Abdominal Stomas and their Skin Disorders

An Atlas of Diagnosis and Management

Second Edition

Edited by

Calum C Lyon
Amanda Smith

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and Their Skin Disorders

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Orders in the rest of the world

This book is dedicated to the memory of George Taylor (1996–2009)
whose short life reminds us how much there is still to learn.

Contents

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Foreword

Patients with long-term conditions sometimes experience problems long after they have been discharged from secondary care. For people with stomas, problems can occur with peristomal skin disorders.

Since its first publication in 2001, when it was highly commended in the BMA Surgery Section book awards, *Abdominal Stomas and Their Skin Disorders* has proved to be a very valuable resource to healthcare professionals working in the field of stoma care. This publication has been an important reference source for understanding, diagnosing, and treating patients with stoma-related skin disorders, and the authors are to be congratulated for sharing their wide-ranging and in-depth experience of the difficult skin problems associated with the area around the stoma. Dr. Calum C Lyon and Amanda J Smith have gained recognition by winning awards for their work in the peristomal skin area.

The Ileostomy and Internal Pouch Support Group (IA) is proud to have been involved in the provision of funding and resources for the work in this publication. IA is a national support network for people with ileostomies or internal pouches. Established in 1956 as the Ileostomy Association by a group of people with ileostomies and some members of the medical profession, IA now has 54 local member organizations and a postal group in the United Kingdom and Ireland, managed by volunteers, most of whom have an ileostomy or internal pouch.

With thanks to the authors, to Dansac Limited, and all those involved in this new edition of *Abdominal Stomas and Their Skin Disorders*.

IA®

The ileostomy & internal pouch
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Anne Demick
National secretary, IA

▎Acknowledgements

▋ Introduction

Perfect peristomal skin is the aim of the stoma patient and the professionals who attend them (Fig. 1). Unfortunately, however, peristomal dermatoses are a significant problem, affecting more than one-third of colostomy patients and more than two-thirds of urostomy and ileostomy patients [1,2]. Stoma patients may present to stoma-care nurses, gastroenterologists, surgeons, and general practitioners as well as to dermatologists when a skin problem occurs.

Since 1997, we have run a combined stoma/dermatology clinic initially weekly but now monthly, both at Salford Royal Hospital and York Hospital. These are staffed by a dermatologist, stoma-care nurses, and a trainee dermatologist who assess and treat skin problems affecting stomas (peristomal skin problems). A total of 865 new patients have been seen ranging in age from 18 months to 89 years, with approximately equal male to female ratio.

The clinics have allowed the introduction of some novel approaches to treatment and development of those suggested by other practitioners and even the patients themselves (see appendix 4). There has been a notable change in the skin problems presenting in clinic (Fig. 2). There are proportionally fewer cases now of simple fecal/urine irritation, particularly that caused by the patient wearing an inappropriate stoma appliance as we are more aware of how to avoid this and place more emphasis on patient education. Since 2005, there have been fewer cases of pyoderma gangrenosum referred, while on the other hand we have identified more cases of nicorandil ulceration and lichen sclerosus (see chaps. 5 and 6). We provide advice via telephone and increasingly by email so that some patients do not need to come to clinic and, in a proportion, the skin problem has cleared by the time they come to clinic.

Figure 1   Perfect peristomal skin.
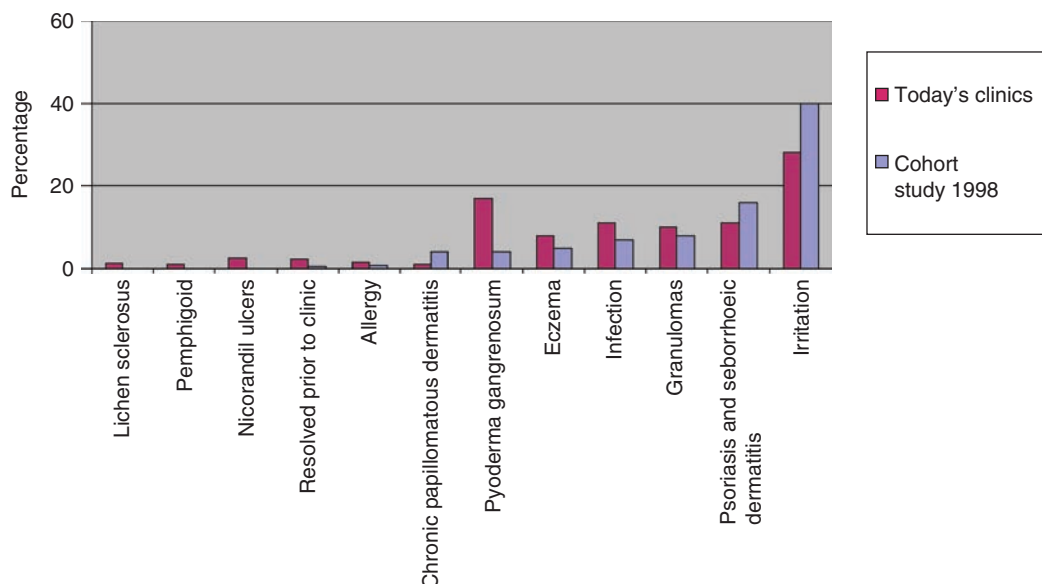
Figure 2   Diagnoses seen in clinic.

This second edition has been revised and updated, and we have sought to include contributions from other authors and centers in order to broaden the perspective and areas of expertise. Treatment sections are updated to reflect the significant improvement in some areas, especially therapy for inflammatory bowel disease. There are entirely new sections on children with stomas (chap. 8) and on inflammatory bowel disease (chap. 7).

It is not intended as a comprehensive textbook of either dermatology or stoma-care, and readers are directed for further reading to the bibliography at the end of the book. We are aware that for the Salford Clinic in particular many of the cases that are seen represent the more complex end of the spectrum, and we have aimed to ensure that this text reflects the whole spectrum of skin disorders not just the rare and interesting (Fig. 2). Prominence is, therefore, given to the more common diagnoses, emerging conditions such as nicorandil ulcers, and to rarities that might easily be missed by those who have not managed a case before (e.g., lichen sclerosus).

Throughout this book, it is important to read the figure legends because some of the important information about each condition presented there may not be included in the main body of the text in order to avoid excessive repetition.

As the book is intended as a resource for any health professional who may be called upon to manage a peristomal dermatosis, there is a glossary of dermatological, surgical, and nursing terms at the back of the book, in appendix 1. The terminology for different parts of a stoma appliance can be confusing and the terms may vary between different countries or even different centers. We have therefore included a diagram to specify the parts of a stoma appliance, including their many synonyms (appendix 2). We have also included appendices covering skin physiology (appendix 3) and the use of topical steroids on peristomal skin (appendix 4). Finally, to enhance the effectiveness of this atlas as an aid to diagnosis, there is a diagnostic flow-chart (appendix 5) to guide the reader to the appropriate chapter.

Developments for the future include the introduction of training for stoma nurses to perform minor surgical treatments, for example, for granulomas, and we continue to trial new therapies.

A commonly used preparation triamconolone acetonide 0.1% in carmellose sodium paste (Adcortyl in Orabase) has been discontinued by the manufacturers so that we are currently having to have potent steroid formulated in carmellose sodium paste by manufacturing pharmacies.

ABBREVIATIONS COMMONLY USED IN THIS BOOK

ACD	allergic contact dermatitis
ACE	antegrade colonic enema
CD	Crohn's disease
IBD	inflammatory bowel disease
ICD	irritant contact dermatitis
PEG	percutaneous endoscopic gastrostomy
PG/PPG	(peristomal) pyoderma gangrenosum
UC	ulcerative colitis

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An Historical Note

Amanda J. Smith

Ostomy surgery is not a new concept. In the first century BC, Celsus (1) observed that penetration of the small bowel after an abdominal wound left "nothing to be done"; however, the large bowel could be sutured and healing with a fistula would take place. Heister (2,3) attempted to fix an injured gut to the abdominal wall, as feces were expelled through the opening and not via the anus.

Littre (4) performed a postmortem examination on a baby who was noted to have an imperforate anus; he presumed it would be possible to bring the upper portion of the bowel to the abdominal wall to create an anus. The first patient to have a surgically performed colostomy fashioned was Margaret White in 1756; her surgeon, William Cheselden, performed a transverse colostomy for a strangulated hernia. Margaret had surgery at the age of 73 and lived for many years afterwards (5).

Success for surgeons forming colostomies came in the middle of the 19th to the early 20th century. George Freer performed the first elective surgery in the United Kingdom in 1815 on a baby who unfortunately died after three weeks, following a loop colostomy. Approximately 50 years later, Allingham (6) constructed a loop colostomy held in place by a rod. A similar procedure is still undertaken today.

Ileostomy surgery developed much later than colostomy surgery, as many surgeons were skeptical about repairing diseased or damaged small bowel. If a surgical procedure was performed, the ileostomy was often a temporary measure and gut was reconnected. Unfortunately, certain diseases returned or even underwent malignant change.

Surgical options for certain disease required removal of the whole colon and formation of an end permanent ileostomy. Patients endured long operations, often in four stages, until 1943 when Miller and colleagues (7) performed a one-stage procedure of panproctocolectomy with an ileostomy. This was not spouted, so that patients suffered stenosis and skin problems as a result of effluent on the peristomal skin. The gold standard is the spouted ileostomy described in 1952 by Sir Bryan Brooke (8). Even today, the ileum is sutured to the abdominal wall surface and is everted back upon itself. The ileostomy is easier for the patient to manage as the spout fits into the aperture of the appliance (see Figs. 2.1 and 2.2, p. 25), thus reducing fecal effluent onto the peristomal skin.

In 1969, Kock (9) developed a technique of creating an internal pouch from the terminal ileum to act as a reservoir for feces. The pouch is intubated and emptied with a catheter via a nipple valve (10). The most recent advance has been the ileoanal pouch developed by Sir Alan Parkes in 1978. The ileum is fashioned into a "J" or "W" shape, opened and formed into a pouch. The tip of the pouch is anastomosed to the anus and, as the anal sphincters are intact, the patients' continence is restored (11) (see chap. 2 for more information).

Several attempts were made from the late 1800s to the 1930s to develop surgical techniques for urinary diversion, but in the 1958 Bricker devised and perfected his ileal conduit. Urine passes from the ureters into an isolated section of ileum, one end of which is brought out to the surface of the abdomen, and a stoma is formed. However, in the Wallace technique the ureters are anastomosed to one another at the end of the ileal segment (12).

Paul Mitrofanoff (1980) developed reconstruction surgery involving the urinary tract with the innovation of a continent urinary pouch. This involves construction of a reservoir from existing bladder or bowel or from both. The reservoir is then drained through a piece of appendix, vas deferens, or ileum and constructed into a flush stoma, which acts as port for a catheter (see Fig. 2.5, p. 26) (13).

Continent fecal stomas (14) (see Fig. 1.6) are used when the appendix or small segment of bowel is used to make a channel from right iliac fossa abdominal wall into the cecum. This facilitates insertion of a catheter or antegrade colonic enema (ACE) button (see Fig. 2.6) into the colon to perform washout with irrigation fluid, therefore, fecal effluent exits via the anus.

As medical and surgical techniques continue to advance, patients who would not have survived major surgery are now considered for laparoscopic surgery, which aims for faster recovery, minimal surgical trauma, less postoperative pain, lower postoperative complication rates, and shorter hospital stay. Often, laparoscopic surgery is combined with multimodal approach of enhanced recovery (15).

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1 | Intestinal and Urological Stomas: Surgical Aspects

Alka Jadav, Noel W. Clarke, Sanjai K. Addla, and Gordon L. Carlson

Approximately 20,800 people undergo stoma formation every year in England (1). The current number of people with stomas in the United Kingdom is not known precisely, but almost 30 years ago 120,000 people had a stoma. With the advent of new surgical techniques and earlier diagnosis, these figures have fallen to approximately 100,000. While the number of patients with temporary stomas has tripled over the last decade, up to 50% of stomas may never be reversed (2). Creation of a stoma is often but a small part at the end of an extensive operative procedure. It is, however, a part of the operation that the patient will have to deal with on a daily basis and deserves the surgeon's full attention. A poorly functioning stoma is, at best, a daily inconvenience for the patient and, at worst, a source of major morbidity. The aim of this chapter is to discuss the classification, techniques, and complications associated with creating intestinal and urological stomas.

DEFINITION

A stoma is a surgically created opening between the alimentary or urinary tract and body surface. The term "stoma" refers to the actual portion of bowel or urinary tract that comes to the surface and is derived from the Greek word meaning mouth or opening.

ANATOMICAL CLASSIFICATION OF STOMAS

Intestinal stomas can be created using small or large bowel and can either be end or loop stomas. However, intestinal conduits for urinary diversion are always end stomas.

End Stomas
End stomas are the simplest to create. The divided bowel is brought through the abdominal wall and sutured to the skin.

Loop Stomas
A mobile loop of either small or large bowel is brought to the abdominal wall and its margins are sutured to the skin once the bowel has been opened (but not completely divided). Loop stomas are usually intended to be temporary.

Double-Barreled Stomas
A double-barreled stoma resembles a loop stoma, but the bowel has been divided first, usually because the intervening segment has been resected. The two separate remaining segments of bowel are then brought out through a single opening in the abdominal wall. The advantage of creating a double-barreled stoma is that it facilitates later reanastomosis of the bowel, without having to perform a laparotomy.

Mucus Fistula
A mucus fistula is a defunctioned segment of bowel, either small or large bowel, brought out onto the abdominal wall as a nonfunctioning stoma. It is usually created after emergency

subtotal colectomy or segmental resection and end ileostomy (because of concerns that the closed distal end of bowel might break down if left inside the abdomen). The mucus fistula may be exteriorized at a separate site to an end stoma or sutured to the proximal stoma and exteriorized through the same opening on the abdominal wall (double-barreled stoma).

Intestinal Conduit Urinary Diversion

These comprise ileal, jejunal, and colonic conduits and are always end stomas.

FUNCTIONAL CLASSIFICATION OF STOMAS

Stomas can also be classified by their functional role.

Input Stomas

These allow nutrients, fluids or, sometimes, drugs to be infused into the gut (e.g., gastrostomy, jejunostomy, and appendicostomy).

Diverting Stomas

These divert the contents of the gastrointestinal tract away from diseased gut or distal anastomoses (e.g., loop ileostomy and loop colostomy).

Output Stomas

These provide an outlet for the elimination of body waste (e.g., end ileostomy, end colostomy, and urostomy).

INDICATIONS

End Stomas
End Ileostomy

This is usually a permanent stoma made at the completion of abdominal colectomy or proctocolectomy for the following conditions:

1. Inflammatory bowel disease (Crohn's disease or ulcerative colitis).
2. Multiple "sea" of sessile polyps in the colon that will make future attempts at polyp control difficult (including familial adenomatous polyposis).
3. Multiple synchronous large bowel cancers.
4. Colonic motility disorders (e.g., intractable constipation).
5. In critically ill patients undergoing ileal or ileocolonic resection, where primary ileocolic anastomosis is not advisable because of concerns regarding the risk of anastomotic leakage. Under these circumstances, the colon may be closed off and left within the abdomen, as an alternative to a double-barreled ileocolostomy. The stomas can then be reversed at a later date, once the patient has fully recovered.

End Colostomy
Permanent End Colostomy
Indications

1. *Malignancy*: For example, in the treatment of a rectal cancer that is too low or too bulky for restorative resection. In advanced low rectal neoplasms, particularly those that are fixed and which have been treated initially by radiotherapy, abdominoperineal resection and end-colostomy formation are indicated. In frail elderly patients with rectal cancer, the risk

of anastomosis may not be justified and end colostomy may be preferable. In such cases, the rectum is stapled off and left in the pelvis (Hartmann's procedure).
2. Anorectal agenesis.
3. Severe fecal incontinence or pelvic floor disorders (e.g., anismus).
4. Severe anorectal Crohn's disease, where proctectomy may be required.

Temporary end colostomy
Indications

1. Fecal peritonitis, for example, in perforated colonic cancer or perforated diverticular disease of the colon, a Hartmann's procedure may be performed.
2. Trauma: temporary end colostomy may be appropriate for some penetrating colonic injuries.
3. Imperforate anus or Hirschsprung's disease with incontinence in an infant, pending later reconstructive surgery.

Loop Stomas
Loop Ileostomy
A loop ileostomy is designed to be a temporary stoma and has become popular as a means of the following:

1. Protecting an anastomosis at high risk of leakage or where the consequences of leakage would be particularly difficult to manage, for example, after low anterior resection, ileo-rectal anastomosis, and ileal pouch-anal anastomosis (in ulcerative colitis and familial polyposis).
2. Diversion of enteric contents from a distal enteric fistula or complex abdominal sepsis.
3. Decompression of distal ileum and colon.
4. As a definitive therapy for megacolon (3).

Loop Colostomy
A loop colostomy may be temporary or permanent.

Indications
1. Large bowel obstruction, mostly due to carcinoma, that is irresectable or if the patients have major comorbidities precluding major colonic resection.
2. As a temporary means of diversion for anorectal fistula, repair of sphincter injuries, and severe anal sepsis.
3. Imperforate anus.
4. Fecal incontinence in elderly patients.

TECHNIQUE

Preoperative Counseling
The possibility of a stoma should be discussed with patients undergoing elective or emergency colorectal surgery, and a stoma nurse should be involved as early as possible. The necessity of the stoma, its site, appearance, and function of the stoma should be explained. A general discussion about the appliance and changing frequency is important. The effect of the stoma on clothing, sexual relations, sports, activities, and work should also be discussed, as well as information about stoma care services (see chap. 2). Risks of common or major complications of stoma formation (see section "Complications of Stomas") should be discussed. It is particularly

important that patients and, where appropriate, their carers understand that a "temporary" stoma implies that a stoma is *intended* to be temporary and is not a guarantee of the reversibility of the stoma in all circumstances.

Marking the Proposed Stoma Site (See also chap. 2)

Siting the stoma is one of the most important points to be considered in both elective and emergency surgery. The optimum site will depend on the type of stoma, previous incisions, scars, the patient's build, and clothing habits. Figure 1.1 highlights the commonly used sites for different stomas.

The optimum stoma site must be accessible, visible, and comfortable to the patient. The stoma site should be marked with the patient in sitting position when any crease or fold of skin will be more prominent. The position is then rechecked with the patient in supine and standing positions. A stoma site should fulfill the following criteria:

- It should be at least 5 cm away from the planned incision line, in the middle of or at least within the surface markings of the rectus abdominis muscle, that is, it should traverse the rectus abdominis in order to reduce the risk of prolapse, hernia, and stoma retraction, as well as to improve adherence of the appliance to the skin.
- The stoma site should be away from creases, scars, the umbilicus, and bony prominences (e.g., iliac crest and costal margin).

The proposed stoma site should be tested preoperatively, first by applying an empty bag and then, if apparently satisfactory, the site should be tested when the appliance is full of water and with the patient fully clothed.
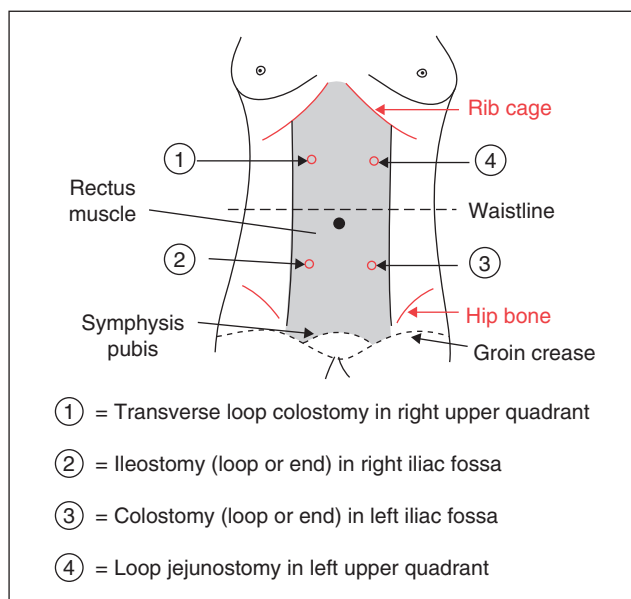
Figure 1.1   Typical stoma sites and types.

General Considerations

A stoma can be created in the following ways.

Through a Trephine

A trephine is a cylindrical-shaped core of the skin and subcutaneous fat that is removed from the premarked stoma site, through which the stoma is brought to the skin surface. It should be straight and wide enough to prevent bowel compression (two to three fingers in width; NB: not adult fingers for a child's stoma). In removing skin and subcutaneous tissue to form the trephine, the excessive excision of fat should be avoided in order to minimize the chance of dead space around the stoma with its attendant risks of parastomal seromas and abscess formation. After muscle is exposed, a cruciate incision is made in the anterior rectus sheath, splitting the rectus abdominis muscle. Then the posterior rectus sheath is divided using diathermy, making a cruciate incision in order to minimize bowel compression. During this, care is taken to avoid the inferior epigastric vessels that can cause bothersome bleeding during construction of the stoma. The bowel is then delivered through the trephine opening.

As a Part of a Formal Laparotomy

It is sometimes necessary to perform an emergency laparotomy to remove a diseased segment of bowel (e.g., perforated or obstructed colon), prior to creating a stoma. A trephine is created in the abdominal wall (see section "Through a Trephine") and the bowel is delivered to the surface. After closure of the laparotomy and dressing of the wound, the bowel is opened and the stoma is created. It is very important that the laparotomy wound is dressed prior to creation of the stoma and application of the stoma appliance, as if done the other way round, if the appliance was to leak after surgery, the wound would be contaminated with fecal material, predisposing to postoperative wound infection.

Laparoscopically Assisted Stomas

The advantages of laparoscopic surgery include early recovery, reduced hospital stay, reduced postoperative intra-abdominal adhesions, and avoidance of large, painful incisions. Laparoscopic stomas have advantages over trephine stomas as they may permit an adequate inspection of the peritoneal cavity, detection and assessment of concurrent pathology, division of adhesions and, most importantly, accurate orientation of proximal and distal ends of the bowel. Depending on the experience of the surgeon, laparoscopically assisted stomas can be attempted in the majority of patients. Contraindications to this are patient with diffuse fecal peritonitis, bowel obstruction, and enterocutaneous fistulas. Previous laparotomies are no longer a contraindication; however, the procedure may take longer to perform, with a higher risk of conversion to open.

End Ileostomy (Brooke Ileostomy)

Prior to the development, by Bryan Brooke, of the spouted ileostomy, life for many ileostomates was uncomfortable and undignified because of repeated leakage of ileostomy effluent onto the peristomal skin. Flush ileostomy led to repeated and often uncontrollable leakage of liquid ileostomy effluent onto the peristomal skin. Since ileostomy effluent is alkaline, contains activated digestive enzymes, it is discharged continuously and excoriates as well as digests the skin; the deceptively simple (and therefore brilliant) modification allowing eversion of the ileostomy to create a spout and thus ensure that effluent could be discharged away from the skin surface has made life tolerable for tens of thousands of people.

A 5 to 10 cm length of healthy ileum with good blood supply is used to construct the stoma. In general, the ileum should be divided as close to the ileocecal valve as possible—usually 2 cm in the case of ulcerative colitis, but in Crohn's disease this will depend on the degree of the Crohn's involvement of the distal ileum. Proper visualization of the mesenteric blood vessel arcade is required to ensure adequate blood supply to the terminal ileum. The ileum is then divided between two clamps or by using a cutter stapler to avoid spillage of the bowel contents.

After completion of the primary surgical procedure, the stoma trephine is made and the terminal ileal end is pulled through it. In order to form a good spout, a 5 to 10 cm length of ileum is drawn through, which after eversion should give a spout of 3 to 5 cm. The stoma is everted by
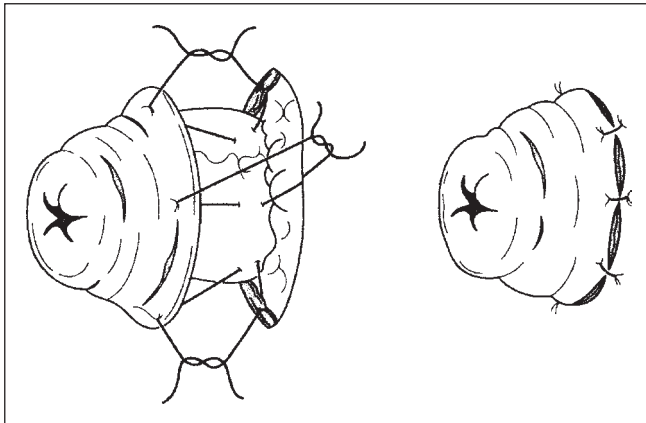
Figure 1.2 Formation of an end ileostomy, showing the placement of sutures to evert the stoma and form the spout.
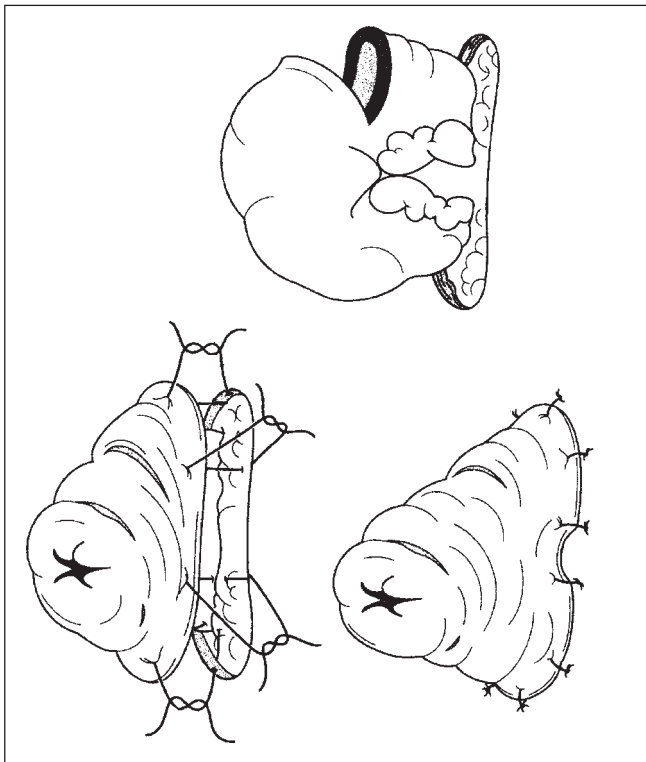
Figure 1.3 Construction of a loop ileostomy, showing how the sutures and incision are placed to form the spout.

taking a series (six to eight) of absorbable sutures between skin, serosa 3 cm from the stoma edge and the full thickness at the mucosal edge of the stoma (Fig. 1.2). When these sutures are tightened, the stoma should be everted, resulting in a spout approximately 2 to 3 cm in length. Care should be taken not to suture small bowel mesentery.

Loop Ileostomy

The ileal loop is delivered through the trephine by placing a soft rubber tube under the mesenteric border of the loop. It is then constructed in a similar way to the end ileostomy, after closure and coverage of the laparotomy wound. A transverse enterotomy is performed at the antimesenteric border of the ileum, close to the skin and the distal end is sutured to the skin before eversion of the proximal end (Fig. 1.3). Eversion and suturing of the
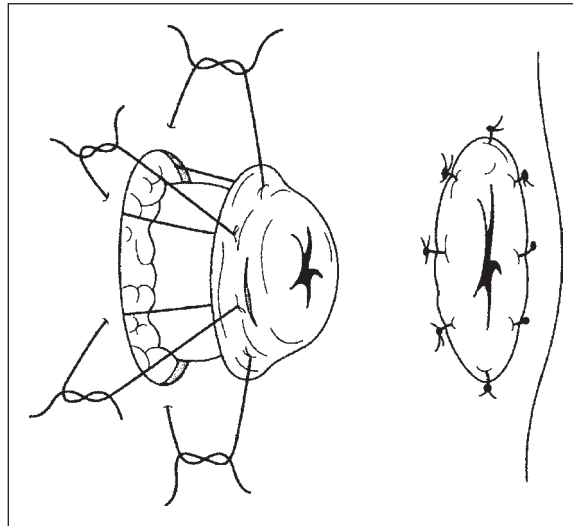
Figure 1.4   End colostomy, showing placement of sutures.

ileostomy is done in the same way as in the end ileostomy, creating a spout 2 to 3 cm above the skin surface.

Colostomy
The ascending and descending colon are retroperitoneal and tethered to the posterior abdominal wall, which means that they will require mobilization if they are to be brought out as an end or loop colostomy. However, the transverse and sigmoid colon have a mesentery which makes them quite mobile, making mobilization less likely.

End Colostomy
After delivering the colon through the stoma opening, the colon is opened and a series of absorbable sutures are taken between the skin and the full thickness of the colonic end (Fig. 1.4). The stoma appliance is then fitted.

Formation of an end colostomy through a trephine without a laparotomy is commonly performed for end sigmoid colostomy. After performing the trephine in the usual manner in the left iliac fossa, the sigmoid loop is brought out. The distal end of the loop is identified by either insufflating air into a Foley catheter inserted in the rectum or by using the flexible sigmoidoscope to insufflate air or shine the light, which will identify the distal end of the loop. Using the surgical linear cutter stapler, the distal end of the sigmoid loop is closed and then returned to the peritoneal cavity. The proximal end is constructed as an end colostomy, as described above. By doing this laparoscopically, visualization of the intestinal loop as it is brought through the stoma site helps ensure appropriate orientation of the mesentery and bowel, thereby obviating the need for endoscopic assistance.

Loop Colostomy
A plastic bridge is usually placed underneath the colostomy to prevent early retraction of the stoma (Fig. 1.5).

Transverse incisions can also be used to create loop stomas. With a *loop transverse colostomy*, a 5 cm transverse incision is made in the right upper quadrant, then the rectus sheath is divided in the direction of the incision and the peritoneum is divided. A segment of transverse colon is identified by its taeniae and brought to the surface with the aid of a soft rubber sling passed through the mesentery, as described above. An incision long enough to evert the bowel wall circumferentially is made longitudinally in the taenia coli and the edges are sutured to the skin, as described before.
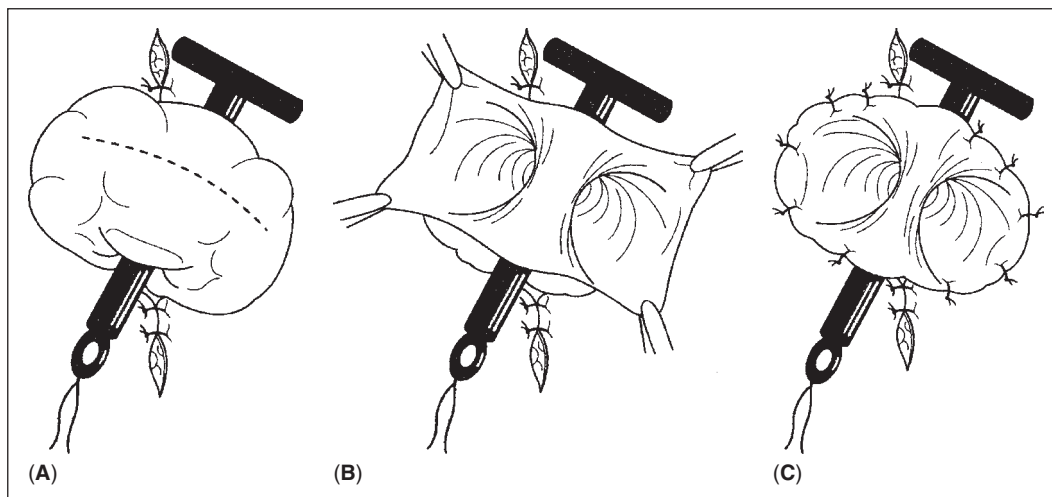
Figure 1.5 Loop transverse colostomy: the loop of bowel is (**A**) supported over a rod then incised, and (**B**) opened. The mucosal edge is fixed to the skin with full-thickness bowel sutures (**C**).

Figure 1.6   Antegrade continence enema (ACE) "button" in appendicostomy.

For a *Loop sigmoid colostomy*, an oblique 5 cm skin incision is made in the left iliac fossa and a loop of the sigmoid colon is brought to the surface and fashioned, as described in case of loop transverse colostomy. It is usually important to distinguish the sigmoid and transverse colons from each other, and the presence of appendices epiploicae (attached to the sigmoid colon) and the greater omentum (attached to the transverse colon) are very useful in this regard.

Less Common Stomas

Appendicostomy
Bringing the appendix to the abdominal wall creates a tiny and unobtrusive stoma that can be dressed with a pad and intubated intermittently. An appendicostomy is usually created to administer antegrade colonic enemas (Fig. 1.6) in patients with slow-transit constipation. The appendix is mobilized, maintaining its blood supply and exteriorized via the umbilicus or right iliac fossa, in the same way as a colostomy. This is usually undertaken initially with an indwelling catheter inserted into the stoma to reduce the risk of stenosis at the skin surface. The stoma is then intermittently catheterized to irrigate the colon.

Cecostomy
Inserting a tube into the cecum through an incision in the right iliac fossa was historically advocated to protect left sided colonic anastomoses or as a treatment for large bowel obstruction,

cecal perforation, or cecal volvulus. This technique is now rarely used because it is associated with a high complication rate. Occasionally, when the appendix is absent as result of previous surgery, a tubularized graft of the cecum is created and employed in the same manner as an appendicostomy.

Kock "Continent" Ileostomy

Most patients cope with a well-constructed end ileostomy, but an appliance must be worn at all times. Kock devised a continent ileostomy in which an ileal reservoir is created with a nipple valve that can be catheterized intermittently by the patient and drained, thus obviating the need for the patient to wear a stoma appliance. Since the stoma does not work continuously, a spout is not needed, making it much less obtrusive. However, the Kock pouch is time consuming and difficult to create, and the nipple-valve mechanism fails in up to 40% of patients, leading to persistent leakage of ileostomy effluent onto the skin. The continent ileostomy is now very rarely constructed and has largely been replaced by the ileoanal pouch.

UROLOGICAL STOMAS

Definition

An opening on the skin through which urine is diverted to and from the normal urinary tract. The urinary diversion can be continent or incontinent, depending on the type of diversion and the surgical technique.

Classification

The organ from which the urostomy is fashioned determines this (Table 1.1).

Indications

The commonest indication for urinary diversion is obstruction to the ureters, generally caused by a benign etiology like a calculi, necessitating a temporary nephrostomy. Operations that require a cystectomy to treat cancer also need diversion of urine, generally in the form of ileal conduit. Rarely, urinary diversion is undertaken to address congenital malformations or to treat significant urinary incontinence.

Location

Location is dictated by the type of urostomy, that is, the organ utilized to divert the urinary stream. Nephrostomies are positioned in the flank, urethrostomies in the midline in the perineum, and an ileal urostomy is usually positioned in the right iliac fossa.

The most common permanent urostomy is that formed in conjunction with an ileal loop conduit diversion following cystectomy, and subsequent discussion is based on this variety of urostomy.

It is important that siting of the stoma be carried out preoperatively, together with a stoma care specialist. An appliance is required and the location will reflect the mobility of the conduit (small bowel), the patient's general habitus, dexterity, and abdominal geography and is thus highly individual.

One must take into account the degree of abdominal girth, skin folds, scarring, protuberances (e.g., lipomata), and belt lines, all of which should be noted and avoided.

Table 1.1   Classification of Stoma According to the Organ

Organ	Stoma
Kidney	Nephrostomy
Ureter	Ureterostomy
Bladder	Cystostomy
Urethra	Urethrostomy
Ileum	Ileal urostomy (Ileal conduit)

The patient should be examined in the sitting, standing, and supine positions to ensure the most comfortable fit of the appliance, which should be worn by the patient prior to deciding the definitive site. Several sites may be marked preoperatively as the actual mobility of the bowel segment may favor one particular site over another.

Technique

All patients undergoing urinary diversion with formation of a urostomy receive preoperative preparation that is both mechanical [e.g., bowel preparation with sodium picosulfate (Picolax™) and clear fluids] and antibacterial (cefuroxime and metronidazole given at induction of anesthesia) to reduce postoperative wound infection and, possibly, wound dehiscence.

Having isolated the segment of ileum to be utilized based on the visible segmental arterial blood supply and taking care to avoid the terminal ileum, soft noncrushing clamps are applied to the small bowel, distal and proximal to the lines of resection. The wound is then draped with large swabs soaked in povidone–iodine solution. A segment of ileum, approximately 20 cm long, proximal to the terminal 20 cm of ileum is isolated on a mesenteric pedicle. Following isolation, the ileal segment is wrapped in a loose swab and placed caudal to the remaining small bowel. The free small bowel ends are then anastomosed together with a 3/0 Monocryl™ interrupted seromuscular suture.

The conduit is washed out with saline until the emerging fluid is clear. The ureters are spatulated and joined to one another on the medial borders using a continuous 4/0 polydioxanone suture. The proximal end of the isolated bowel is sutured onto the ureteric plate using continuous 4/0 polydioxanone suture. The ureteroileal anastomosis is performed over stents that are placed up into the kidney and are brought out through the conduit onto the skin to protect the anastomosis and to allow healing.

The region of the skin marked for the urostomy is then picked up and a circular hole is fashioned with cutting diathermy onto the anterior rectus sheath. A cruciate incision is made on the anterior rectus sheath followed by splitting of the rectus muscles and incising of posterior rectus sheath into the peritoneal cavity. The hole is dilated to allow two fingers. A Babcock™ clamp is fed through the hole and applied to the distal end of the conduit, which is then brought out through the skin. During this maneuver, it is important to ensure that the mesentery on which the conduit and stoma depend for their blood supply maintains its correct orientation, that is, pointing to the patients left shoulder. The conduit is fixed at the level of the anterior rectus sheath to the four corners of the cruciate incision using 2/0 Vicryl™ sutures.

The stoma of choice for an ileal urostomy is the nipple stoma, first described by Brooke in 1953. This is formed using absorbable, interrupted sutures between the skin and bowel, which is everted to create a nipple spout after having first anchored the stoma to the underlying fascia.

Throughout the procedure, one must adhere to basic surgical principles of good practice and ensure that all anastomoses are tension-free and have a good blood supply. The operative field must be sterile and tissue disruption should be kept to a minimum. At the end of the operation, the stoma will be protruding with a spout of 2 to 3 cm, with the two ureteric stents in place.

Each end of the urinary stents is cut in a particular way for easy identification in case one has to be removed early or leakage at the ureteroileal anastomosis is suspected, requiring a stentogram. The left stent is cut oblique and the right stent is cut straight, that is, at a right angle.

COMPLICATIONS OF STOMAS

Factors that influence the development and incidence of stoma-related complications are as follows:

1. *Stoma height*: The long established theory that a colostomy should be flush at the time of fashioning is misleading. Most stoma care nurses agree that a minor degree of eversion is necessary to direct the effluent into the pouch. It is recognized, but not proven, that an ileostomy should be 2 to 3 cm in length at the time of fashioning. One recent study showed that if a stoma, be it an ileostomy or a colostomy, is less than 10 mm in height within 48 hours of surgery, it has a 35% probability of being problematic. As the height of the stoma increases, the probability that it will be problematic decreases (4). During the first four to six weeks

of the postoperative period, as the edema of the stoma decreases, the stoma shrinks in circumference by approximately one-third.

2. *Stoma type*: On the whole, complication rates for ileostomies are slightly higher than for colostomies. Long-term complications have been reported in up to 58% of colostomies (5) and up to 78% of ileostomies (6). The incidence of complications after urostomy is similar to ileostomy. Certain complications are more commonly associated with certain stoma types and will be discussed later on.

3. *Body mass index of the patient*: Obesity may increase the risk of stoma-related complications. These are generally attributable to mechanical problems, especially difficulty obtaining sufficient length of vascularized intestine to pass through the obese abdominal wall without compromised vascularity or excessive tension, which may lead to retraction, stenosis, or even frank infarction of the stoma.

4. *Age*: The incidence of complications is higher in children compared with adults, and there is evidence of a decrease in incidence of problematic stomas with age (4).

5. *Underlying diagnosis*: The incidence of complications is higher in stomas following radiotherapy or for Crohn's disease than for ulcerative colitis. Patients with poor cardiorespiratory function are also more likely to have problematic stomas, and optimizing the perioperative health status of the patient may reduce morbidity, particularly in the elderly (7).

6. *Emergency surgery*: Stomas created during emergency surgery are more likely to result in postoperative complications. Although this may be partly the result of more difficult surgery undertaken under less favorable conditions, inability to site the stoma adequately undoubtedly plays a role. Preoperative consultation of the patient with a stoma nurse with marking of the skin site and patient education reduces adverse outcome (8). Surgeons with specialist colorectal training have been shown to generate fewer stoma-related complications than "general surgeons" (7).

Early Complications of Stomas
Ischemia

This is an early complication occurring in approximately 2% to 3% of stomas. It is more common in colostomies than ileostomies, particularly if the left colic artery is ligated. The usual cause is inadequate colonic mobilization, leading to excessive tension on the stoma. Other causes of ischemia are mesenteric hematoma, inadvertent ligation of stomal blood supply or an excessively tight stoma trephine causing vascular embarrassment. Excessive use of inotropes in the postoperative period may also contribute to ischemia by causing impaired mesenteric perfusion. At its mildest, venous congestion may result in a dusky and edematous stoma (Fig. 1.7) within the first 24 to 48 hours postoperatively. If left to progress, necrosis will develop and the stoma will disintegrate and slough. Minor degrees of ischemia may lead to superficial mucosal

Figure 1.7   An edematous stoma soon after surgery. The edema has resulted in dusky, ischemic mucosa. This mild ischemia settles spontaneously.

sloughing at the mucocutaneous junction. This is common and rarely requires treatment. More extensive ischemia may lead to chronic stricturing or even acute full thickness infarction, resulting in severe abdominal wall or even intra-abdominal infection.

Management

It is important to differentiate between local ischemia of the stoma and a hypoperfusion of the stoma as part of wider hemodynamic instability after major surgery in septic or hypovolemic patients and to manage systemic illness appropriately.

Local ischemia can usually be treated conservatively if the general condition of the patient is satisfactory and there is no evidence of ischemia extending deep to the rectus muscles and/or signs of intra-abdominal or spreading abdominal wall infection. The extent of ischemia can be assessed endoscopically or by using a clear proctoscope and pen torch. If the ischemia extends deep to the rectus muscle, urgent surgical revision is necessary. If the patients' general condition deteriorates with frank evidence of ischemia, laparotomy with refashioning of the stoma should be considered. Careful reassessment of the trephine may reveal it to be too tight and this can usually be easily rectified.

Sepsis

Acute infection at the mucocutaneous junction of the stoma might be anticipated in almost all cases but is, in fact, surprisingly unusual. It almost always responds to simple drainage and removal of one or two sutures. Antibiotics are almost never indicated in the absence of spreading cellulitis. It is more common in colostomy, Crohn's disease, and after emergency surgery. It may be caused by ischemia of the stoma or repeated trauma from a rod (bridge) inserted under the loop stoma. Ischemia may lead in turn to sepsis as a result of retraction of the stoma with subsequent fecal contamination within the abdominal wall or peritoneal cavity. Abdominal wall infections, particularly in obese, immunocompromised, and diabetic patients, may result in synergistic gangrene (Fig. 1.8) (see chap. 4).

Management

Secondary peritonitis mandates urgent laparotomy, resection of nonviable bowel, mobilization of the bowel, and fashioning a well-vascularized tension-free stoma. In case of fasciitis, early laparotomy, resection of nonviable bowel and debridement of the abdominal wall, and resiting of a viable stoma should be undertaken.

Figure 1.8 Mucocutaneous separation secondary to perioperative sepsis. This patient went on to develop synergistic gangrene (see chap. 4).

Bleeding

Early bleeding is not an unusual complication and can occur in up to 10% of cases. It is usually self-limiting and due to perioperative trauma. It can result from inadequate local hemostasis or venous congestion due to a tight stoma opening.

Management

If the bleeding is minor and from the mucosa, observation is all that is required as it usually stops spontaneously. On the other hand, if the bleeding is excessive, local exploration of the stoma is mandatory with suture ligation of the bleeding vessel.

Prolonged Ileus (Failure of Normal Bowel Peristalsis)

Prolonged postoperative ileus can be caused by intraperitoneal or retroperitoneal hemorrhage, sepsis, bowel ischemia, electrolyte imbalance, regional anesthesia, or concurrent medication.

The patient will look and feel unwell, with painless abdominal distension and either vomiting or high nasogastric aspirate. This may lead to dehydration, oliguria, hyponatremia, and hyperkalemia. The stoma will produce little or no effluent for the duration of the ileus but will look macroscopically normal.

Management

Nasogastric decompression, fluid replacement, and correction of electrolyte imbalance should be undertaken. Consider reinstitution of steroids if the patient was on steroid therapy within a month of the operation.

Radiological investigations in the form of oral contrast studies or abdominal Computed tomography scan with oral contrast may be required to exclude a mechanical intestinal obstruction and the presence of intra-abdominal collections.

If the patient does not settle within 7 to 10 days, becomes septic or increasingly unwell, further laparotomy may be indicated.

Urostomy obstruction with ileus is almost unheard of since the adoption as a standard practice of performing anastomosis with ureteric stents in place. Occasionally, decompression of an edematous urostomy with a soft Foley catheter for a period of five to seven days will resolve the obstruction.

Retraction

Retraction occurs when the stoma is drawn or pulled back below the skin level and appears as a concave defect on the abdomen (Fig. 1.9). For ileostomies, retraction may simply appear as a stoma flush with the skin. Retraction is not an uncommon complication, occurring in the early postoperative period or as a late complication. Retraction has been reported to occur in as many as 10% to 24% of all stoma patients (9). Causes include inadequate mobilization of the bowel or a short mesentery, which puts the bowel under undue tension. It may also occur as a result of poor fixation of the bowel or ileal conduit to the skin. Removal of the support bridge in a loop stoma can also result in retraction. Partial retraction so much so that mucocutaneous integrity is disturbed can result in exposure of the subcutaneous tissue to fecal contents with variable results, ranging from mild peristomal cellulitis to the development of abscesses and fistulae within the abdominal wall and even necrotizing infection, as discussed above. Retraction may also lead to the overflow of bowel effluent from proximal to distal limbs in loop stomas, negating their diversionary role with potential complications if a downstream anastomosis is compromised. In the case of urostomies, this results in an increased risk of cutaneous complications such as encrustation, ulceration, and stenosis.

Management

The goal of managing a retracted stoma is to maintain a secure seal between the bag and the skin. Early contact with the stoma nurse is needed for modification in pouching technique such as the addition of support and convexity as well as the use of barrier pastes or wedges to fill in

(A)   (B)
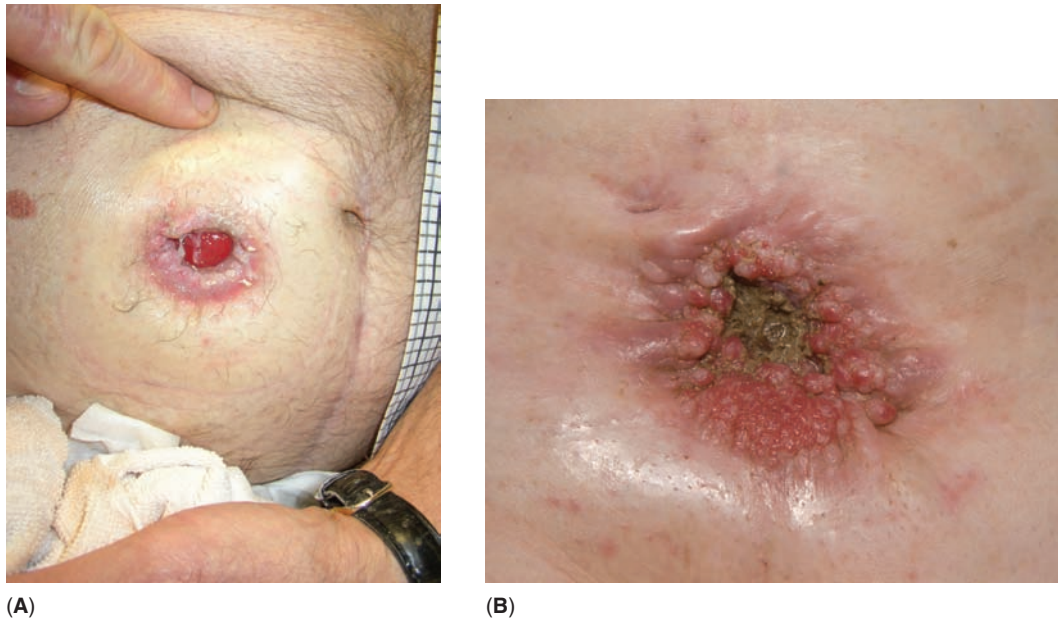
Figure 1.9   (**A**) Retracted urostomy: the patient's postoperative weight gain has compounded the problem by further burying the stoma. (**B**) Retracted ileostomy: this occurred soon after surgery and resulted in avoidable leakage and skin irritation.

small indentations. Surgical revision is considered when a good pouch seal cannot be obtained or when septic complications result.

Detachment of the Mucocutaneous Wound
This complication is dealt with in chapter 2.

Late Complications of Stomas
Skin Excoriation (See chap. 4)
This is a more common problem with ileostomies and urostomies than with colostomies and occurs in up to 30% to 40% of patients (10). Ileostomy efflux is liquid and contains proteolytic enzymes. The contact of the efflux with skin causes irritation, maceration, excoriation, and digestion. For this reason, an ileostomy is constructed as a spout 2 to 3 cm beyond the skin of the abdominal wall so that the effluent can pass directly into the connecting appliance. Secondary infection can occur in the irritated peristomal skin, with immunosuppressed and diabetic patients being more susceptible to fungal infections.

Management
Prevention, by constructing an adequate spout is essential. While good enterostomal therapy, enthusiastic local wound care, and careful attention to provision of a well-fitting appliance may help, refashioning of the stoma will be required if modification of the appliance fails to solve the problem. This can often be done as a local procedure without the need for full laparotomy, depending on the previous surgery.

Prolapse
This not uncommon complication can be found alone or in association with a parastomal hernia. Stomal prolapse occurs in 7% to 11% of stomas (11). Causes include an excessively large fascial opening, excessive mobile length of redundant intra-abdominal bowel, and raised intra-abdominal pressure, such as occurs in intestinal obstruction (Fig. 1.10). Prolapse following

Figure 1.10 Prolapsing ileostomy: when the patient stands the stoma prolapses, increasing in length and girth. This causes leaks as appliances are dislodged. Note the resulting dermatitis.

Figure 1.11 Prolapsed transverse colostomy. These stomas are rarely formed because of the risk of such complications.

colostomy is much more common than after ileostomy. A prolapse is more commonly seen with loop transverse colostomies, especially those done in the presence of distal obstruction. Both the proximal and distal bowel segments can protrude, although prolapse appears to be more common in the distal segment (11) (Fig. 1.10). In minor cases, prolapse is principally a cosmetic problem, but it may cause difficulties with securing a stoma appliance and more extensive prolapse may result in strangulation and obstruction if a large amount of bowel herniates. Chronic prolapse can cause irritation, bleeding, ulceration, and even peristomal necrosis (Fig. 1.11).

Management

Intervention is not necessary if the prolapse is mild and nonprogressive. Manual reduction can be considered in acute prolapse but may be very difficult if the prolapsed bowel is edematous. Reduction may be achieved after the use of an osmotic agent such as salt or sugar applied topically, which aids in reduction of the tissue edema. This is, however, not a definitive treatment (12). Severe and recurrent prolapse with manifestations of ischemia or obstruction require surgical correction. The stoma should be mobilized, redundant bowel excised, and the hernia defect repaired. In some cases, resiting of the stoma is needed with a laparotomy. However, these procedures can lead to considerable morbidity, especially when carried out on frail elderly patients. Local surgical correction of prolapse can be performed safely under sedation or spinal anesthetic using a linear stapling device to amputate and secure the prolapsed stoma at the desired level (13,14). Prolapsing temporary stomas should be closed if possible.

Urostomy

A prolapsing urostomy is prone to trauma and poses problems with appliance attachment. The usual etiology is inadequate fascial fixation and occurs in up to 10% of the cases. Should the stoma become so prolapsed as to cause difficulty with appliance attachment or trauma, any excessive protuberance may be resected and stoma refashioned.

Stenosis

Stenosis, the narrowing of the lumen of the stoma, can occur either at the fascial or cutaneous level, or both. Extreme narrowing may threaten normal stomal function, impairing the output of the effluent. The causes of stenosis are ischemia, peristomal sepsis, retraction, narrow abdominal trephine, or narrowing after repair of parastomal hernia. Excessive scar formation resulting from mucocutaneous separation is also another cause (11). Stenosis is most frequently seen in end colostomies (Fig. 1.12A). If patients with Crohn's disease develop stenosis of their stomas, recrudescent disease should be considered.

If stenosis is at the skin level, narrowing of the stomal lumen or narrowing of the skin around the stoma may be visible. The patient may have narrow or "ribbon-like" stools, pain at the time of stoma emptying, and excessive, explosive, high-pitched gas. The patient with a fecal stoma may complain of constipation followed by a large volume of output. With stenosis at the fascial level, the stoma may be normal in appearance but the patient may present with symptoms of incomplete intestinal obstruction.

Management

Management of stenosis depends on its level of severity. Mild stenosis with minimal signs and symptoms will respond to a low residue diet, stool softeners, and adequate hydration, which will facilitate the movement of soft stool through the bowel lumen. If severe and associated with signs and/or symptoms of obstruction, dilatation may be considered using Hagar's dilators (15). All forms of dilatation are not usually successful in the long term, with a high rate of recurrent stenosis and refashioning of the stoma is generally required. This can be done via a local peristomal procedure or formal laparotomy.

Urostomy

Stenosis is usually a late complication, occurring in 3% of patients (Figs 1.12B and C). The etiology is chronic ischemia and/or poor surgical technique or chronic ileal inflammation resulting from prolonged exposure to alkaline urine. Subsequent keratinization around the stoma (see section "Chronic Papillomatous Dermatitis" in chap. 3) is thought to be the first indication of impending stenosis, which if left untreated, will progress to late stoma obstruction and upper tract deterioration.

Treatment involves initial urine acidification with oral ascorbic acid and periodic dilatation, which may be performed with topical analgesia. Cutaneous soaks with acetic acid may be used, but if this fails, surgery may be required to excise the stenotic segment and fashion a wider stoma. As a last resort, the stoma may have to be relocated to a different site.

(A)

(B)

(C)

Figure 1.12 Stenosed stomas: (**A**) a colostomy formed one year previously for carcinoma. It has become rapidly stenosed with an aperture just 5 mm in diameter. This required prompt surgical revision. Note the encroachment of skin over the mucosa at the nine- and three-o'clock positions. (**B**) This urostomy for spina bifida was formed when the patient was an infant (30 years earlier). It gradually became very small and receding. Inflammation and hyperkeratosis are absent. (**C**) This urostomy formed for spina bifida when the patient was a child shortened over the years and leaks occurred. The resulting inflammation and hyperkeratosis have impinged on the stomal opening. This patient responded to removal of the hyperkeratosis and appliance modifications so that surgery was avoided. The pigmentation is typical of longstanding urostomies and is particularly marked in this darker skinned patient.

Fistula
Paraileostomy fistulas occur in 10% of the patients with ileostomy in the United Kingdom (Fig. 1.13). Fistulas can be due to recrudescent Crohn's disease, chronic sepsis due to the use of nonabsorbable sutures, or even sutures placed too deeply at the fascial level during construction. Fistulas complicating recurrent Crohn's disease are multiple and associated with recurrent infection. The stoma is deformed or stenotic and there is a history of intermittent obstruction. Non-Crohn's fistulas are usually single with a straight track and normal looking healthy stoma. Fistulas may lead to recurrent leakage and skin excoriation.

Management
Surgery is usually required to correct the local infection and refashion the stoma. Exclusion of Crohn's disease is important in order to assess the extent of the procedure required. This may require endoscopic and/or radiological assessment of the stoma. Although the stoma can be revised locally, adequate correction of stomal fistulation usually requires a laparotomy. The new spout can be fashioned through the old trephine if suitably sited or through a new trephine, depending on the condition of the local tissues.

Figure 1.13   Fistula at the mucocutaneous junction in a recently ileostomy (arrow); this was probably caused by perioperative trauma. The leakage has caused ulceration and inflammation of the peristomal skin.

Figure 1.14   Prominent parastomal hernia in a patient with an ileostomy for ulcerative colitis. There are many eroded areas of skin that result from the hernia stretching and the tearing of the thinned skin at bag changes.

Parastomal fistulas in colostomies may sometimes be treated simply by laying open the fistulous tract, as one would do with a fistula-in-ano.

Parastomal Hernia

This is a common and well-recognized clinical problem and may occur in as many as 50% of all stomas (16) (Fig. 1.14 and Fig. 6.24). Its incidence varies, but studies examining the long-term incidence report up to a 28% paraileostomy and 56% paracolostomy hernia rate (17). Although the incidence of parastomal hernia increases with time, most hernias present within the first two years of stoma formation (18).

Most parastomal hernias are sliding hernias, containing small bowel or omentum. Etiological factors include poor abdominal muscle tone, poor placement of the stoma (i.e., outside the rectus muscle), poor wound healing, and poor surgical technique, especially creation of too large a fascial defect. Most parastomal hernias do not require repair. It is estimated that surgical intervention is indicated in approximately 15% of the patients for pain, poor fitting of the appliance with subsequent leakage, associated prolapse, obstruction, incarceration, strangulation, or cosmetic reasons (19). In most cases, patients have minimal symptoms and can be reassured, as the risk of strangulation is low.

Management

There has been recent interest in prophylactic mesh insertion at the time of primary stoma formation. In a recent study, at 12-month follow-up, parastomal hernia was present in 50% of

patients who did not receive a prophylactic mesh and in only 5% in whom mesh was used. After five years, the difference in parastomal hernia rates remained significant between the groups, at 81% and 13%, respectively (16).

If the hernia is asymptomatic, consideration should be given to conservative treatment. However, if surgery is necessary, local repair is usually advocated initially. Before mesh hernioplasty was introduced, suture repair of the defect in the abdominal wall sheath was routinely undertaken. However, the recurrence rate for this procedure was unacceptably high, often reaching up to 70%. Better results have been reported with the use of mesh, but recurrence may still occur in up to 35% of repairs (20). The mesh can be placed by a conventional open surgical approach or, more recently, laparoscopically. While laparoscopic parastomal hernia repair shows promising results with lower recurrence rates, documented complication rates are higher, with a tendency towards more serious complications such as bowel injury and obstruction.

Recurrent parastomal herniation is a difficult problem to manage. Persistent mechanical failure of local abdominal wall tissues at the stoma site may require laparotomy and either resiting of the stoma or even transposition to the opposite site of the abdomen. This type of surgery may be technically demanding, associated with significant complications and should only be undertaken when the patient's condition is sufficiently severe to warrant the risks involved and the patient has been counseled appropriately.

Infection

Chronic infection occurs in up to 10% of patients and should be distinguished from the ulceration, polypoid granulomas, and sinuses that characterize Crohn's disease. Ulcers and persistent local infection may be caused by trauma from a badly fitting stoma appliance, pyoderma gangrenosum, or from self-induced trauma. Nonabsorbable sutures can cause chronic infection with sinus formation. Local infection, if treated inappropriately, can result in ulceration and sinus or fistula formation, which perpetuate the infection.

Management

Active treatment of any local infection with great care on applying appliances to avoid trauma, treatment of active Crohn's disease, and proper drainage of any local abscess. Appropriate management of a sinus or fistula is mandatory in order to control and prevent persistent local infection.

Mechanical Obstruction

Mechanical obstruction may occur as a result of stenosis, stricture, prolapse, hernia, tumors, or polyps. Mechanical obstruction of a stoma may be due to intra-abdominal adhesions as well as pathology within the segment of bowel passing through the abdominal wall. Entrapment of bowel through the lateral gutter of the abdominal cavity, in the peritoneum or through the pelvic–peritoneal closure line after abdominoperineal resection of the rectum should be considered as a possible cause of intestinal obstruction. Bolus obstruction of an otherwise healthy ileostomy due to consumption of bulky, indigestible foods (notably fruit pith and nuts) is common. Retroperitoneal tunneling of ileostomy or colostomy (which was advocated in the past in order to avoid entrapment of the bowel in the lateral space) is especially likely to result in mechanical obstruction and has long since been abandoned for this reason.

The presenting symptoms vary according to the site, severity, and cause of the obstruction. Vomiting, cessation of stoma output, and abdominal distension are features of complete obstruction and should be dealt with aggressively in order to avoid progression of a simple uncomplicated obstruction to gangrenous bowel that necessitates resection, particularly in the case of Crohn's disease.

Bleeding

Bleeding may be due to ulceration, trauma from a badly fitting stoma appliance or self-inflicted injury, recurrent inflammatory bowel disease, or parastomal varices (Fig. 1.15).
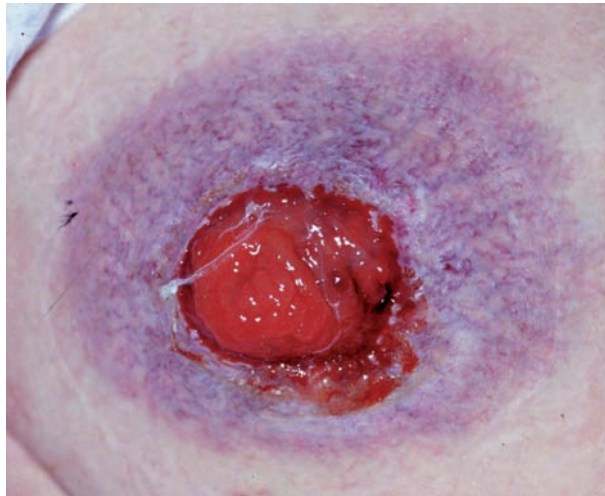
Figure 1.15   There are prominent small vessels radiating out from this stoma. The direction of blood flow is from bowel to skin, indicating a portosystemic anastomosis. These small vessels are not varices but caused significant problems because of recurrent, profuse bleeding. They responded in the short term to cauterization.

Parastomal variceal bleeding can occur in patients with inflammatory bowel disease and sclerosing cholangitis with cirrhosis of the liver, and it indicates progressive liver disease in patients with portal hypertension. Variceal bleeding is usually profuse, recurrent, and of sudden onset but an excessive oozing can also result from local trauma. Parastomal varices are a consequence of formation of a shunt between the mesenteric veins and veins of the abdominal wall. This portal–systemic connection is termed *caput medusae* when it appears around the umbilicus.

Management

In contrast to bleeding from parastomal varices, bleeding from other causes is usually not profuse and can be controlled by treating the underlying cause and local measures such as simple compression or ligation of bleeding points. The initial treatment of parastomal variceal bleeding consists of local compression around the stoma. Injection sclerotherapy is often unsatisfactory as an initial treatment and rarely provides long-term control.

Further treatment should principally be directed at the underlying cause of the portal hypertension. Although a surgical procedure to control the bleeding, for example, by disconnecting the portal–systemic collaterals would appear relatively simple, it is often extremely hazardous. Detaching the mucocutaneous junction may result in the opening of numerous thin-walled dilated vascular channels and provoke torrential hemorrhage, which can be enormously difficult to control. It should be avoided unless required as part of another operative procedure and should not be undertaken to control bleeding from the stoma, except in extremis.

Ileostomy Flux

Profuse ileostomy diarrhea can be caused by local or systemic infection, intra-abdominal sepsis, gastroenteritis, bacterial overgrowth, bowel obstruction, ileostomy stenosis, or recurrent Crohn's disease. However, in many patients, no cause can be identified.

Patients with a high-output ileostomy may become severely dehydrated with hyponatremia, hypokalemia (or occasionally severe hyperkalemia accompanying profound sodium depletion), hypomagnesemia, and hypocalcemia. Patients who have been receiving steroid therapy are at risk of Addisonian crisis if the dose of steroid has not been increased or restarted when the ileostomy output has increased.

Management

Persistent and untreated ileostomy output in excess of 1.5 L of fluid each day is usually incompatible with outpatient management and most patients will require admission to hospital. Treatment consists of the following:

- A thorough examination to identify any possible precipitating cause and starting treatment of the underlying pathology if found (sepsis is an especially common cause in postoperative patients and should be actively excluded).
- Replacement of ileostomy losses by giving intravenous fluid and electrolytes and limiting oral fluid intake to 1500 mL/day. Excessive intake of oral hypotonic fluids (artificially sweetened carbonated beverages, water, tea, fruit juices, and alcohol) may exacerbate fluid and electrolyte losses.
- Oral fluid intake is recommenced when the ileostomy output has decreased preferably in form of glucose–electrolyte solution.
- Close monitoring of the fluid and electrolyte homeostasis, with accurate, daily fluid balance measurement, aided by daily measurement of serum and, most importantly, urinary electrolyte composition. The latter provides a much more useful guide to whole body sodium and potassium status.
- Maintenance requirements as well as replacement of fluid and electrolyte losses should be continued until the patient is stabilized and the ileostomy output decreases.
- Patients on steroids should have their steroid dose adjusted, and patients who have been on steroids in the previous year should be given hydrocortisone (100 mg) intravenously at six-hour intervals for 24 hours.
- Oral codeine or loperamide can be used to decrease stoma output. Where there is concern regarding gastric hypersecretion (e.g., when small bowel length is relatively short), proton pump inhibitors may be of value. Somatostatin analogues are rarely indicated.

Underlying causes amenable to surgical treatment are dealt with after complete resuscitation if they present as an emergency such as intra-abdominal sepsis.

Cancer (See also chap. 6)

In patients who have had stoma surgery for bowel or urinary tract malignancy, carcinoma appearing around the stoma may result from metastasis, seeding of tumor at operation, or residual tumor (Fig. 1.16 and Fig. 6.1). In these cases, the tumor will usually be evident within
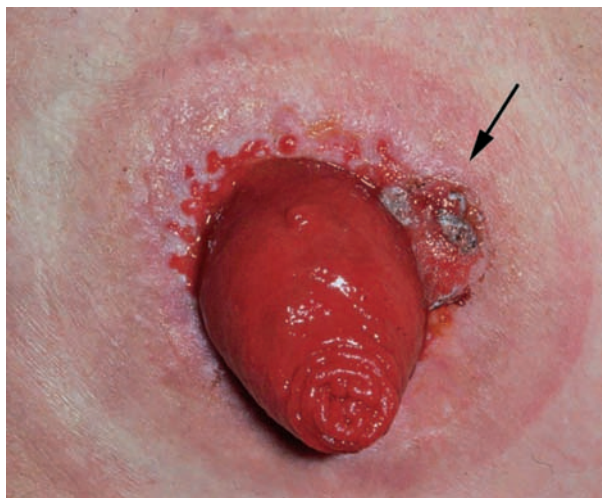
Figure 1.16 Early adenocarcinoma at the mucocutaneous junction (arrow). This appears to have risen in an area of bowel metaplasia of the skin.

(A)

(B)
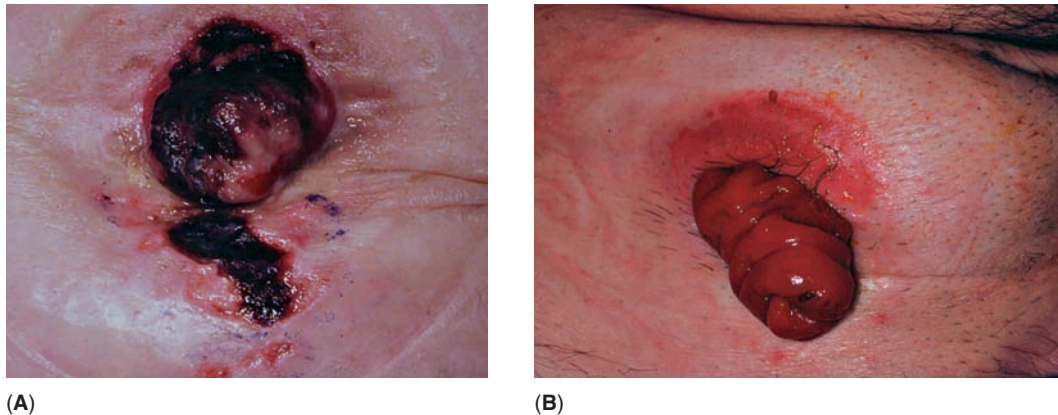
Figure 1.17 (**A**) Dermatitis artefacta of a urostomy. The patient has burned the stoma and skin. (**B**) Dermatitis artefacta around an ileostomy. The patient was rubbing the skin continually, which has resulted in a fixed erythematous plaque. There was an insurance claim for injury following a car accident, in which it was said that the seatbelt had damaged the patient's peristomal skin. Subsequent to the successful settlement the patient did not attend the clinic.

months of the initial surgery. However, some patients may develop primary carcinoma of the stoma or surrounding skin many years after stoma surgery for nonmalignant disease. It has been suggested that such cases occur as a result of the chronic peristomal inflammation seen in some stoma patients or perhaps secondarily to bowel metaplasia occurring around the stoma (21–25). Biopsies should be performed early for any suspicious lesions on or adjacent to a stoma. Wide resection of the stomal carcinoma, with adjacent skin, subcutaneous fat, abdominal wall, and distal bowel segment and its mesentery is suggested. The new stoma should be relocated to another position and the abdominal wall defect should be closed primarily or with a mesh repair (26).

Dermatitis Artefacta
Self-inflicted trauma to the stoma and surrounding skin is a rare event but one that should be considered in instances in which the lesion is atypical in its distribution or duration. These lesions are characteristically chronic and are commonly found in patients who have been plagued by unexplained stomal complications in the past (Fig. 1.17) (see also chap. 5, p. 163) Chronic inflammation is the most common finding on biopsy although the possibility of squamous cell carcinoma at the lesion edge must be borne in mind (Marjolin's ulcer). Strict observation and supervision will usually allow the lesion to heal satisfactorily.

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2 | Stoma Appliances, Specialist Nurse, and the Multidisciplinary Team

Kirstine Farrer, Victoria Kenyon, and Amanda J. Smith*

A stoma is a surgically created opening of the bowel or urinary tract on the body surface. The commonest stomas are ileostomy, colostomy, and urostomy.

The different types of stoma, their indications, and procedures are described in chapter 1. An ileostomy (Figs. 2.1 and 2.2) is an opening of the ileum onto the surface of the abdominal wall and the output is a "porridge" consistency.

A colostomy (Fig. 2.3) is an opening into the colon, bringing the large bowel to the surface of the abdominal wall. The solidity of the feces depends on the colostomy site, with a more formed motion produced if the colostomy is formed at the descending or sigmoid colon. The colostomy is flush with the skin surface and a rosebud shape.

A urostomy (Fig. 2.4) is fashioned to enable urine to be excreted via an abdominal stoma. The urostomy is spouted in the same way as an ileostomy (1).

As described in the "Historical Note" (p. xiv), a continent urinary (Mitrofanoff) pouch is an alternative to urostomy formation (Fig. 2.5). The antegrade continence *or colonic* enema (ACE) procedure may be considered instead of a colostomy. This procedure is undertaken more commonly in children and young people (see chap. 1). The aim of the ACE is to empty ascending, transverse, and descending colon with daily irrigation (Fig. 2.6). This may take up to 60 minutes. Following surgery, it may take up to a month to establish a satisfactory routine with the correct amount of fluid being adjusted as necessary to maximize evacuation and continence. However, careful selection of suitably motivated patients is essential, and they should be aware that ongoing support is readily available (2).

The ileoanal pouch probably represents the closest to normal continence one can achieve after loss of a functioning colon and rectum. A number of patients will develop skin diseases around the continent stoma or perianal region that may require specialist input. Many of the concerns about management, body image, and social acceptability of all continent/ileoanal pouches are the same as for conventional stomas.

PROCTOCOLECTOMY AND THE ILEOANAL POUCH

Traditionally, patients requiring proctocolectomy had a permanent end ileostomy. While most patients adjusted well, a small proportion of the patients found the change in body image and the psychological implications unacceptable. Consequently, surgeons endeavored to find an alternative.

The Kock pouch (see chap. 1), entailed the construction of a terminal ileal reservoir pouch within the abdominal cavity, which was brought out onto the abdominal wall through a nipple valve.

Previously, a direct anastomosis between ileum and low rectum/anus had been used but resulted frequently in urgency and incontinence problems. In 1978, Sir Alan Parks created the restorative proctocolectomy, a revolutionary step. Also known as ileoanal pouch or J pouch, this is an internal reservoir of ileum situated where the rectum would normally be. It provides not just a potential cure from their disease but continent anal function is possible through preservation of the anal sphincter (Fig. 2.7). There have been a number of adaptations of technique with S- and W-shaped pouches also (3).
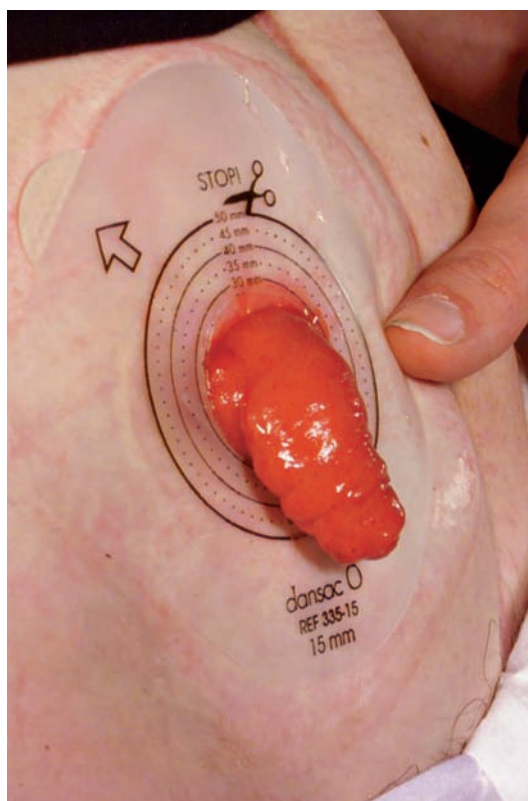
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*In this chapter, the title "specialist nurse" has been adopted. Ostomy patients receive expert nursing and high levels of quality care from nurses who have various descriptive names or titles.
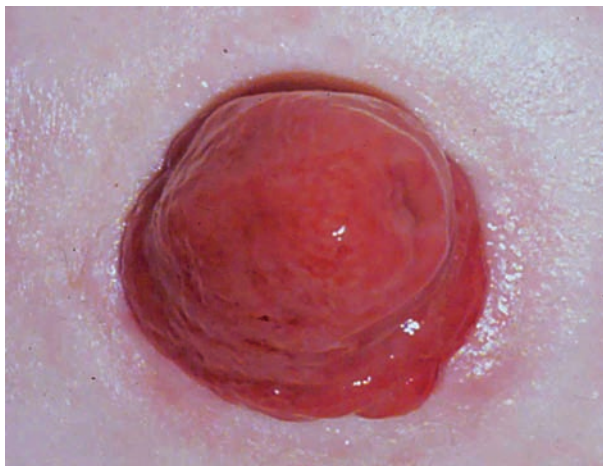
Figure 2.1   A normal, spouted end-ileostomy.

Figure 2.2   The aperture of the appliance's release film, filled by the ileostomy for demonstration (side view).

Patient Selection/Indications for Pouch Formation

The restorative proctocolectomy is now a gold standard operation offered for the treatment of ulcerative colitis, familial adenomatous polyposis, and some cancers and provides the majority of patients with a decent alternative to the permanent ileostomy.

Where indeterminate colitis is diagnosed, patients should be considered for restorative proctocolectomy as, although complications and failure of pouch surgery are slightly higher than in ulcerative colitis, the long-term outcomes are acceptable (4). Review of the histology by

**Figure 2.3**   A normal, rosebud-shaped colostomy.

Figure 2.4   A urostomy or ileal conduit.

Figure 2.5   Catheterization of a continent urinary pouch.

Figure 2.6 Patient with an ACE for chronic constipation. This is the same patient as in Figure 1.6. The patient is irrigating the colon via the ACE button and the feces will be flushed through the colon and evacuated from the end colostomy into an irrigation sleeve.
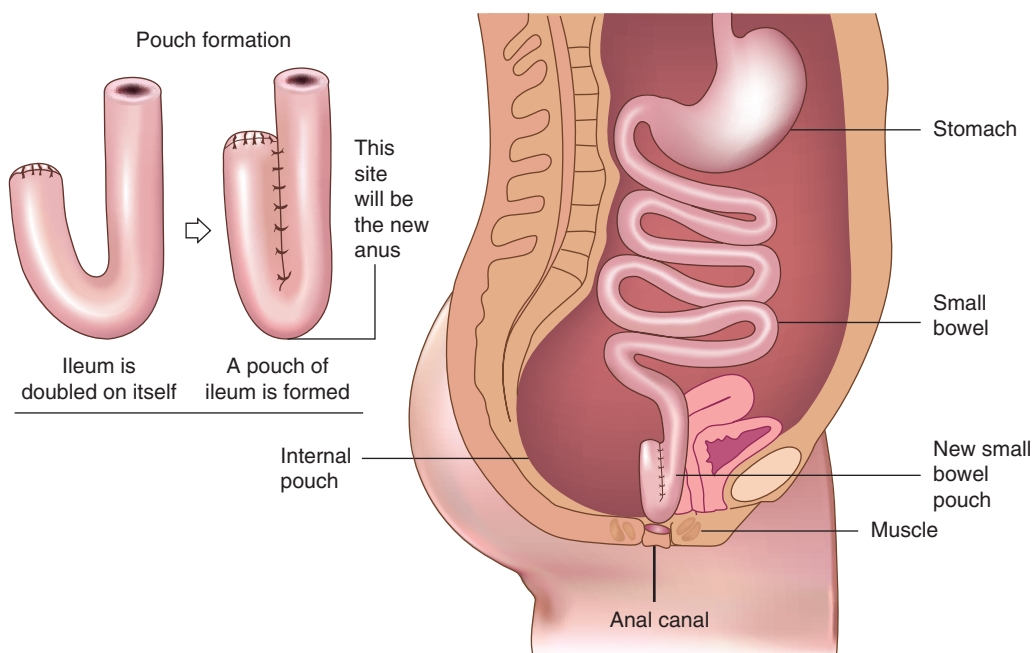
Figure 2.7 Formation of an ileoanal pouch.

an experienced histopathologist is essential, and adequate patient counseling is fundamental to allow the patient to understand the implications of surgery.

The following patient groups should *not* be considered for or offered restorative proctocolectomy:

- Crohn's disease (high complication rate from disease recurrence)
- Sphincter impairment (fear of incontinence)
- Metastatic cancer/low rectal cancers (risk of recurrence)
- Cognitive/debilitating disorders (depending on individual circumstances)
- Age (complications increase with age, individual preference is important)

The Operation

Restorative proctocolectomy involves excision of the colon and rectum, preserving the sphincter muscles and anus and construction of the pouch.

It is possible to carry out the entire procedure in one stage but is usually performed in two or three stages to minimize the risk of anastomotic leak and pelvic sepsis. It is usually performed as a planned procedure when medical therapy (in ulcerative colitis) has failed or in familial adenomatous polyposis and cancer cases. The first operation involves a proctocolectomy and fashioning of the pouch with a temporary defunctioning ileostomy (loop ileostomy) (Fig. 2.7). In an emergency—when patients are very sick, have a low serum albumin, or if they are on high-dose steroids—a subtotal colectomy is carried out first (leaving the rectum to reduce operative risk) and the pouch is formed later.

Three to six months later, a pouchogram is performed and, if normal, the ileostomy is reversed.

Multidisciplinary Approach to Caring for Pouch Patients

Patients who are considering pouch surgery are embarking on a life-changing journey and need to be offered expert-research-based information to allow them to make the right informed choice.

The physical, emotional, and social effects of having restorative proctocolectomy can have massive impact on quality of life and can prove a difficult journey for these patients and their families. Therefore, it is essential that a multidisciplinary team (MDT) approach is adopted to optimize care and outcomes.

It is believed that successful outcomes are "built on sensible patient selection, clear preoperative counseling, an operative strategy appropriate to the patient, and expedient management of complications" (5).

The introduction of the Quality Care Service Standards 2009 is a long-awaited document with the aim of ensuring that patients who have inflammatory bowel disease receive health care that is safe, effective, and of consistently high quality. Representation of professionals and patients have collaborated to define, for the first time, what is required in terms of staffing, support services, organization, patients' education, and audit to provide integrated, high-quality inflammatory bowel disease services and recognizes the need for a designated pouch/stoma therapy nurse for every patient and every patient will have access to all members of the MDT.

When a patient has been discussed with an MDT and considered suitable for restorative proctocolectomy, the clinical nurse specialist is the lynchpin coordinating the patient pathways and is integral in providing accurate evidence-based information and support in the pre- and postoperative period. In this way, the patient is mentally, physically, and socially assessed and prepared for what could be a long, stressful, and arduous journey with realistic expectations. Slater (6) recognizes that giving patients information prior to impending surgery can reduce their emotional response and facilitate coping, thus aiding recovery. This will allow the patient to make an informed decision when faced with deciding whether restorative proctocolectomy with all its uncertainties is the right operation for them over a panproctocolectomy with a permanent stoma, which results in less surgery but is not without its own risks and complications. The importance of the role of the nurse specialist is well documented as is the role of voluntary organizations and opportunity to speak to experienced patients; both can act as an excellent medium for sharing experience and support and are integral in managing patient's anxiety and potential complications throughout the patient's pathway.

Complications and Management (Table 2.1)

Many pouch complications present with similar symptoms; gastroenteritis, for example, can present like Crohn's disease of the pouch. When a patient presents with new symptoms, it is important that they have a general assessment including early review, stool culture, biochemical and hematological analysis (including inflammatory markers) before considering other more invasive or diagnostic investigations. All patients should be offered support and information throughout.

Table 2.1 Pouch Complications, Symptoms, and Management

Complications	Symptoms	Management
Pouchitis (inflammation of the pouch mucosa)	Increase in frequency in stools, burning sensation, abdominal cramping, a sense of urgency before having bowel movement and bloody stools or fever.	Arrange pouchoscopy with biopsy. Medical treatment (usually a course of oral metronidazole). Arrange follow-up.
Crohn's disease	Increase in frequency in stools from the norm, abdominal cramping, a sense of urgency before having bowel movement and occasionally bloody stools and fever, loss of appetite, weight loss, lethargy, other manifestations, bloating, incomplete evacuation.	Consider pouchoscopy/biopsy/contrast studies/examination under anesthetic. Dietary advice. Discuss in MDT, consider medical therapy (often requires defunctioning and/or excision of pouch).
Pouch/anal stricture	Increase in frequency in stools from the norm, watery stools, abdominal cramping, a sense of urgency, reluctancy to eat, bloating, incomplete evacuation.	Consider pouchoscopy/biopsy/contrast studies/EUA (dependent on individual assessment). Dietary advice. Discuss in MDT, consider surgical or radiologically guided dilatation with ongoing self-dilatation. Regular assessment of symptoms.
High anastomotic stricture (usually Crohn's disease)	Increase in frequency in stools from the norm, watery stools, abdominal cramping, a sense of urgency, reluctancy to eat, bloating, incomplete evacuation.	Consider pouchoscopy/biopsy/small bowel contrast studies/EUA (dependent on individual assessment). Discuss in MDT, consider surgical or radiologically guided dilatation (often requires surgery to excise the pouch or formation of a defunctioning stoma).
Weak sphincter/ leakage	Varies from incontinence to minor seepage of feculent material intermittently or when passing flatus (often occurs at night) (Fig. 2.8).	Commence or increase bulking agents such as ispaghula husk (Fybogel™) or codeine. Dietary advice including timing of meals, use of continence products, and skin care (see "Skin irritation").
Skin irritation	Excoriation, burning sensation, erythema, itching, weeping.	Identify and treat the cause. Adequate cleansing, advise cotton underwear, use of barrier creams or cholestyramine cream.
Pouch vaginal fistula	Passing vaginal flatus/enteric material, sepsis, vaginal soreness/excoriation.	Identify cause. Discuss in MDT. Can be managed with seton suture, can result in defunctioning or excision of pouch.
Early postoperative pelvic sepsis/ anastomotic leak	Abdominal pain, fever, tachycardia, evacuation of blood/pus from pouch, abnormal biochemistry/inflammatory markers.	Early detection. May be managed with radiologically guided drainage or surgery. May result in poor long-term function or failure.
Male sexual dysfunction	Erectile/ejaculatory dysfunction. This can be psychological or organic (occurs as a consequence of panproctocolectomy).	Careful counseling preoperatively. Preoperative sperm banking should be offered. Open discussion and acknowledgement by surgeon/nurse, early referral to urologist/ psychosexual counselor.
Female sexual dysfunction	Vaginal dryness, painful intercourse, reduction in fertility. This can be psychological or organic (occurs as a consequence of panproctocolectomy).	Careful counseling preoperatively, open discussion and acknowledgement by surgeon/nurse. Use of lubricating products, alternative sexual position. Early referral to gynecologist/psychosexual counselor.

Abbreviations: EUA, examination under anesthetic; MDT, multidisciplinary team.

Figure 2.8   This patient with congenital ichthyosis suffered repeated stoma appliance failures because of the flaking skin on the abdomen. As a result, the patient opted for an ileoanal pouch and prefers to manage the sore skin resulting from a weak sphincter and leaks than to consider another ileostomy.

Failure or Pouch Excision

Most patients following restorative proctocolectomy have good outcome but the need for pouch excision can be devastating. It is, therefore, important for these patients to have the appropriate support mechanisms in place to help them through this difficult time.

As the following account demonstrates, the most vocal advocates of ileoanal pouches are the patients themselves (6).

> "Still being in my early 20s, it was a bit surreal to me being told that I needed to undergo at least one operation as my ulcerative colitis could not be controlled and inevitably this was slightly worrying. Even before I went for my first operation the support offered by both the nursing staff and the surgeon was fantastic, they explained everything in detail and also gave me the opportunity to speak to patients who now lived with a stoma.
>
> Coming out of my first operation was like starting a new life and the feeling of waking up pain-free or needing to take 25 tablets was absolutely fantastic. While still in hospital, the nurses worked very closely with me about how to care for my stoma and took me through in detail all the different types of stoma bags to make sure I had the correct one.
>
> For me, although I was 100% confident with my stoma, I still wanted the reversal, but before I underwent surgery, I spent a lot time speaking with the nurse, surgeon, and past patients to make sure I understood the pros and cons inside out. I did not want the stoma removed from a cosmetic perspective but being a keen sportsman, I felt the stoma hindered my performance but did not stop me playing, I even continued to play in goal while having the stoma.
>
> Since having my reversal, I could not be happier, the first few weeks are a little strange as you have to re-educate yourself on bowel movements but now there is no looking back. My bowel function is not what it was like while I was growing up, but I have now regained the control over my bowel and do not have to wonder where is the closest toilet! The reversal was the best thing I have ever had done, but it is not for everyone.
>
> In total, I had three operations and I still get checked over regularly to make sure there are no problems. Throughout the process, the biggest thing for me was the support channels offered by all of the staff involved, which put my mind at ease and meant that there was always someone to talk to.
>
> Thanks.

Restorative proctocolectomy is a relatively safe procedure, providing patients with a good functional alternative to the permanent ileostomy; it is important to carefully consider the suitability

of patients through MDT review, with good support from the nurse specialist and patient support groups throughout their whole journey.

ROLE OF THE SPECIALIST NURSE

The specialist nurse is a clinical specialist who is autonomous and an expert practitioner in his/her clinical field. He/she makes a vital contribution to the quality and development of nursing practice centered on the holistic needs of ostomy patients and their family. Excellence in clinical practice through direct care involvement remains at the heart of specialist practice (7).

Preoperative Management

Patients who are undergoing ostomy surgery should be cared for within a MDT, because collaboration will ensure that the patient receives a united care approach and a high quality of service. The recent guidelines published by the Association of Coloproctology of Great Britain and Ireland (8) recommends that any patient requiring stoma formation should have access to a specialist nurse before surgery and the referral should occur at the earliest opportunity. The point of contact for the patient and the nurse specialist is at the diagnosis and when surgery is confirmed. The specialist nurse is able to reinforce, clarify, and provide explanations to the patient and family.

Patients require information to enable them to make rational decisions regarding surgery, however, this may not always be possible if emotions and anxieties are running high (9). Adequate information and emotional support is vital if patients are to make informed choices and tolerate treatment (10).

Several contacts may be necessary, as the preoperative stage can vary from individual to individual. It can be as long as 20 years for patients with Crohn's disease or it can be only a few hours in emergency cases. Patients who have to face the prospect of surgery for bowel or bladder cancer have to adapt to a life-threatening disease as well as the stigma of having a stoma fashioned. The patient is often more frightened of "living with a stoma" than facing the operation itself (11). The word "bag" conjures up all kinds of imagery; however, the nurse specialist is able to allay fears and anxieties by developing a trusting relationship with his/her well-developed skills in counseling, assessment, and effective listening (12).

The preoperative support is a tool for the specialist nurse to provide information and to determine the patient's understanding of the forthcoming surgery, management of stoma appliance, and after care. With the implementation of enhanced recovery programs, early patient education in stoma care is essential (13). There are tool kits and DVDs available, which facilitate patients to self-care with their stoma and appliance (Fig. 2.9). Meeting with an established ostomy visitor and national support groups may be helpful. The nurse specialist is involved in a multiplicity of practice settings. Freedom of referral across these settings is essential to ensure that support, assessment, and optimum care are provided for the patient and family (14).

Preoperative Siting

Careful siting of the stoma is of utmost importance and should take place preoperatively when the site can be discussed with the cooperation and consent of the patient (15). Lack of, or poor, siting will result in complex management problems and may affect the patient's acceptance of his/her stoma (16). The utmost care must be taken in ensuring that the stoma is placed where the patient can see the stoma on a smooth skin surface, avoiding the waistline, skin creases and contours, and previous scars (Fig. 2.10).

Postoperative Management

Hospital stays following surgery are now shorter following the introduction of laparoscopic surgery and the enhanced recovery program (see chap. 1). This multimodal approach involves a team of 10 core members with the patient in the center and an active participant in the process (17). The nurse specialist is a crucial member to deliver the necessary knowledge, skills, and support to the patient in the management of their new ostomy.

**Figure 2.9**   Preoperative patient advice and information kits.
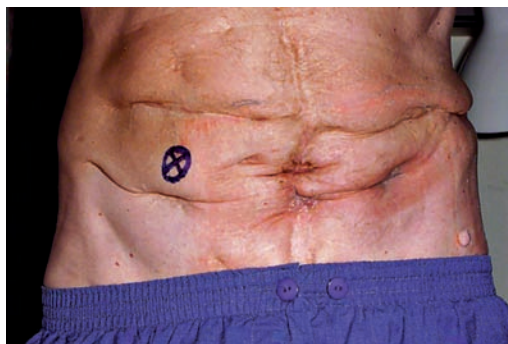
(**A**)

(**B**)

(**C**)

Figure 2.10   (**A**) Siting of an ileostomy in the right iliac fossa, away from copious surgical scars and just low enough to avoid trouser waistbands. (**B**) Colostomy sited too low in a skin fold. (**C**) The bowel mucosa of the colostomy is only visible by stretching the fold apart making it very difficult for the patient to fit the stoma appliance.

(**A**) (**B**)
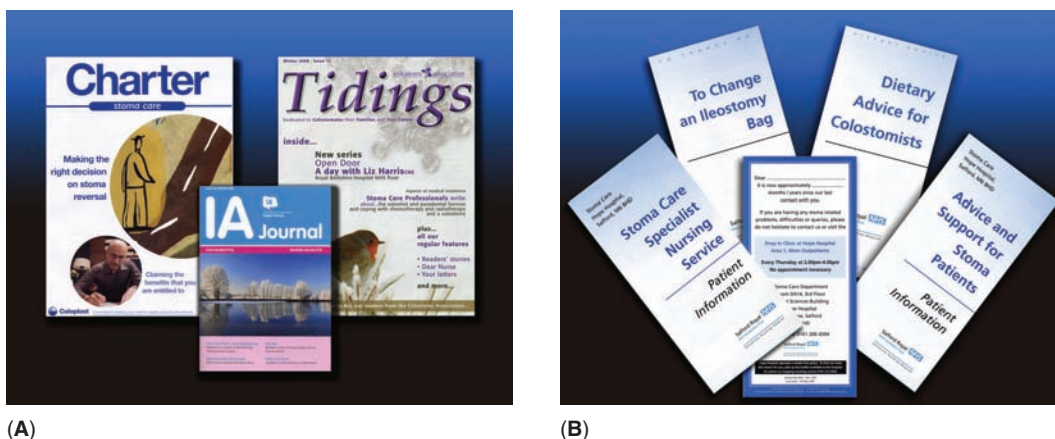
Figure 2.11 (**A**, **B**) A selection of written literature provided for patients after stoma surgery.

Physical needs vary greatly. The patient has to be able to care practically and confidently for their stoma, as any inability will affect the psychological outlook. The patient is taught how to cleanse the skin, change the appliance, and dispose of used materials. Promotion of the slogan "keep it simple" is important when teaching patients the day-to-day practicalities of living with a stoma. Advice and information (Fig. 2.11) given verbally should be supported with written evidence (18).

Communication between the patient and nurse specialist is fundamental in helping the patient to adapt to his/her altered body image, practical problems associated with a stoma, and the psychosexual aspects of life. Patients not managing with a stoma may need assessment of the situation from the nurse specialist and referral to appropriate agencies, for example, a psychosexual counselor (19).

Stoma shape, appearance, and function especially soon after surgery can be a cause of patient anxiety. The nurse specialist should regularly inspect the stoma as it reshapes/remodels throughout the patients' lifetime (Fig. 2.12). Reassurances should be given that changes will occur; however, any deviation from the norms need prompt attention. The earlier a problem is identified, the easier it is to rectify.

Patients are often concerned about their skin, reassurance should be given that most ostomy products are skin friendly and allergy is rare (see chap. 3). The pouch should be cut to the exact size and shape of the stoma to protect the peristomal skin and prevent leakage. The size can be gauged using a measuring guide that comes with most appliances (Fig. 2.12). Judging whether a current appliance is of an appropriate size can also be done using the release film removed from one of the appliances with the stoma placed through the aperture (Fig. 2.13). The stoma may not be perfectly round in shape. In this situation, a template is made from which to cut subsequent appliances (Fig. 2.13). Teaching patients how to measure their stoma may help to reduce some of their anxieties and help prevent problems occurring in the future.

On discharge from hospital, the patient may experience temporary loss of confidence, which may increase anxiety and even the ability to cope.

For patients to adapt to a stoma, the major source of emotional support is the family. The need for knowledge and support at home is paramount. Family acceptance is a major factor in the patients' own successful adaptation. The stoma specialist can prepare and support family and friends of the ostomy patients so that they can help to raise the patient's self-esteem (20).

Information is given to the patient regarding prescription details for their appliances, nutritional advice, holidays, relationships, and stoma-care contact numbers. The specialist nurse, in continuing support at home, ensures that patients continue to have access to specialist care. Patients can self-refer anytime for further physical and psychological support. Community care is provided according to each patient's requirements. However, Wade (11) recommended that patients be recalled at 10 weeks following surgery, as this is often their psychological low point. A routine postsurgery assessment at six months could prevent up to 18% of peristomal irritant dermatitis (21).

(A)

(B)

(C)
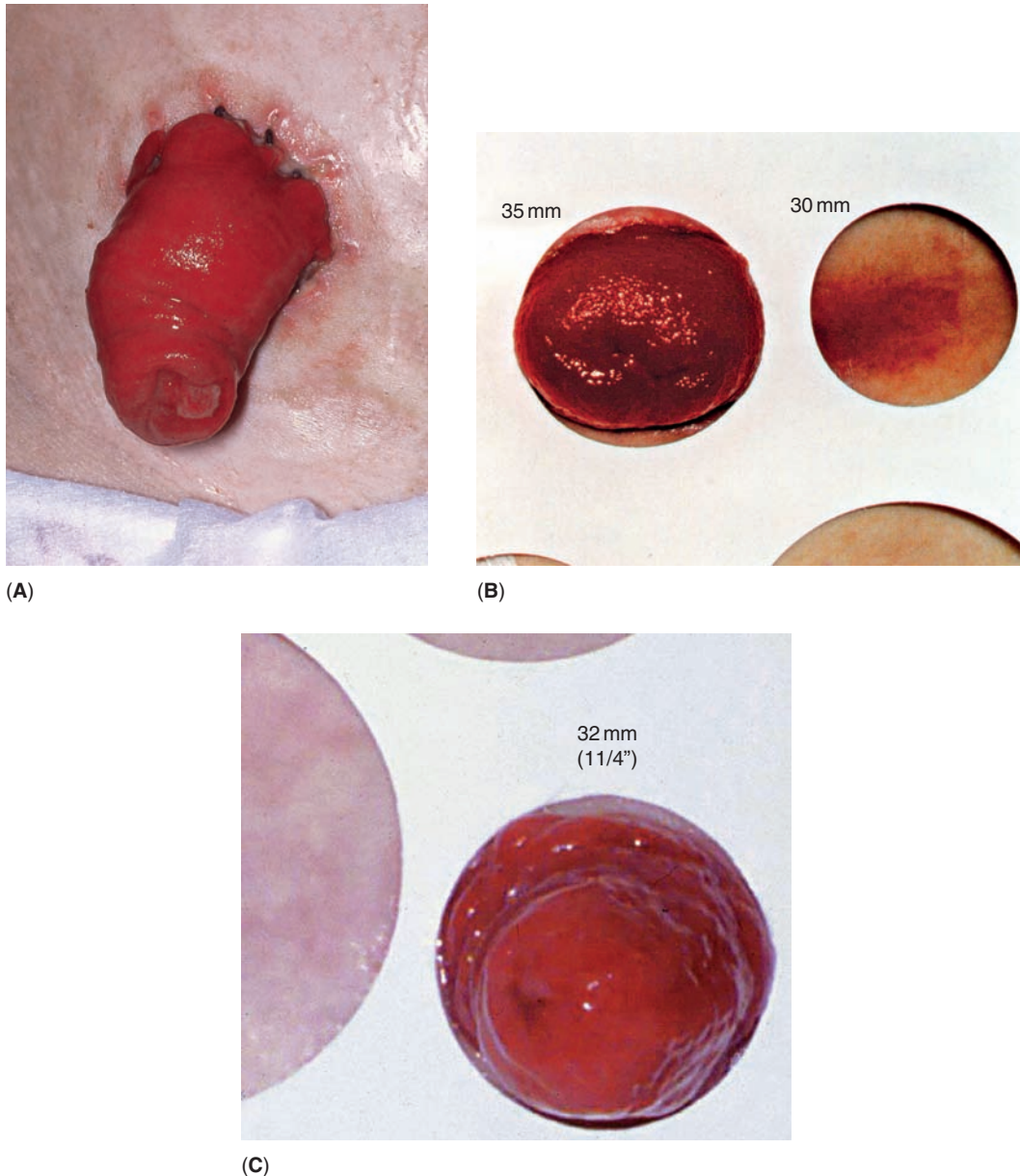
Figure 2.12 (**A**) Six days postoperatively, the stoma is 45 mm in diameter; (**B**) at 26 days, it is 35 mm in diameter and a little retracted in length; (**C**) at 28 weeks, 32 mm in diameter.

Open Access Stoma Care Service

Self-referral from the patient to the specialist nurse is essential. Patients who develop skin problems often fail to report it and do not always seek help (22). They may present at their general practitioner for advice, and the general practitioner may not have the experience or up to date information to manage these disorders. Inappropriate recommendations of creams and lotions can contribute to further skin problems. Advice should be sought from a nurse specialist who demonstrates a commitment and knowledge to a research-based practice and who would not recommend the use of creams without evidence to support their efficacy and safety (23).

A recall service at regular intervals reminds patients and families of the service that is available to them. It also provides an opportunity to assess the stoma, patient's technique, and

(A)   (B)
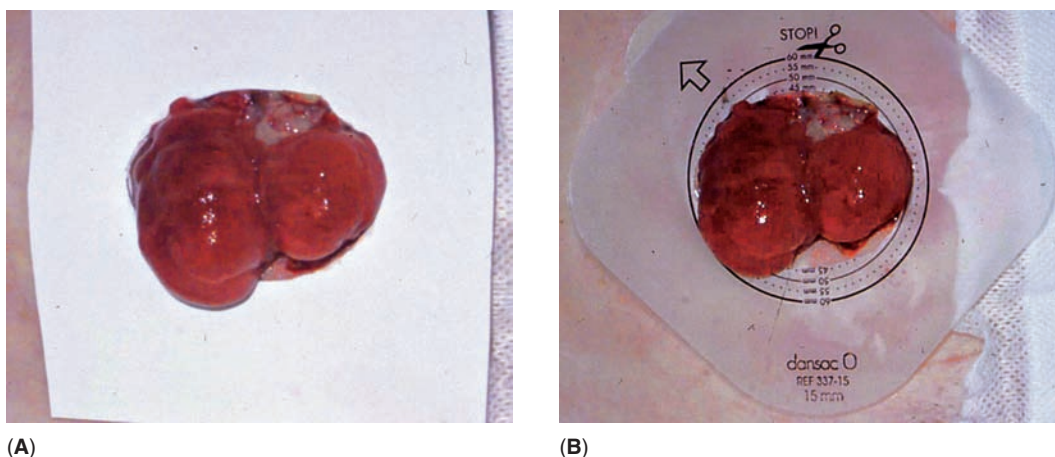
Figure 2.13 (**A**) A paper template cut to the shape of a rather oval ileostomy. (**B**) The stoma bag's barrier is cut using the template (shown using the release film of the bag). This template can be used by some suppliers to provide ready-cut stock to the patient.

ensure that the correct size appliance is used because stomas do change shape and size in the weeks after surgery.

DIETARY CONSIDERATIONS

Stoma patients are often concerned about their fluid and dietary intake following surgery. A period of adjustment may be necessary in the immediate postoperative phase, especially for ileostomates. However, the majority of patients can be encouraged to return to their normal fluid and dietary intake two months following surgery with minor modification (24).

Patients who have had extensive bowel resection, fistulas, or high-output stomas will often require extra nutritional/fluid support. This can be delivered as parenteral nutrition via an intravenous feeding catheter or distal feeding (fistuloclysis). Both have associated challenges for patient and nurse.

Distal feeding is a method of providing nutrition via a feeding tube placed into the distal loop of a stoma or fistula. The benefit is that it sustains nutritional stability in high-output loop stomas and fistulas and can help maintain gut integrity. It is cheaper, safer, and easier to administer than parenteral nutrition.

This method of feeding can be problematic. It is often difficult for patients to come to terms with both feeding and passing fecal effluent through what is seen to them as the same orifice. The patient has to be able to manage the stoma/fistulas with a feeding tube in place (Fig. 2.14). The tube can become dislodged, blocked, feed can backtrack into the stoma pouch, and bulky specialized equipment is necessary to secure the tube to the appliance to prevent leakage (25) (Fig. 2.15).

This is not discrete and often extra stoma accessories, that is, seals, stoma paste, and convexity are necessary to protect the peristomal skin from gastric juices containing proteolytic enzymes and hydrochloric acid (26). Written information is available for staff and patients (Fig. 2.16).

Careful management is essential with nutritional advice and support with a dedicated MDT.

Dietetic Management of Patients with High Output Stomas
Dietitian's Role in the Colorectal MDT
All patients should be seen by a dietitian in order to assess nutritional status and receive advice on diet and fluid intake. The assessment should include anthropometric measurements [weight, height, body mass index (BMI), mid-arm circumference, and tricep skinfold measurements]. Body weight is still the gold standard objective tool; however, weight is affected by fluid balance; therefore, rapid or large losses in weight are more likely to reflect hydration, rather than loss of lean

(**A**)   (**B**)
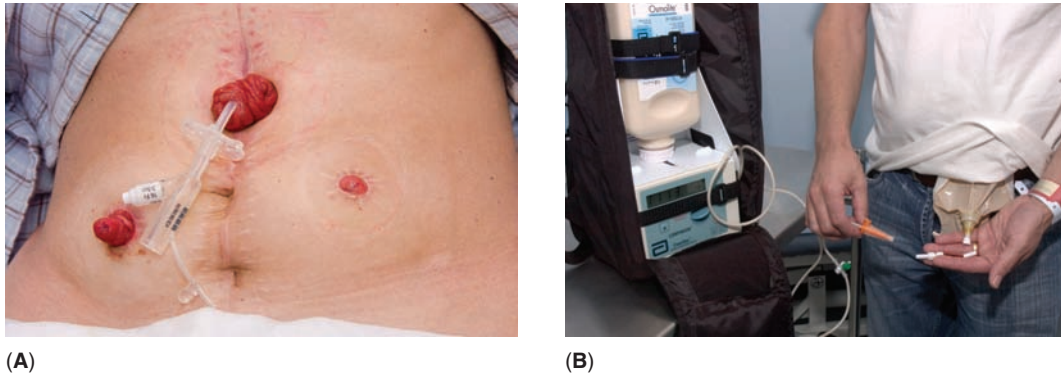
Figure 2.14   (**A**) Distal feeding tube in place. (**B**) Manual dexterity and good vision is essential for this technique.

Figure 2.15   The appliance when fitted with specialized adapter is bulky and can be seen through clothing.

Figure 2.16   Example of written material for patients on distal feeding.

body mass. Weight is often expressed as an index of height to give a measure of BMI, where a BMI of 20 to 25 kg/m² is considered desirable. A BMI of <18.5 kg/m² is used to define undernutrition (27). It is generally accepted that a loss of body weight >10% in the preceding three months (and non-intentional) is considered significant, in terms of clinical outcome (28), and that 20% recent

weight loss is evidence of protein energy malnutrition (29). Patients should be weighed on admission and on a weekly basis (30). Measurement of upper arm anthropometry by the same dietitian in order to avoid interobserver error (31) on admission and subsequent dietetic appointments is a useful adjunct to demonstrate an improvement in nutritional status to the patient (32).

Dietary Management of High Output Stoma

In this group of patients achieving electrolyte and fluid balance can be difficult. The patient may be unable to absorb water and electrolytes, particularly sodium, magnesium and calcium. In severe cases the patient may become dehydrated and depleted in electrolytes. Care must be taken to ensure that hypotonic solutions (i.e., water, tea, coffee, tea, or diet squash) or hypertonic drinks (i.e., sugary squash, lemonade, coke) are not consumed as these will increase the stoma output (33). Additional salt may need to be added to the diet, and/or oral rehydration solutions consumed, at an optimal concentration of 120 mmol/L of sodium (e.g., double strength Dioralyte® or St. Mark's Solution). Patients with a stoma output >1500 mL per day may benefit from sipping up to a liter of a rehydration solution throughout the day. Patient compliance can be poor, due to the solution tasting like sweet salt water, and is one of the most challenging aspects of the dietitian's role within the team. There are a number of measures which can increase the palatability of the solutions such as adding sugar-free cordial and keeping the solution chilled. There is evidence that swapping sodium bicarbonate with sodium citrate may further increase the palatability of the solutions, or by using glucose polymers in the solution (34). There is no published evidence to support the fact that avoidance of fluids or drinks at meal times will improve energy or fluid balance; however, anecdotal evidence would warrant further investigation in this area.

Patients should be educated to:

- recognize the symptoms of dehydration: dizziness, thirst and reduced/concentrated urine;
- take medications to reduce stoma losses in relation to meal times (e.g., loperamide and codeine phosphate).

High fiber foods may block the stoma and cause obstruction, abdominal bloating, or pain. A constant proportion of fat will be absorbed, so as fat intake is increased, there is an increased amount of fat in the stoma effluent. Although increased fat excretion may reduce the absorption of calcium and magnesium (35), high-fat diets are high in energy and are very palatable (Table 2.2).

Table 2.2 Suggested Meal Plan for a Patient with a High Output Stoma, Including 600 mL of Rehydration Solution and on a Hypotonic Fluid Restriction of 1000 mL per day.

Breakfast	
8 am	Small cup of tea or coffee (200 mL)
8.30 am	Cornflakes/rice krispies/fine porridge + milk
	White toast + margarine
9.30 am	Rehydration solution 200 mL
10 am	Small cup of tea or coffee (200 mL)
11 am	Plain sponge cake or crumpets
Lunch	Cheese omelet/sandwich made with white bread, containing cold meat, tuna, chicken, or cheese
	Yogurt/crisps/cheese and crackers/banana/peeled pear or peach
2 pm	Rehydration solution 200 mL
4 pm	Small cup of tea or coffee (200 mL)
Evening	Meat (roasted or stewed), fish (grilled), poultry (roasted or stir-fried), eggs
	Potatoes—chips, roasted, boiled (no skins); pasta or rice
	Broccoli/cauliflower (florets) or root vegetables (e.g., carrot, swede, sweet potato), passata (ensure no seeds and skin)
	Add herbs and garlic puree to flavor food and table salt
	Sponge and custard/cheesecake/mousse
	Small glass of fresh fruit juice (200 mL)
8 pm	Rehydration solution 200 mL
10 pm	Small cup of tea or coffee (200 mL)

Studies comparing dietary supplements have also shown no beneficial effects of elemental diets in absorptive capacity (36). Elemental and semi-elemental feeds have the disadvantage of being both hyperosmolar and containing a minimal amount of sodium, which will excerabate fluid, magnesium, and sodium losses (36).

Fistuloclysis and Distal Feeding

The nutritional management of patients with high-output enterocutaneous fistulae with mucocutaneous continuity [i.e., fistulae which will not close spontaneously with conservative management of total parenteral nutrition (TPN) and keeping the patient nil by mouth] or high-output proximal loop enterostomies have traditionally required parenteral nutrition. Studies have demonstrated that TPN can be avoided in selected patients by administering enteral feed or saline distally via an anatomical or surgically created mucous fistula (Table 2.3).

Feeding is achieved by inserting a gastrostomy feeding tube into the intestine distal to the fistula or loop stoma. Infusion of enteral feeding is increased slowly, without the reinfusion of chyme, until the patient can tolerate their nutritional and fluid requirements by a combination fistuloclysis/distal feeding and oral diet, following which TPN can be withdrawn. Teubner et al. (37) reported that fistuloclysis was attempted in 12 patients with jejunocutaneous or ileocutaneous fistulas with mucocutaneous continuity. Fistuloclysis replaced TPN entirely in 11 of 12 patients. Nutritional status was maintained for a median of 155 days (range 19–422), until reconstructive surgery could be safely undertaken in nine patients. One patient resumed TPN, one died of ischemic heart disease, and one was not suitable for reconstructive surgery due to medical co-morbidity. Fistuloclysis and distal tube feeding are safe methods to provide effective nutritional support in selected patients with enterocutaneous fistulae or a high-output loop stoma (38). To date, the intestinal failure unit in Salford has discharged 34 patients home on this new indication for home enteral tube feeding, which equates to nearly 12,000 patient days of distal enteral tube feeding (Table 2.3).

PRACTICAL ADVICE FOR SUPPORTING THE OSTOMIST

Stoma Appliances

As the surgeons strive to improve their surgical techniques, the stoma specialist ensures successful management of the ostomy with patients' approval of an appropriate well-fitting pouch. The choice of stoma appliance is made with the advice from the specialist nurse who considers the stoma site, the clinical need, patients' preference, lifestyle, and ability.

Patients today have a large and varied range of pouches, skin care products, deodorants, adhesives, and even methods of obtaining stock to choose from. However, for the new ostomist adapting to life with a stoma may be confusing with the amount of choice available.

Early appliances date back to the 1700s when Daquesceau (39) performed a colostomy, which was managed with a small drawstring leather bag as a collecting device. Patients at the time used available household products such as lint, Gamgee dressings, and cotton material to collect their effluent, with the use of heavy belts and buckles to hold them in place.

Table 2.3 Patient Selection for Fistuloclysis or Distal Feeding

| Factors	Essential	Desirable
Sepsis-free	Yes	
Mucocutaneous continuity	Yes	
Hemodynamically stable	Yes	
Proximal output between 0.5 and 2.5 L	Yes	
Distal contrast studies completed	Yes	
Patient consent	Yes	
Patient can psychologically cope with a stoma	Yes	
Manual dexterity	Yes (if self-caring)	No (if carers attending to stoma bag)

(A)

(B)

(C)

(D)
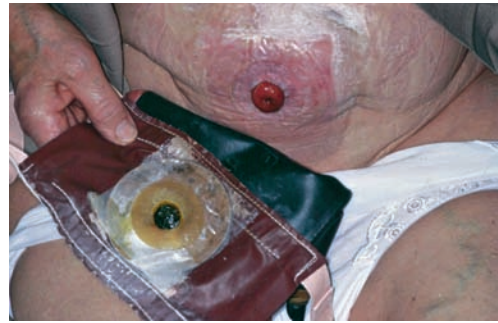
(E)

Figure 2.17 Appliances from the 1940s and 1960s: (**A**) reusable black rubber ileostomy bag that is still available. (**B**, **C**) It is used with a leather and canvas harness system. (**D**) A different rubber system with a colostomy bag shown. (**E**) A Schacht's nonadhesive bag system (see also Fig. 5.41B).

The black rubber bag was a significant breakthrough in the 1940s, patients washed and changed these weekly. Leather harnesses (Fig. 2.17), strong adhesives, and silicone glue were used to hold the bag in place. Patients were instructed to "rest" quietly while the silicone set (24). An assortment of bags was given in varying lengths for social activities and "intimate moments." Despite the appearance of these devices, some patients continue to use them today, along with the Schacht's bag (Fig. 2.17 and Fig. 5.41B), which became available in the
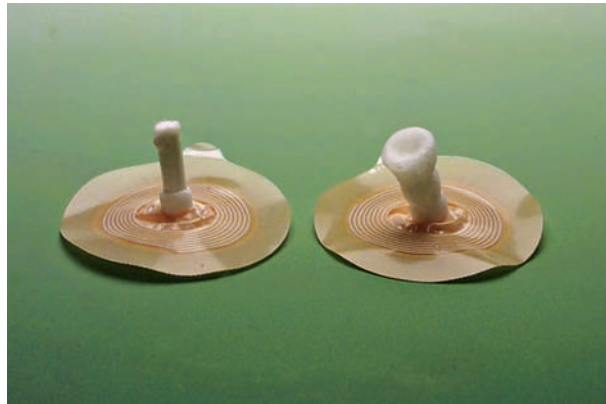
Figure 2.18   The Conseal plug (Coloplast, Peterborough, U.K.).

Figure 2.19   A selection of closed flushable pouches available in opaque plastics.

1960s. The latter is a clear plastic pouch secured with a nonadhesive harness. Patients who favor the older designs often report that the new products are expensive and are not as effective in sticking.

Plastic appliances improved patients' quality of life, as the appliances were disposable and lightweight. Pouch development improved with the introduction of karaya to protect the peristomal skin, which encourages early epithelialization of any wounds or ulceration.

Colostomy appliances are available now, which are toilet flushable to reduce the embarrassment of disposing of the contents. Some colostomists also have the advantage of being able to irrigate the bowel intermittently and wear only a plug in between. The plug (Fig. 2.18) looks a little like a tampon. It can be kept in situ for up to 12 hours.

Today's flange adhesives have been developed from hydrocolloids patented in the 1960s for wound dressings. Developments to improve the flexibility, adhesiveness, and water-handling properties during the 1970s have encouraged the use of hydrocolloids in most modern bags. Today's pouches consist of several layers of plastic film that are odor proof, low noise, of softer feel, and have a waterproof backing with the added security of hydrocolloid sticking to body contours.

There are three main types of stoma appliance.

Figure 2.20 Drainable pouches available in different sizes.
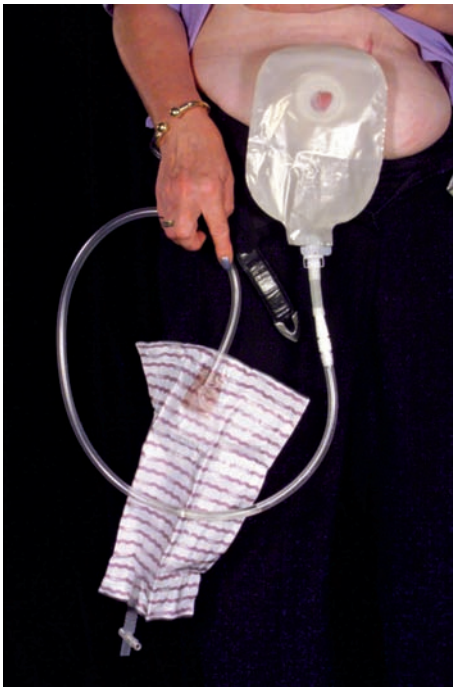
Figure 2.21 A urostomy pouch attached to a night drainage system.

1. A closed pouch (Fig. 2.19) is suitable for transverse or sigmoid colostomy when the contents are solid feces. This appliance is usually changed once or twice a day. An integrated charcoal filter, which may be one or two, is fitted for flatus to escape with reduced odor.
2. A drainable pouch (Fig. 2.20) is suitable for an ileostomy or for a colostomy in the ascending colon, which produces effluent of a porridge-like consistency. The pouch is changed every 24 to 48 hours and in between effluent can be emptied through a drainable end that is held secure with integrated Velcro fastening, a drainable clamp or soft tie. It is important that these are fixed properly to ensure safe closure and no leakage. Many drainable pouches now have an integrated charcoal filter, which allows flatus through while absorbing odor.
3. A urostomy pouch (Fig. 2.21) has a tap mechanism for drainage, often with a tactile or colored spot to indicate if the tap is open or closed. This pouch is suitable for urine and high enterocutaneous fistulae. Most types incorporate a nonreturn valve to prevent urine splashing back

Figure 2.22 Two-piece pouches: urostomy pouch with tap (left), drainable ileostomy pouch (center), and closed colostomy pouch (right).
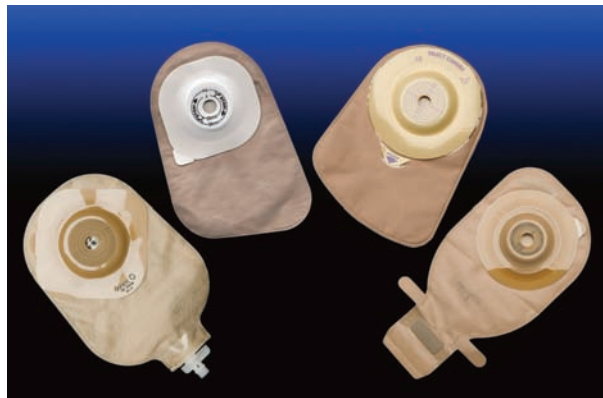
Figure 2.23 Convex-backed appliances—note the increase in depth of the faceplate on the surface which meets the skin.

onto the stoma. A facility to attach a night drainage system is available. The pouch is usually changed every 24 to 48 hours.

These pouches can also be divided into three groups, one piece, two piece, and convexed (or convex inserts).

One-piece pouches have a sticky flange usually made of hydrocolloid, which sticks directly onto the skin. The two-piece system (Fig. 2.22) has a separate flange that is applied to the skin and can remain in place for about three to five days. Pouches are attached to it by a clip or plastic attachment, which provides a secure seal. Two-piece systems can be difficult for patients with poor eyesight, tremor, or poor manual dexterity; however, the new generation of two-piece pouches is more easy to use.

A flushable one-piece closed pouch has been developed for colostomy usage. It appears very similar to a traditional pouch but the inner lining is flushable down the toilet (40). It allows the colostomist the freedom to flush the pouch down the toilet anywhere (Fig. 2.19).

Convexed pouches (Fig. 2.23) have an integrated convexity on the skin surface that improves the peristomal seal by increasing the depth of the faceplate in order to conform to the peristomal skin contours. The pouch can be very effective in patients who are experiencing leakage problems due to retraction of the stoma or high-output effluent. However, caution is needed in patients with a history of pyoderma gangrenosum, caput medusa (peristomal varices),

Figure 2.24 Skin damage from belt loops at either side of a stoma bag. The pressure from wearing a belt too tightly has caused a recurrence of pyoderma gangrenosum at either side of the ileostomy in this patient with Crohn's disease.

Figure 2.25 Clear plastic pouch used immediately after surgery to allow observation of the stoma.

Figure 2.26 Some frequently used ostomy accessories.

Figure 2.27   Hydrocolloid wafer placed on the skin before applying the bag. In this case, it was used to protect irritated and inflamed skin.

pressure ulcers, mucocutaneous separation, Crohn's ulcers, or malignant ulcers as further peristomal skin damage can occur (41). It is probable that a convex pouch may trigger pyoderma gangrenosum in some patients (see chap. 6).

Two-piece and convexed pouches can have additional support from the optional use of waist belts; however, caution is needed to ensure that the patient does not wear the belt too tightly as added skin trauma can occur at the belt loop sites (Fig. 2.24).

In the immediate postoperative period, a clear plastic pouch is usually used to allow observation of the stoma (Fig. 2.25). A number of patients with poor eyesight or poor manual dexterity prefer to continue using this appliance because it is easy to see the position of the stoma through the bag when placing the appliance. More usually, the effluent from the stoma can be concealed using flesh-colored or opaque "soft-to-touch" pouches. As for other appliances, these products are available with the aperture precut or "cut-to-fit."

Stoma Accessories

There are various stoma accessories (Fig. 2.26) available for the patients and the nurse specialists to help in the management of ostomies. However, assessment of patient's need is extremely important to prevent misuse and create additional unnecessary problems (42). A wide range of skin barrier preparations is available, including:

1. Wipe-on films (e.g., Saltair lotion™, Periprep wipes™, Salts, Birmingham, U.K.; Clinishield™, LBF™ wipes, CliniMed, Buckinghamshire, U.K.; Protective Wipes™, Coloplast, Cambridgeshire, U.K.; Skinsafe™, Opus-Healthcare, Colchester, U.K.)
2. Plastic or hydrocolloid films (wafers) (e.g., Coloplast protective sheets, Coloplast, Cambridgeshire, U.K.; Askina™, Braun, Sheffield, U.K.)
3. Hydrocolloid washers (e.g., G-Xtra seals™, Dansac, Cambridge, U.K.; Cohesive seals™ Salts, Birmingham, U.K.; Adapt Barrier Rings™, Hollister, Wokingham, U.K.)
4. Pastes and powders [e.g., Stomahesive paste™, Orahesive™, corticosteroid in carmellose sodium paste (see p. xii), ConvaTec, Uxbridge, U.K.; Dansac Soft Paste™, Dansac Ltd., Histon, U.K.; Soft paste™, Pelican,Cardiff, U.K., Cohesive Paste™, Eakin, Co. Down.]

These preparations are applied to peristomal skin as a protective layer to help prevent skin damage. Skin contours, creases, and scars can be filled using pastes or hydrocolloid wafers and washers to render the surface level before applying a bag (Figs. 2.27 and 2.28). Patients often use stoma wafers and skin barriers because they feel they have developed an allergy to their product. However, allergy to ostomy products is rare (43). Barrier preparations may also be used by patients who feel the need for added security such as those who are very active or working closely with other people. Some such patients use innovations of their own to improve

Figure 2.28 Filler paste used around a receding stoma before applying the bag in order to prevent leaks and protect irritated skin. Any of the pastes mentioned can be used in this way for receding stomas and for those with an irregular skin surface, for example, caused by scarring.
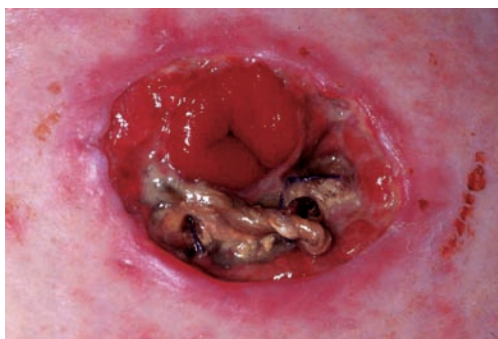

(**A**)

(**B**)

(**C**)

Figure 2.29 Mucocutaneous separation: (**A**) four days postoperatively, the mucocutaneous wound has separated. The problem was treated conservatively using daily applications of carmellose sodium powder. (**B**) After three weeks, the wound has healed with some overgranulation in the base. Treatment was continued. (**C**) Complete healing is evident 28 days after surgery.

(A)

(C)

(B)

(D)

(E)
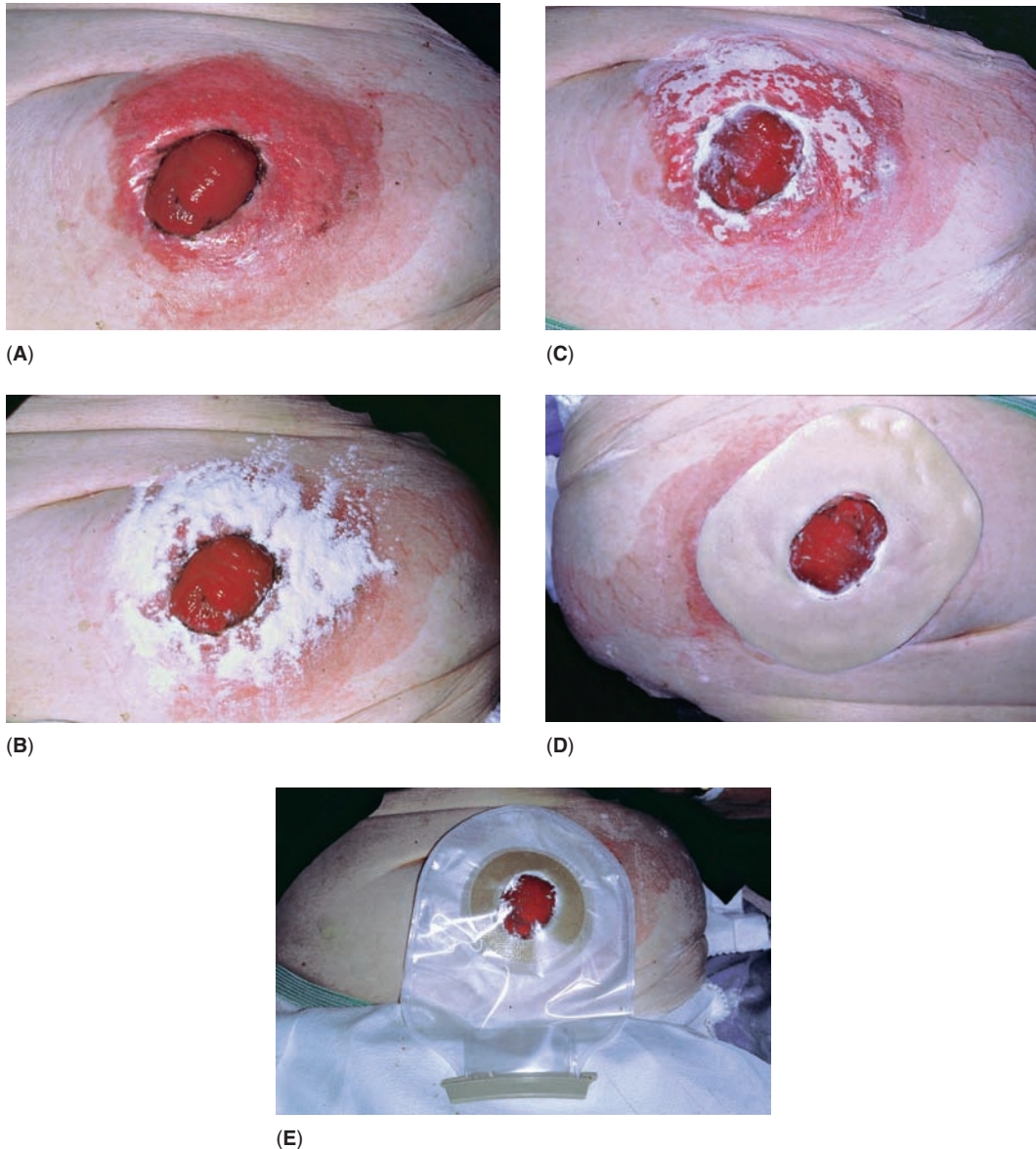
Figure 2.30 Application of Orahesive powder or sucralfate powder to (**A**) eroded peristomal skin. (**B**) Powder is sprinkled on to the skin and (**C**) the excess removed by lightly wafting. The powder remains adhering to the moist eroded areas only. For further protection, in this case, a secondary hydrocolloid wafer (**D**) was applied before (**E**) fitting the bag.

security, for example, one of our male patients uses an adapted, reinforced corset to allow him to go rock climbing, confident that he will not suffer leaks. Other examples of the use of these products are given in the next section.

MANAGEMENT OF SOME SPECIAL SITUATIONS

Dehiscence of the Mucocutaneous Junction (Mucocutaneous Separation)

Mucocutaneous separation (Fig. 2.29) occasionally occurs in stomas, which have been constructed under some degree of tension. The common causes are local infection, abdominal distension, preop-

erative radiotherapy, and poor nutrition. Despite the alarming appearance, this self-limiting condition responds to various conservative methods that are undertaken by the nurse specialist. The wound is dressed at each pouch change with carmellose sodium paste/powder [corticosteroid in carmellose sodium paste (see p. xii) or Orahesive] and a hydrocolloid-only stoma appliance used. With this approach, the wound will heal satisfactorily, usually within four weeks (Fig. 2.29). If the cavity around the stoma is deep, this may be packed with an alginate dressing until healed.

Eroded Fecal Dermatitis

This complication is discussed in chapter 3. It usually occurs around high-output stomas such as jejunostomies and very proximal ileostomies. The problem responds to daily treatment with carmellose sodium powder or sucralfate (Fig. 2.30). Older treatments involved infrared lamps; patients were instructed to place a heat lamp 36 cm from the erosions to promote healing (44).

Unpleasant Odors

Some ostomists complain of odor from their stoma. A thorough assessment should be undertaken by the nurse specialist to detect the cause of the odor, as an appropriate fitting pouch with a good seal should not allow the escape of unpleasant smells.

The odor may be diet related, necessitating dietary advice. There are various types of deodorants available in sprays, drops, or pellets. However, caution is needed in demonstrating their use to patients as contact with the peristomal skin can induce skin allergies. Apart from deodorant air sprays, these products are intended for use in the stoma pouch only so that skin contact should not occur.

Cleaning the Peristomal Skin

Water and cotton gauze (cotton wipes) are sufficient for cleaning feces and urine from the peristomal skin. Patients may be tempted to use moist wipes (bought over the counter), however, these could induce skin allergens as perfume and other potential allergies are present. Patients who use washable cloths for cleaning their peristomal skin are advised to wash the cloths in a nonbiological washing powder, not bleach (sodium hypochlorite) or disinfectant, to help reduce the potential for skin irritation. It is recommended that those patients who bathe or shower with no pouch on should use a bath or shower gel that is nonoily and unperfumed and that skin is thoroughly rinsed.

Abdominal Hair

Hair around the peristomal skin may hinder pouch adhesion or the patient may experience pain on removal of the flange. Most patients choose to shave and are encouraged to shave no more frequently than weekly and with a clean razor because hair follicles can become infected if shaving is more frequent and hygienic washing practices are not adhered to.

Management of Severe or Circumferential Peristomal Ulcers

Peristomal ulceration is uncommon but, as described in chapter 6 for pyoderma gangrenosum in particular, it can cause severe problems for normal stoma pouch use. Thin hydrocolloid wafers or steroid impregnated tape may be used over the ulceration before applying the stoma pouch. Caution and regular assessment is necessary as steroid tape can cause skin atrophy. This not only reduces the risk of leaks around the stoma but also allows topical treatments such as tacrolimus paste to be applied (Fig. 2.31). Some patients with severe pyoderma gangrenosum are unable to take systemic treatments because of concurrent ill health. For these people, topical treatment with tacrolimus alone, used under a secondary wafer, may be sufficient despite the severity of their disease at presentation (Figs. 2.32 and 2.33).
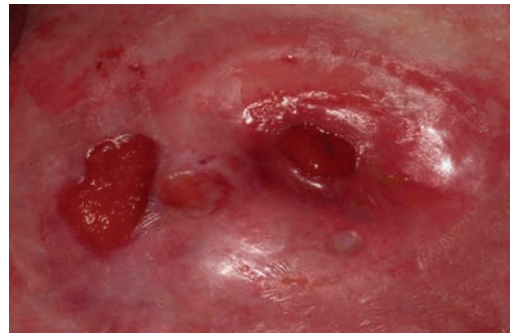
Silent Ostomists

Silent ostomists are patients who had their stoma fashioned many years ago and who have had no contact with or access to a nurse specialist. They are often referred as they get older because their faculties or manual dexterity diminish or because other circumstances have changed,
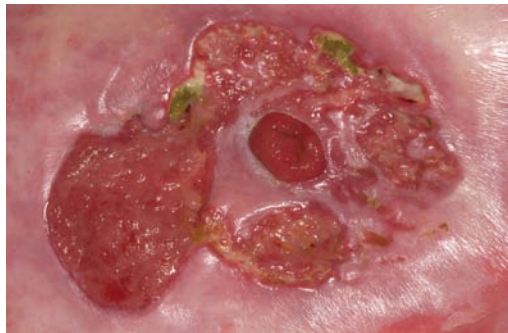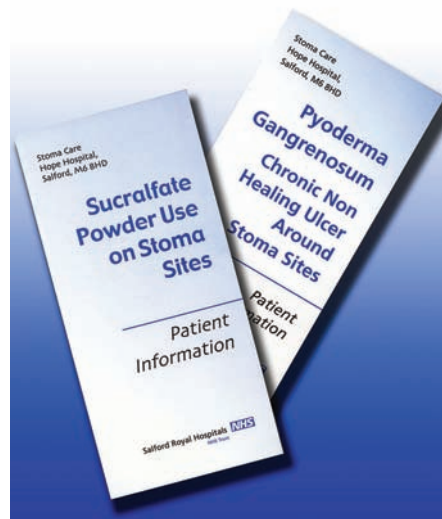
(A)

(B)

(C)

(D)

Figure 2.31 (**A**) Eighty-nine-year old with first presentation of pyoderma gangrenosum in outpatients. Topical tacrolimus paste commenced. (**B**) Reviewed after two weeks of treatment; there is marked improvement of ulcers with granulating tissue. (**C**) After a further two weeks, the ulcers are virtually healed. (**D**) We have developed a range of leaflets for specially prepared treatments such as topical tacrolimus in corticosteroid in carmellose sodium paste (see p. xii) paste.

(A)

(B)

Figure 2.32 (**A**) Circumferential, discrete pyoderma gangrenosum ulcers affecting a colostomy formed for ade-nocarcinoma of the colon. (**B**) Tacrolimus paste was applied and healing was achieved in eight weeks.
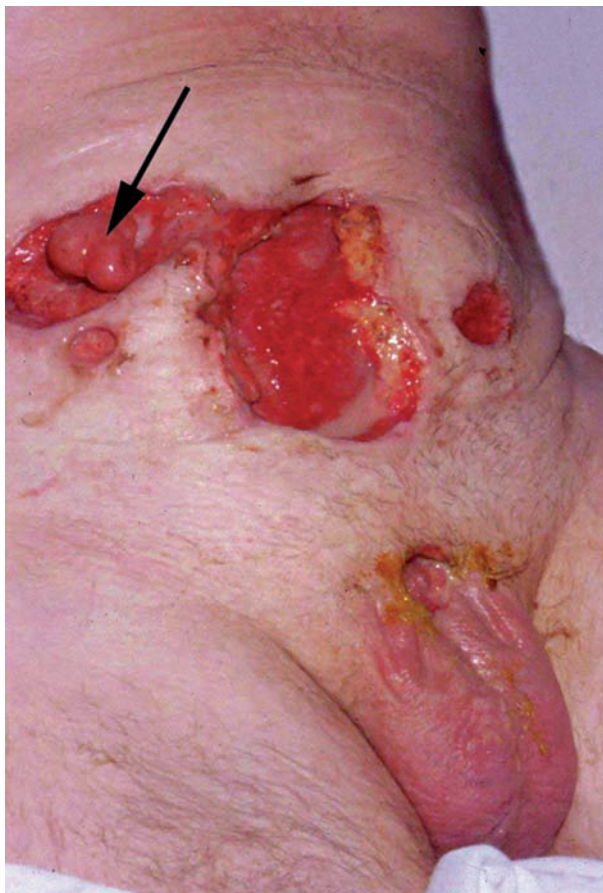
Figure 2.33 Severe pyoderma gangrenosum affecting a urostomy (arrow) formed because of surgical trauma. Another ulcer is present on the abdomen and pyoderma gangrenosum has also destroyed the penis. This patient was treated with topical tacrolimus paste. Around the urostomy, this was applied under a thin hydrocolloid dressing before fitting a bag. The patient was unable to receive systemic immunosuppressive therapy because of concurrent bacterial endocarditis requiring valve replacement. Nevertheless the pyoderma gangrenosum healed over eight weeks using topical treatment alone.

resulting in a failure to cope with their stoma. In raising the stoma care profile in communities with posters, leaflets, open days, and contact with primary care teams, access can be gained for all ostomy patients (45).

THE STOMA CARE SPECIALIST NURSE AND THE MULTIPROFESSIONAL TEAM

Ostomy surgery is a major life event. Patients' successful adaptation to life with a stoma depends on the practical and psychological support they receive during this time. Specialist nurses are instrumental in providing good preoperative counseling, postoperative support, and in helping patients to adjust to their altered body image and life with a stoma.

The following thoughts are from a local member of the ileostomy association.

"My ileostomy was made in 1965—prestoma nurse era. An appointment was made with a representative of Prince & Fletcher (appliance house). When I arrived for the fitting, a male representative handed a pink flesh-colored corset with bones rather like 'Gone with the Wind'.

> *There was a hole to thread the inevitable rubber bag. Once threaded the bag had to be sited over the stoma, hooks and eyes done up one handed, while the other hand held the bag. The male representative handed under the cubicle curtain a tiny rubber bag and explained that this was for 'intimate moments'! I do not know who was more embarrassed, me or my mother. She was shocked to the core!"*

KEY MESSAGES

Preoperative Management

- Patients should have access to a specialist nurse for explanation and advice as well as for the practical aspects of stoma siting.
- The stoma should be sited where the patient can see it; it is away from scars and body folds and is not likely to be damaged by clothing.
- Involvement of MDT is essential.

Postoperative Management

- Patients should be assessed before leaving hospital to ensure that
  - they are using an appropriate appliance and
  - they are able to care for their stoma and understand that cleansing procedures should be kept simple and, if possible, only water should be used.
- A follow-up appointment at 10 to 12 weeks should be offered to reinforce this advice and to provide any other practical advice appropriate to pre-empt any lack of practical or psychological coping. An interim home visit may be useful in some cases.
- Regular but less frequent visits are provided to allow reassessments of the stoma care routine and appliance type or size.

Stoma Appliances and Accessories

- A wide range of appliances is available that will cover the individual requirements of most patients.
- Stoma pouches with a convex-surfaced barrier are effective in reducing leaks from short or receding stomas, but care should be taken in patients with existing skin trauma or a history of pyoderma gangrenosum.
- Numerous barrier, hydrocolloid, and paste preparations are available to manage peristomal leaks and irritation.
- Where there is severe or circumferential ulceration, a secondary hydrocolloid dressing/steroid impregnated tape worn under the bag can be highly effective in preventing leaks and allowing topical treatments to be used.
- In general, stoma-care routines, including washing, appliances, and accessory use, should be kept as simple as practical in order to minimize the potential for skin problems.

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3 | Dermatitis: Contact Irritation and Contact Allergy

Jason D. L. Williams and Calum C. Lyon

Irritation, particularly from stoma effluent, is the commonest cause of peristomal skin problems (1). Allergy, in contrast, is one of the rarer causes. Both of these conditions, although pathologically distinct, can produce similar peristomal rashes and, for this reason, they are covered together. Furthermore, most patients and many health professionals have popularly regarded allergy as the likeliest cause of peristomal dermatoses. This myth is fostered by the number of individual case reports in the medical literature describing contact allergy to components of stoma appliances or their accessories. The consequence of this presumption is that many patients try several changes of appliance type in an attempt to identify the "allergenic" ones, a process that can result in costly wastage of unused batches of materials.

Peristomal skin provides an ideal situation for developing either allergy or irritation. The skin is repeatedly stripped when appliances are removed (causing irritation), it is intermittently bathed in irritating stoma effluent and, for most of each day, it is occluded in a humid environment (increasing the risk of sensitization). Any potential allergens are held next to this skin by the appliance and this, together with the humidity, makes them more likely to cross the skin and cause sensitization. Furthermore, inflammation resulting from preceding or coexistent irritation appears to enhance the likelihood of sensitization. Nonetheless, allergy can be scientifically tested by means of a number of well-established clinical investigations and appears to be unusual in stoma patients.

In general dermatological practice, a wide variety of allergic and irritant reactions is seen. These are commonly found on exposed sites, especially the hands and can be work related. The distribution and sometimes the appearance of the rash provide clues to its cause (Fig. 3.1). Acute irritant contact dermatitis (ICD) typically presents as a well-defined erythema, which is often edematous, sometimes with blister formation. If the irritation is severe, there may be skin necrosis. Acute allergic contact dermatitis (ACD) is also erythematous but the margins are indistinct and blurred. Papules and vesicles are often seen and the lesions may become painfully eroded and crusted. Itch is a feature common to both ICD and ACD. A small number of patients with localized dermatitis may develop secondary, generalized dermatitis that may further confound the diagnosis (termed an id reaction). If exposure to the causative agent continues in either ACD or ICD, all the above features may be seen at different stages of evolution. Both conditions often progress to a chronic, erythematous scaly eruption with fissuring at certain sites such as palms and soles. Thickening of the skin (lichenification) due to rubbing and scratching as well as secondary infection may also occur. In summary, chronic ACD and ICD may be impossible to tell apart on clinical examination alone.

With regard to peristomal skin, fecal/urine irritant reactions are usually obvious as they occur where skin is demonstrably exposed to effluent, also these dermatoses will resolve when the contamination is prevented by appliance modifications. Irritant reactions also include a number of easily recognized papular reactions to peristomal irritation, usually the result of persistent skin contact with stoma effluent. For the other patients with peristomal dermatitis, or in those patients where the dermatitis persists, further investigations may be indicated to exclude allergy.

In this chapter, we discuss the nature of the large variety of peristomal irritant reactions, their investigation, and management before going on to describe cutaneous allergy and its investigation and then, some miscellaneous disorders.

- Irritant reactions
  - Fecal/urine irritation
    - Dermatitis
    - Papular irritant reactions

- - ○ Physical irritation
    - ▪ Clothing or appliances
    - ▪ Dermatitis artefacta (see chap. 5)
  - ○ Chemical irritation
    - ▪ Appliances or topical treatments
  - ○ Nonspecific irritant dermatitis
- Allergic reactions
- Other skin changes
  - ○ Pigmentation
  - ○ Vascular proliferation

IRRITANT REACTIONS

The skin reacts in a limited number of ways to a wide range of pathological insults. All the peristomal irritant reactions, for example, share common histological features, including acanthosis, hyperkeratosis, and a dermal inflammatory infiltrate. Furthermore, different clinical patterns of peristomal irritation frequently coexist in the same patient. These clinical patterns, ranging from dermatitis to papules and plaques, probably represent a spectrum of presentations of

(**A**)

(**C**)

(**B**)
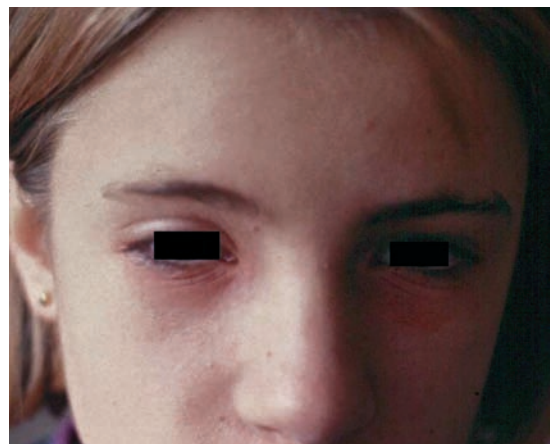
(**D**)

Figure 3.1 (**A**) Allergic contact dermatitis (ACD) to fragrance in a stoma bag deodorizer. The rash consists of coalescing vesicles and excoriated erythema. The edge of the erythema is indistinct. The rash is distributed in the area of skin where the patient allowed skin contact with the deodorizer. (**B**) ACD to chromates used to tan shoe leather, affecting only the skin in contact with the shoe upper. (**C**) ACD to garlic. Note the distribution on the tips of the thumb and index finger. (**D**) ACD to nickel in eye shadow.

the same basic pathological processes. Nonetheless, the individual morphological features are distinctive and it is important to appreciate both the distribution and the morphology of the inflammation if one is to identify the source of irritation and prevent it.

Fecal/Urine Irritation

Feces or urine leaking onto the skin cause irritation. If contact is transient, the skin will heal rapidly, but if it is persistent or recurrent, an irritant reaction ensues. The commonest clinically apparent reaction is dermatitis (inflamed skin). To protect itself against further irritant attack, the skin reacts by becoming hyperplastic and hyperkeratotic (see "Glossary," appendix 1) and the resultant thickening, if extensive, will be clinically apparent as papules or plaques.

A number of factors may be responsible for stoma effluent persistently coming into contact with the skin.

1. *The appliance used by the patient is inappropriate:* In the weeks after stoma surgery, the stoma remodels even after surgical wounds have apparently healed. In most cases, the stoma becomes smaller in diameter and sometimes in length. If the patient continues to use the same stoma appliance, it will leave the skin exposed to contamination because the appliance aperture is now too large. The resulting area of inflammation is frequently crescentic and inferior to the stoma but may be circumferential if the patient alters the position of successive appliances relative to the stoma. This type of irritant reaction will resolve if the appliance type is changed for one with a smaller aperture (see chap. 2). Stomas do continue to alter in shape with time as the patients' weight or abdominal musculature changes. Regular appliance assessments are therefore advised.
2. *The structure of the stoma is suboptimal:* The ideal stoma is long enough to prevent leakage under the appliance. However, complications do occur and the stoma may have been short since formation; it may have become retracted subsequently or buried in abdominal fat as the patient gains weight after surgery. Crohn's disease or infection may cause atrophy and shortening of the stoma. These complications are described in detail in chapter 1. They may respond to appliance modifications (chap. 2), although in some cases the only course of action is surgical refashioning of the stoma. Occasionally, parastomal hernias or other surgical complications occur that impair bag adhesion and these are illustrated below.
3. *The position of the stoma is suboptimal:* As described in chapter 1, the ideal stoma is placed to avoid body folds, clothing, and surgical scars that might dislodge the appliance and cause leaks. Surgical necessity may mean that the stoma siting is suboptimal.
4. *The stoma output is so high that leaks are inevitable:* Sometimes the stoma output may be several liters a day. This is certainly true of ileostomy patients with short bowel and of those with a jejunostomy. These more proximal stomas also produce a higher concentration of digestive enzymes in the effluent. As well as increasing the likelihood of skin corrosion, in some instances, the effluent will rapidly dissolve the hydrocolloid of the stoma barrier so that leakage onto peristomal skin is unavoidable.
5. *Primary peristomal skin diseases or physiological changes impair bag adhesion and consequently cause leaks:* Inflammatory skin diseases such as eczema or psoriasis interfere with normal bag adhesion to the skin thereby causing leaks. The ensuing irritant inflammation may worsen bag adhesion and exacerbate the initial dermatosis, further compounding the problem. Menopausal women sometimes experience impaired bag adhesion due to sweating during menopausal flushes. Any other cause of increased sweating such as climate change or fever may similarly cause problems.

Where sweating is a persistent problem and simple measure such as unperfumed roll-on deodorants are not effective, botulinum toxin (BOTOX™, Allergan) injections intradermally can be very effective. Botulinum toxin may have a place in reducing excess mucus secretion from stomas and possibly even lengthening shortened stomas by paralysis of longitudinal muscle.

In all the situations described above, the irritant reactions that result will impair bag adhesion so that leaks are now more likely and a vicious cycle is set up.

Dermatitis

Definition

This remains the most common single cause of peristomal skin problems and occurs where the skin is repeatedly bathed in leaking stoma effluent. The term dermatitis is often used to imply an eczematous reaction to an exogenous agent, either allergic or irritant. Many dermatologists use this terminology to distinguish it from endogenous eczema such as atopic eczema. Because it is in common, we will use the word dermatitis here although for most clinical and histological purposes the terms eczema and dermatitis are regarded as synonymous.

Etiology

The etiology of fecal/urine irritant dermatitis is discussed above in points 1 to 5.

Clinical Features

While the morphology of fecal/urine ICD may be indistinguishable from dermatitis produced by other causes, the distribution is determined by the leakage of stoma effluent onto the skin and this area of contamination is usually obvious. Peristomal fecal/urine dermatitis is analogous to the napkin rash that was commonly seen before modern absorbent nappies were available (Fig. 3.2). However, it differs in one way. Napkin dermatitis spares the skin folds because the sodden nappies do not touch them; however, in peristomal dermatitis, skin folds or scars are

(A)

(B)

(C)

Figure 3.2 (**A** and **B**) Napkin dermatitis in an infant due to prolonged contact of the skin with wet nappies. Note that the dermatitis spares the skin folds because the nappies do not come into contact with them. (**C**) Similar fecal irritant dermatitis around a loop ileostomy where the appliance aperture was cut too large.

often the route by which leaking effluent tracks away from the stoma. Peristomal skin folds are, therefore, typically inflamed (Fig. 3.3).

For simplicity, the illustrations are grouped into the different causes of effluent leakage listed above. Nonetheless, two or more of these causes of leakage may coexist in the same patient to produce a complex clinical picture. Similarly, more than one irritant reaction pattern may be found in the same patient.

1. *The appliance used by the patient is inappropriate:* This is probably the commonest cause of largely preventable irritant reactions (Figs. 3.4–3.9).
2. *The structure of the stoma is suboptimal:* It may be short (Figs. 3.10 and 3.11), retracted (Fig. 3.12), buried in abdominal fat (Fig. 3.13), distorted (e.g., by scarring) (Figs. 3.14 and 3.15), associated with a parastomal hernia (Fig. 3.16), or associated with a stoma prolapse (Fig. 3.17).
3. *The position of the stoma is suboptimal:* The stoma may be high on the abdomen, sited in an abdominal skin fold that dislodges the appliance when the patient sits forward (Figs. 3.3 and 3.18), or near a surgical scar (Fig. 3.3).
4. *The stoma output is so high that leaks are inevitable:* This is a problem particularly for ileostomies with short bowel and for jejunostomies (Figs. 3.19 and 3.20). It may also be difficult to prevent leaks in patients with a feeding gastrostomy. This is because of the highly corrosive nature of gastric contents, where even brief skin contamination can result in eroded dermatitis (Fig. 3.21).
5. *Primary peristomal skin diseases or physiological changes impair bag adhesion and consequently cause leaks:* Primary skin diseases and their impact on peristomal skin are discussed in Chapters 5 and 6. The increased perspiration experienced during the menopause can result in a nonspecific peristomal dermatitis and lifting of the bag, resulting in fecal/urine irritation (Fig. 3.22).

Peristomal skin inflammation from any cause will impair bag adhesion and cause leaks. Patients often respond by changing their appliances more frequently and in so doing traumatize the skin further. This initiates a vicious cycle as the skin stripping of frequent bag changes makes dermatitis, and therefore leaks, more likely (Fig. 3.23A). Occasionally, despite careful pre- and postoperative counseling, a patient becomes unduly anxious about their stoma and may change the bag several times a day because of fears about socially embarrassing leaks. Ironically, this makes leaks more likely because the damaging cycle of events described above occurs (Fig. 3.23B). Patients' bag changing frequencies should therefore be assessed and excessive bag changing should be discouraged.

Figure 3.3 Peristomal dermatitis due to fecal leakage in a patient with an ileostomy for Crohn's disease. The dermatitis is most marked in the skin folds and scars around the stoma, particularly extending to the umbilicus. There is one area of sparing (arrow) because the patient applied the bag when seated and this fold was covered when the bag was placed.

(A)

(B)

(C)
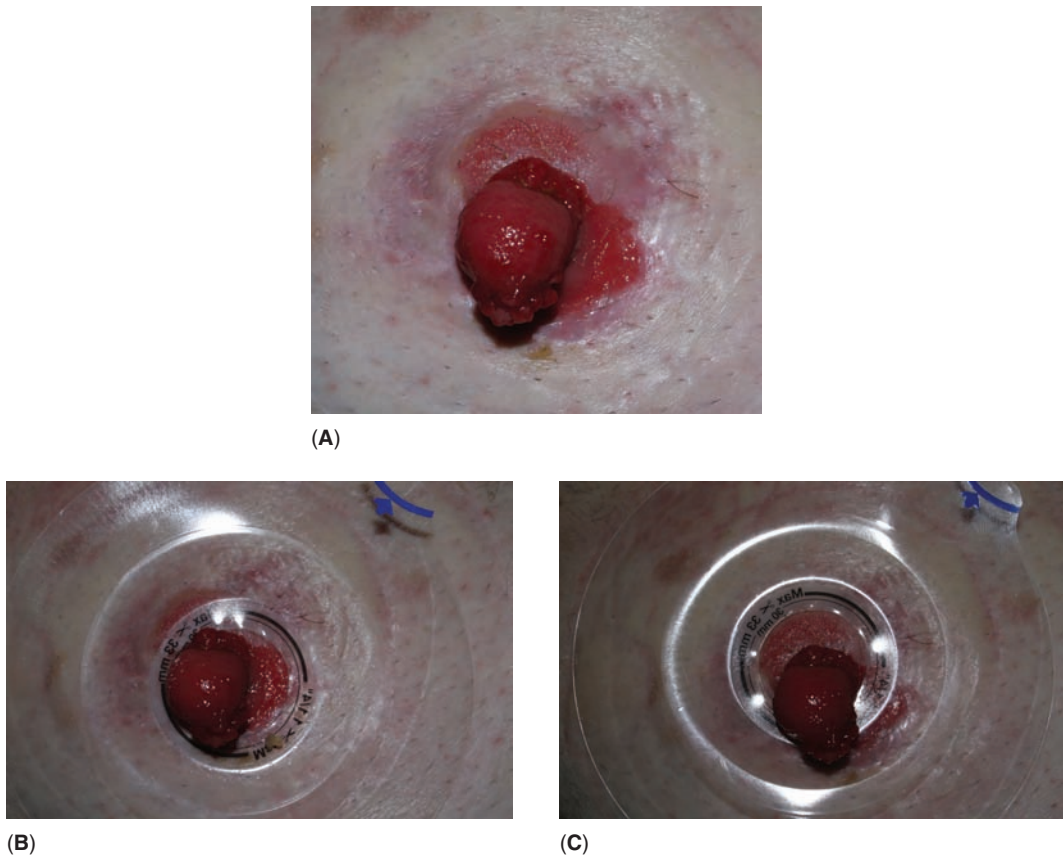
Figure 3.4 Reduced stoma diameter in the months after surgery, resulting in dermatitis. (**A**) Two areas of erosion and hyperkeratosis secondary to fecal irritation. (**B** and **C**) Figures show the two positions that the patient wore the appliance, thus exposing two areas of skin repeatedly to fecal contamination.

Management

With regular postoperative follow-up, the bulk of these problems can be prevented by institution of appropriate appliance modifications before skin problems occur. If the stoma is reduced in circumference, a bag with a smaller aperture is selected. If it is short or receding into fat, a range of convex-backed appliances or hydrocolloid washers is available. A range of interventions is available for the prevention of leaks in patients with poorly sited stomas, scarring, hernias, or prolapsing stomas. These include appliance modifications, filler pastes to achieve a flat surface for bag application, and additional hydrocolloid dressings worn under the bag. These and other products are discussed in chapter 2.

Acute, painful ICD can be treated with a short course of topical corticosteroid (appendix 4) in order to settle the inflammation rapidly before these secondary prevention measures are undertaken. Hydrocolloid such as carboxymethylcellulose pastes and powder (Orahesive™ powder, Conva Tec Ltd., Uxbridge, U.K.), which do not interfere with appliance adhesion, can also be used to protect irritated skin and promote healing.

We have found that daily applications of sucralfate powder are highly effective (2) in the management of the eroded dermatitis, which occurs when stoma effluent persistently leaks onto the skin (Fig. 3.20). Sucralfate is a derivative of sucrose that is licensed for use in the management of gastric ulcers and has also been shown to be effective, in powder form, as a treatment for eroded napkin or peristomal dermatitis. The powder that is used for peristomal erosions forms a sticky paste when moist so that it acts as a protective physical barrier on the denuded skin. Research suggests that it also promotes healing of ulceration by protecting fibroblast growth factors from degradation. If the powder cannot be obtained, a pharmacist can

(A)

(B)

(C)

(D)

Figure 3.5 Fecal/urine irritant dermatitis secondary to using a bag with too large an aperture. In the cases illustrated, the patients had continued to use the same bags since surgery and had not attended for stoma-care assessment. As a result, they were all using appliances with too large an aperture that permitted chronic fecal soiling of the skin. (**A**) This patient has a crescent of indurated, hyperkeratotic dermatitis because the patient always placed the bag in the same place. Histologically, there was marked, reactive acanthosis and this raised area could also be considered as an inflammatory acanthoma. (**B**) This patient placed the bag slightly differently each time it was changed so that the whole circumference has been exposed to fecal contamination, and there is circumferential irritation with hyperkeratosis (white). (**C**) As for the patient illustrated in (**B**), there is circumferential dermatitis around this colostomy. The problem is compounded by the short stoma, which makes it less likely that stool will go directly into the bag and soiling is obvious. There are also numerous papules of overgranulation secondary to the irritation. In short colostomies like this, stoma may not empty properly if too small an aperture is cut in the bag so that one may have to compromise by leaving a small amount of skin exposed but protecting it with a barrier preparation. (**D**) This is also a short colostomy but the dermatitis is crescentic and markedly eroded due to chronic fecal irritation. Soiling of the skin is obvious. (*Continued*)

prepare it by crushing the tablets. The powder is used in the same way as carboxymethylcellulose powder, being dusted onto the skin and the excess removed by gentle wafting, to leave powder sticking to the wet eroded areas of skin (see chap. 2).

The management of primary skin diseases is discussed in chapter 6. Problems relating to excessive perspiration can be difficult to treat, although on an anecdotal basis unperfumed roll-on antiperspirants have been effective in some cases.

(**E**)

(**G**)

(**F**)

(**H**)

Figure 3.5   (*Continued*) (**E**) A short ileostomy where the patient used a bag with too large an aperture. (**F**) In this patient, the crescentic area of hyperkeratotic dermatitis has become ulcerated due to repeated minor trauma during bag changes. (**G**) This patient continued to use a bag with too large an aperture despite the advice to change to a smaller one. The imprint of the barrier can be seen clearly. (**H**) Circumferentially irritated skin for the same reasons as the patient in (**B**) but in a patient with very darkly pigmented skin.

Papular Irritant Reactions

As discussed, papular irritant reactions are produced by the same pathological processes as dermatitis and as such represent the farther end of the spectrum of fecal/urine irritant reactions. There are, however, distinct patterns with different clinical implications, for which there may be different management strategies.

"Granulomas" (Papular Overgranulation Sometimes with Bowel Metaplasia)

Definition.   This is characterized by papular, benign tumors appearing around stomas well after surgical wounds have healed. This category, therefore, does not include overgranulation

Figure 3.6 Circumferential dermatitis around a short ileostomy. The patient used a bag with too large an aperture corresponding to the raised ring around the stoma and the long-term irritation has also resulted in acanthomatous inflammation (see section "Papular Irritant Reactions").

Figure 3.7 This patient with a urostomy for carcinoma developed short-lived irritant dermatitis due to leaks from the short, rather buried, stoma. The patient continued to change the bags very frequently even though the primary problem had settled. This produced a more peripheral irritant dermatitis due to repeated skin stripping by the woven fabric, adhesive part of the appliance. Note also the typical post-inflammatory hyperpigmentation around this recurrently inflamed urostomy.

Figure 3.8 Fecal irritant dermatitis around an ileostomy in a patient with Crohn's disease. The stoma is short and there is a parastomal hernia, both factors that contribute to poor appliance adhesion.

Figure 3.9 Fecal irritant dermatitis around a short ileostomy in a patient with ulcerative colitis who cut the stoma-bag aperture too large (illustrated). The patient became anxious about bag failures because the patient worked with the public as a receptionist and was changing the bag five times a day to pre-empt leaks. The resulting skin stripping made the problem of bag adhesion worse. Note the fecal irritant dermatitis in an apron shape below the stoma and the accompanying fecal soiling (arrow).

of surgical wounds. The lesions are composed of inflamed granulation tissue, acanthomatous epidermis, and islands of bowel metaplasia. They present as friable, tender papules that bleed easily and are often called "granulomas" or "inflamed polyps."

Etiology. We regard fecal irritation as the principal etiological factor for these lesions for the following reasons:

- They occur around short or receding stomas.
- There is always evidence of chronic fecal soiling of the skin.
- Lesions occur at the sites of soiling.
- New lesions occur in previously normal skin if the stoma-bag aperture is cut too large, thereby exposing skin to soiling.
- There is often bowel metaplasia of the skin, analogous to gastric or intestinal metaplasia of the esophagus seen in the precancerous condition of Barrett's esophagus, where refluxing gastric contents irritate the lower esophagus.

It appears that in some people fecal contamination of the skin adjacent to the artificial mucocutaneous junction triggers bowel metaplasia of the skin as well as producing the more typical features of acanthosis and hyperkeratosis.

Histology. The histological features of a typical lesion and of the normal mucocutaneous junction are shown in Figure 3.24. This disorder has some similarities to Barrett's esophagus both clinically and histologically. In the latter condition, repeated gastric reflux causes gastric metaplasia of the squamous epithelium of the lower esophagus. Histologically, islands of gastric mucosa are seen within the squamous epithelium and continuous with it.

Clinical features. These lesions present as red papules, usually involving the mucocutaneous junction, at least initially. They are very common and most are asymptomatic. They can, however, become tender or precipitate stoma bag leaks because they are friable and the resultant bleeding will dislodge appliances. Fecal irritation is the common factor, so they will occur around a normal stoma if the bag aperture is cut too large (Fig. 3.25). The strongest evidence that this disorder is caused by fecal irritation comes from the observation that, if patients develop one lesion and cut their bag larger to accommodate it, they expose normal skin to feces and new lesions develop. The patient may then cut the bag aperture even larger and the affected area
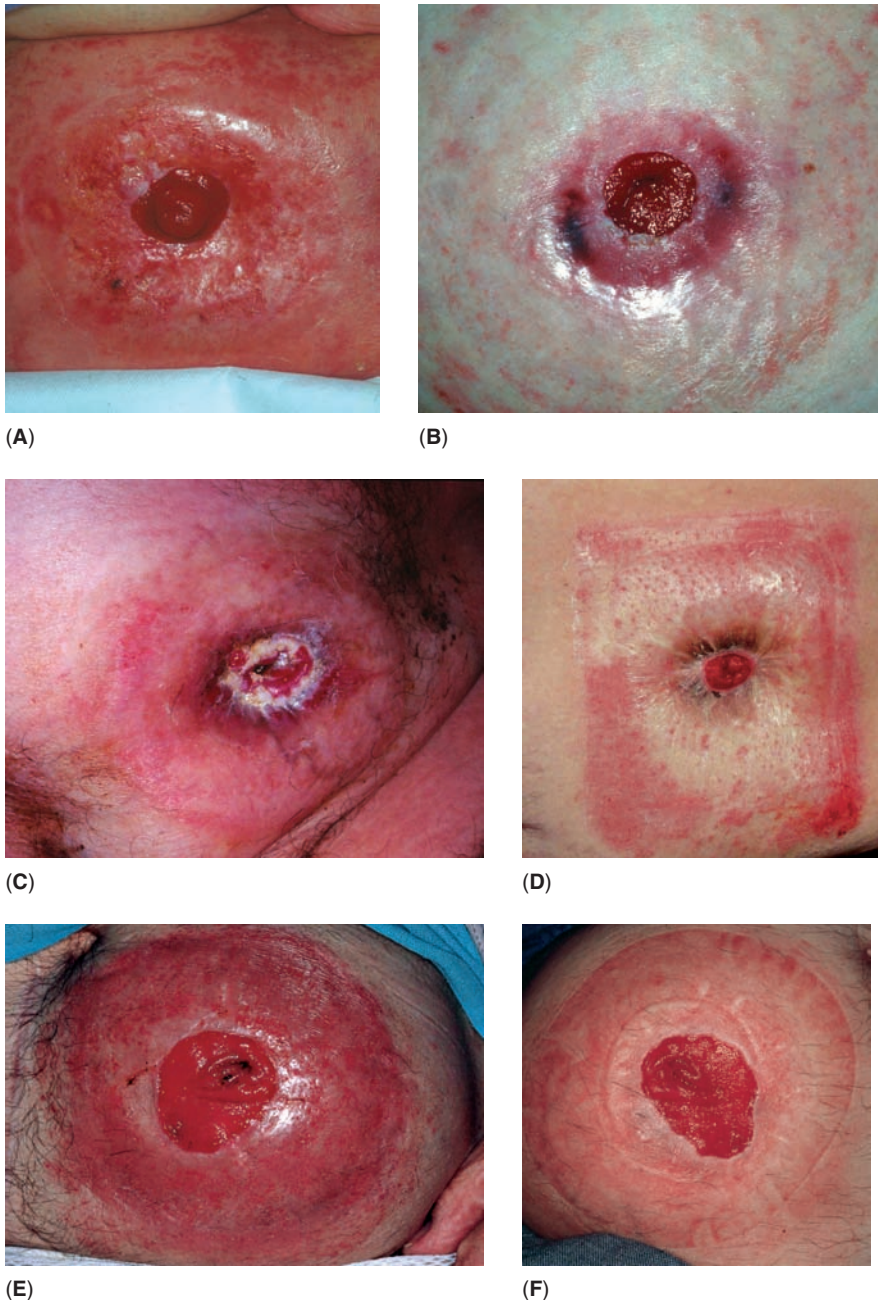
Figure 3.10 (**A**) Fecal irritant dermatitis around a short ileostomy. The dermatitis has spread to involve the surrounding skin. (**B**) Short and slightly buried colostomy where the patient used too large an aperture in order to ensure that feces went into the bag. As a result, the exposed skin is inflamed. (**C**) A very short and slightly retracted urostomy in which it is difficult to prevent leaks under the bag. As well as dermatitis, there is warty hyperplasia (acanthosis) of the skin, the beginning of chronic papillomatous dermatitis, which is stenosing the stoma (see below). (**D**) Another short urostomy. In this case, chronic inflammation has resulted in post-inflammatory hyperpigmentation—a common finding around such urostomies. The patient changed the bags several times daily because of leaks and this has produced an irritant dermatitis under the adhesive more peripherally. (**E**) Dermatitis around a short colostomy. The tendency to leak was made worse by the parastomal hernia that caused the bags to lift and the dermatitis was made worse by the consequent increased frequency of bag changes. (**F**) The same patient as in (**E**): while the patient still has the propensity for leaks onto the skin, the rash has resolved after a two-week course of daily topical corticosteroid lotion and changing the appliance to one with a thinner, more flexible hydrocolloid barrier.

(A)   (B)
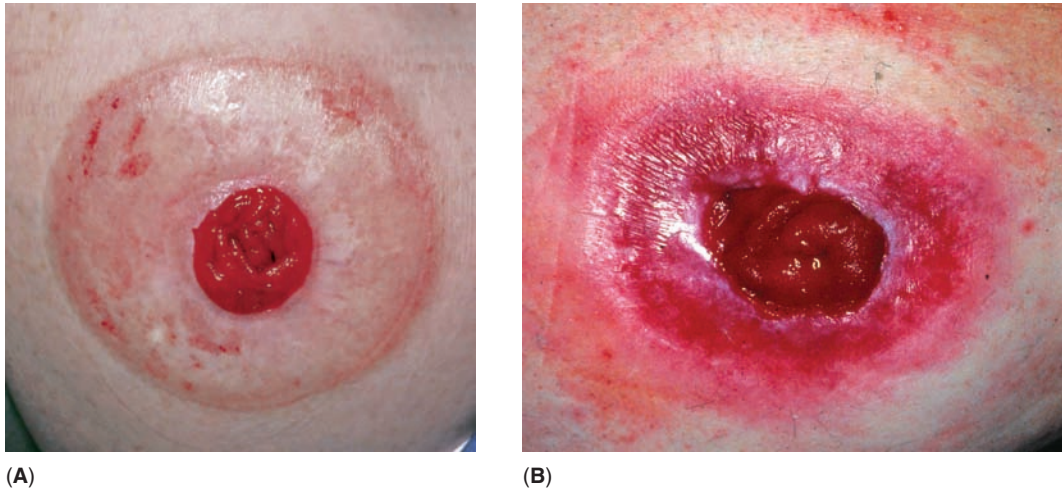
Figure 3.11 (**A**) This patient with a short colostomy developed an itchy dermatitis because, fearing embarrassing leakages, the patient changed the bag six times a day. The rash resolved when the patient reduced the frequency of changes. (**B**) Patient with a short urostomy prone to leaks. The patient tried soaks with vinegar (see section "Chronic Papillomatous Dermatitis"), which helped the inflammation.

expands accordingly. In this way, very significant numbers of overgranulating papules can develop (Fig. 3.26). In some cases, the lesions occur around a stoma that leaks because it is short or distorted. In this situation, in particular, the lesions present with a more flattened moist appearance (Fig. 3.27). In fact, flattened lesions may be the only abnormality seen in some cases (Fig. 3.28), especially in ileostomies. Other stoma abnormalities that cause leaks may be complicated by overgranulation (Fig. 3.29).

A distinctive pattern with a serpiginous or finger-shaped outline is sometimes seen. In our experience, this has occurred only in ileostomies. The surface appearance is like that of the flattened lesions described above (Fig. 3.30).

Primary bowel adenocarcinomas have been described within the peristomal skin, usually of ileostomy patients who had their surgery many years previously (Fig. 3.31). It is probable that such lesions developed in areas of longstanding bowel metaplasia of the skin, as in our case. This situation is analogous to that of gastric metaplasia of the lower esophagus (Barrett's esophagus—see "Histology" section on p.61) where malignant transformation to adenocarcinoma is well recognized. However, while peristomal bowel metaplasia is relatively common, peristomal adenocarcinomas are very rare, only a few cases having been reported worldwide. Nonetheless, patient with longstanding ileostomies (formed at least nine years previously) should be monitored at least annually to check for malignant change. Fortunately, when malignant transformation occurs, the outlook is good as few cases have spread at all at presentation.

Management. In most cases, these lesions are asymptomatic. Indications for treating them include

- painful or uncomfortable lesions,
- recurrent bleeding that impairs bag adhesion, and
- large papules that prevent proper bag placement.

The premalignant potential of these lesions should not be overemphasized. Only a handful of cases of primary peristomal adenocarcinoma have been reported worldwide in the last 30 years, and it is not clear if they all developed in areas of metaplasia. Therefore, destruction of metaplastic overgranulating areas is not indicated to pre-empt any malignant change, although careful observation, particularly of long standing ileostomy patients, would be prudent.

(A)

(B)

(C)

(D)

Figure 3.12   (**A**) This ileostomy became retracted soon after surgery. The area of skin contamination and the fecal damage to the hydrocolloid, which compounded the problem, can be seen. The problem improved when the patient was treated with topical sucralfate daily and changed to a different convex appliance. (**B**) This ileostomy also became retracted soon after surgery. In this case, the problem was more severe, failing to respond to appliance modifications and the patient went on to surgical refashioning of the stoma. (**C**) Retracted ileostomy in a patient with Crohn's disease who also ultimately required stoma refashioning. (**D**) Retracted and buried ileostomy which responded to sucralfate powder and a convex appliance.

Papular overgranulation with bowel metaplasia responds to ablative treatments. Cautery, especially silver nitrate cautery, is a commonly used treatment (Fig. 3.25B). Sticks coated with silver nitrate are available and these are pressed onto the lesions for a few seconds, resulting in chemical destruction of the tissue. Treatments are repeated weekly for four to five weeks until the lesions resolve. The process can be uncomfortable, some patients report burning discomfort for some hours after application. Another treatment that has recently been described is photocoagulation (3). This approach is reported as being painless.

In our practice, we use liquid nitrogen to freeze the lesions (cryotherapy) because it is as effective as cautery but patients do not report discomfort associated with it. The treatment employs a liquid nitrogen spray directed at the lesion for up to 10 seconds until an ice ball develops. Care should be taken not to allow thermal damage to healthy bowel. The treatment is
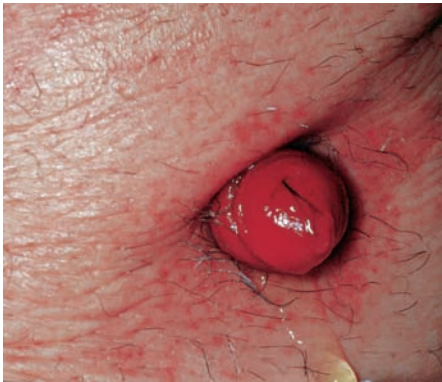
(**A**)

(**B**)

Figure 3.13 (**A**) This urostomy has a good spout but was gradually buried in abdominal fat as the patient gained weight after surgery. The resultant leaks and dermatitis responded to changing to a convex backed appliance. (**B**) Buried ileostomy, compare with Figure 5.50C and D.

(**A**)

(**B**)

Figure 3.14 (**A**) This stoma is tethered subcutaneously by a postsurgical scar. Poor bag adhesion and dermatitis resolved when a convex-backed appliance was used. (**B**) A firm, raised band appears above this ileostomy when the patient tightens the abdominal muscles. It frequently caused lifting of appliances, but leakage around the stoma was prevented by using an adhesive paste (Soft paste™, Dansac) around the stoma.

(A)

(C)

(B)

(D)

Figure 3.15 (**A**) Prominent fecal dermatitis around a loop ileostomy. The smaller opening was distorted by scarring and the patient used a bag with a large aperture to try to accommodate it, thereby exposing healthy skin to contamination. The problem resolved when bags were cut to the exact shape of the stoma so that the skin was protected. (**B**) Urostomy, which is partly buried in a fold but which also has an opening that points laterally at four-o'clock position, resulting in appliance failures and dermatitis. (**C** and **D**) Short, partly buried urostomy that ejects urine laterally. This responded to a convex appliance.

used weekly in the same way as silver nitrate cautery. Cotton wool buds dipped in liquid nitrogen *cannot* be used as they freeze hard to the moist surface, increasing the possibility of wider damage. It only works well with smaller lesions. For larger, polypoid lesions especially those that affect colostomies, shaving and cauterizing them under local anesthetic is most practical and effective. For the patients treated in our clinic, most will need repeat treatments periodically as the lesions can regrow. The time interval varies from a few weeks to three years (Fig. 3.32).

Chronic Papillomatous Dermatitis
Definition. Chronic papillomatous dermatitis (CPD) [syn. pseudoverrucous lesions, "pseudoepitheliomatous hyperplasia" (PEH)] are imprecise terms referring to the same exuberant, warty papules, which occur around urostomies as a reaction to urine irritation of the skin. We have used the term CPD as it was coined by the first group to describe a large series of patients

(A)

(B)

(C)

(D)

(E)

Figure 3.16 (**A**) This patient with a short colostomy and parastomal hernia developed secondary spreading of fecal irritant dermatitis outside the bag area. (**B**) The rash resolved when the patient changed to bowel irrigation every two days and dispensed with wearing an appliance. (**C**) Prominent hernia involving a urostomy. This causes bag failures and leaks such that dermatitis (**D**) is inevitable. (**E**) This patient with a large peristomal hernia suffers repeated appliance failures. The thinned skin is also prone to trauma and ulceration.

(A)

(B)
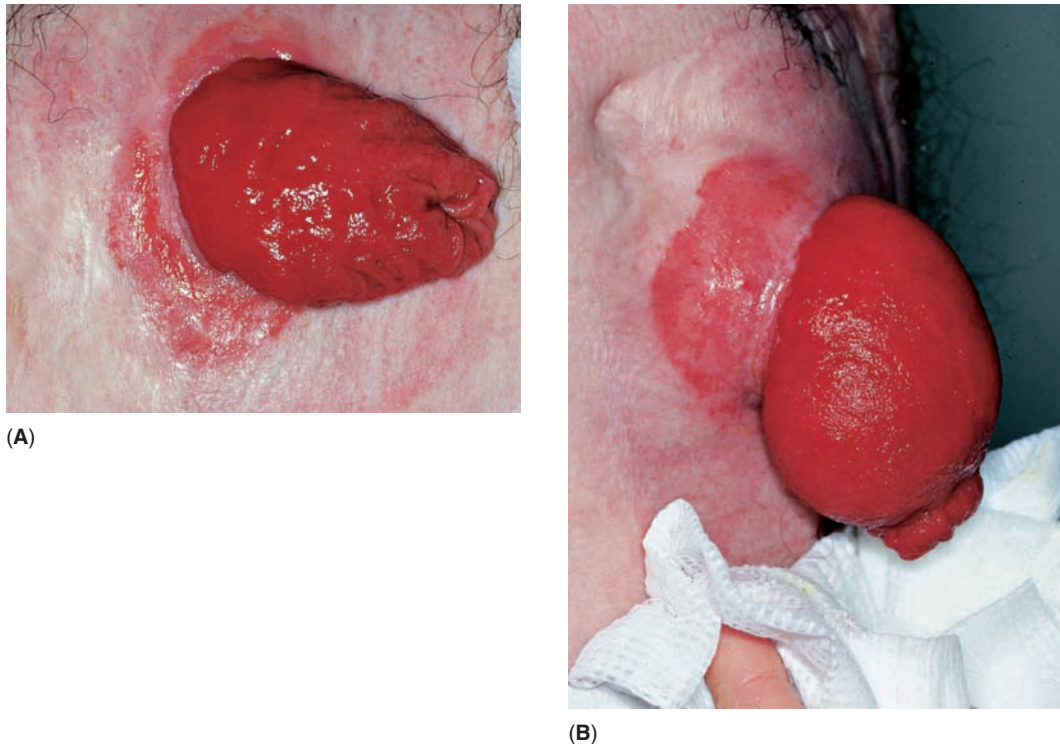
Figure 3.17 (**A** and **B**) This ileostomy for colitis was small with the patient lying down but prolapsed on standing or sitting. The skin tension produced dislodged the appliances and the patient had to undergo refashioning of the stoma to correct the problem (see chap. 1).

with the disorder who had been investigated histopathologically (4). All three terms are or imply a histological definition; however, it is the clinical features rather than the microscopic features that are distinctive (5).

Etiology.   Chronic irritation from leaking urine results in reactive thickening of the skin. Short ileal spouts or recessed stomas increase the likelihood of leakage of effluent onto the skin. In the patients described by Bergman et al. (4), 9 out of 10 used the same type of stoma device, which allowed pooling of urine on the skin under the stoma. The tendency to develop these hyperkeratotic reactions is probably greater if the urine is alkaline, particularly as a result of chronic urinary infection caused by urea-splitting organisms that generate ammonia, which is a strong irritant. Some groups have indicated that CPD only occurs with alkaline urine, however, the association with a high pH is probably more true for the moist encrustations and erosions than for distinct papular lesions (6). Skin pH changes alone will not produce irritant reactions, and the likelihood of developing irritant dermatitis to a primary irritant is apparently not increased if the skin pH is increased from its normally acidic pH of about 5 to >8 on application of the irritant (7). It may, therefore, be that alkaline, ammoniacal chemicals are the principal irritants and, although their presence increases the pH, this is of secondary importance. Nevertheless, the association between alkaline urine and hyperkeratotic irritant reactions is well recorded (8); further evidence for its importance comes from the observation that the dermatosis will improve if the urine is acidified or acetic acid soaks are applied to the skin.

An irritant reaction similar to CPD may also occur in the pubic or perianal skin of neglected infants and incontinent adults (9); however, although the histology is similar, the lesions are often larger and more defined in outline (Fig. 3.33).

(A)

(B)

(C)

(D)

(E)
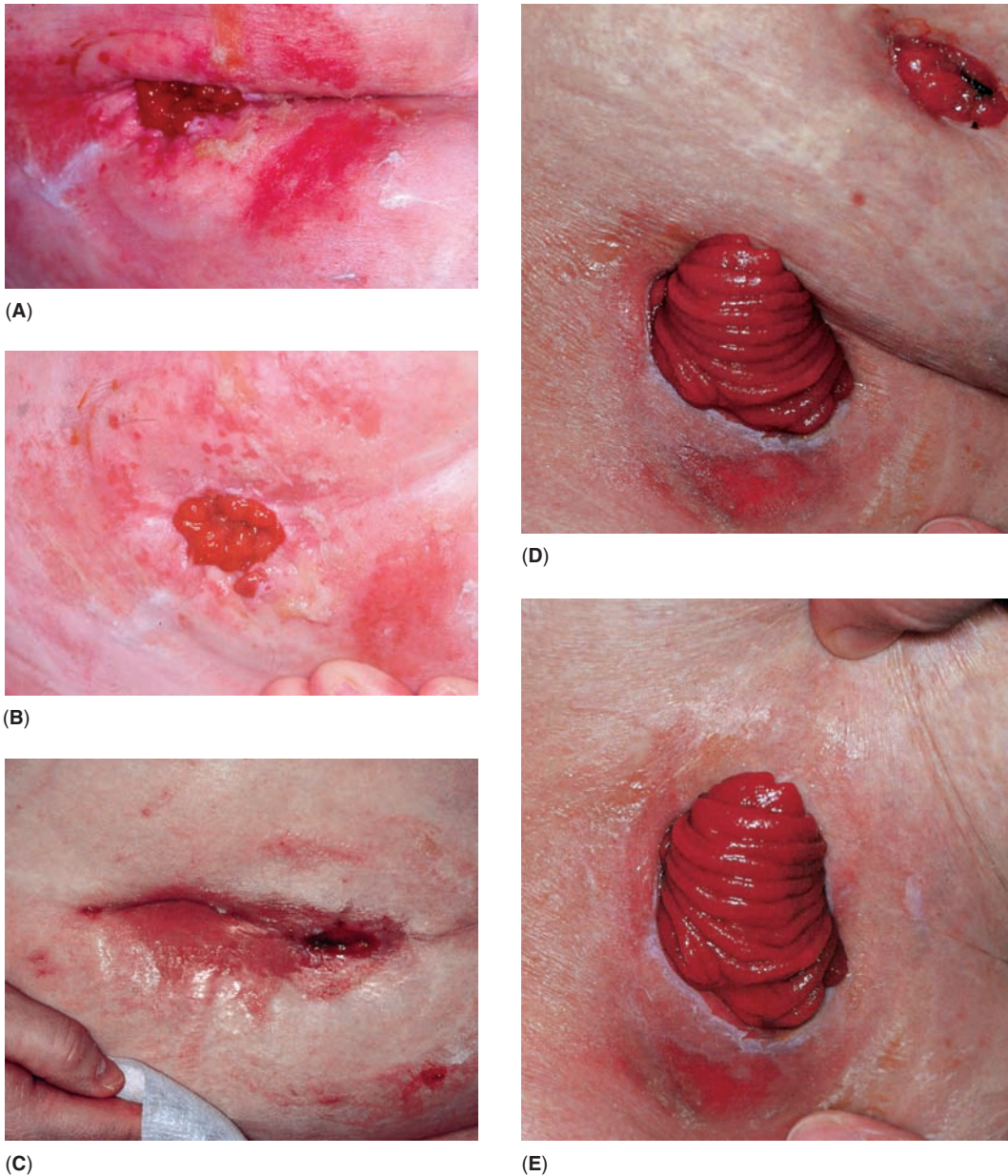
Figure 3.18 (**A** and **B**) This stoma is situated in an abdominal skin fold complicated by a surgical scar and leaks are unavoidable. The skin (**B**) has been stretched to demonstrate the fold. (**C**) This patient has several problems that combined to warrant surgical refashioning of the colostomy. It is short, situated high on the abdomen in the waist skin fold, buried in abdominal fat, and continuous with the umbilical depression. (**D** and **E**) There is a prominent fold of skin above this ileostomy. It caused lifting of bags and fecal irritant dermatitis. The disorder failed to respond to appliance adjustments, secondary hydrocolloid washers under the bag, or adhesive pastes. (*Continued*)

(F)

(G)

Figure 3.18 (*Continued*) (**F** and **G**) This young woman with a colostomy for inflammatory bowel disease has a prominent skin fold and a fat pad above the stoma that enlarged when she gained weight after recovering from her disease. This area is prone to leaks, irritation, and subsequent overgranulation. In (**G**) this is in resolution.

(A)

(B)
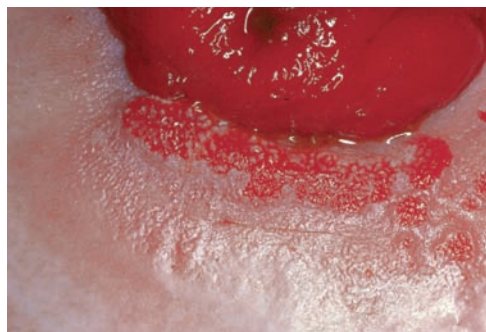
(C)

Figure 3.19 (**A**) The output from this jejunostomy was very high and the potential for leaks was enhanced by the irregular surgical scarring in the peristomal skin. The dermatitis was effectively treated with topical sucralfate (Fig. 3.20). (**B**) Irregular scars on either side of this newly fashioned ileostomy contributed to the tendency for poor bag adhesion that has resulted in florid fecal dermatitis. (**C**) The acute inflammation settled using a short course of topical corticosteroids and, when it had settled, further leaks were prevented using an adhesive paste under the bag (Stomahesive™, Conva Tec). As the illustration shows, some inflammation persisted for a time and this was indurated and raised. It would have progressed to an acanthoma (see Fig. 3.43.) if the preventive measures had not been introduced.

(A)

(B)

(C)

(D)
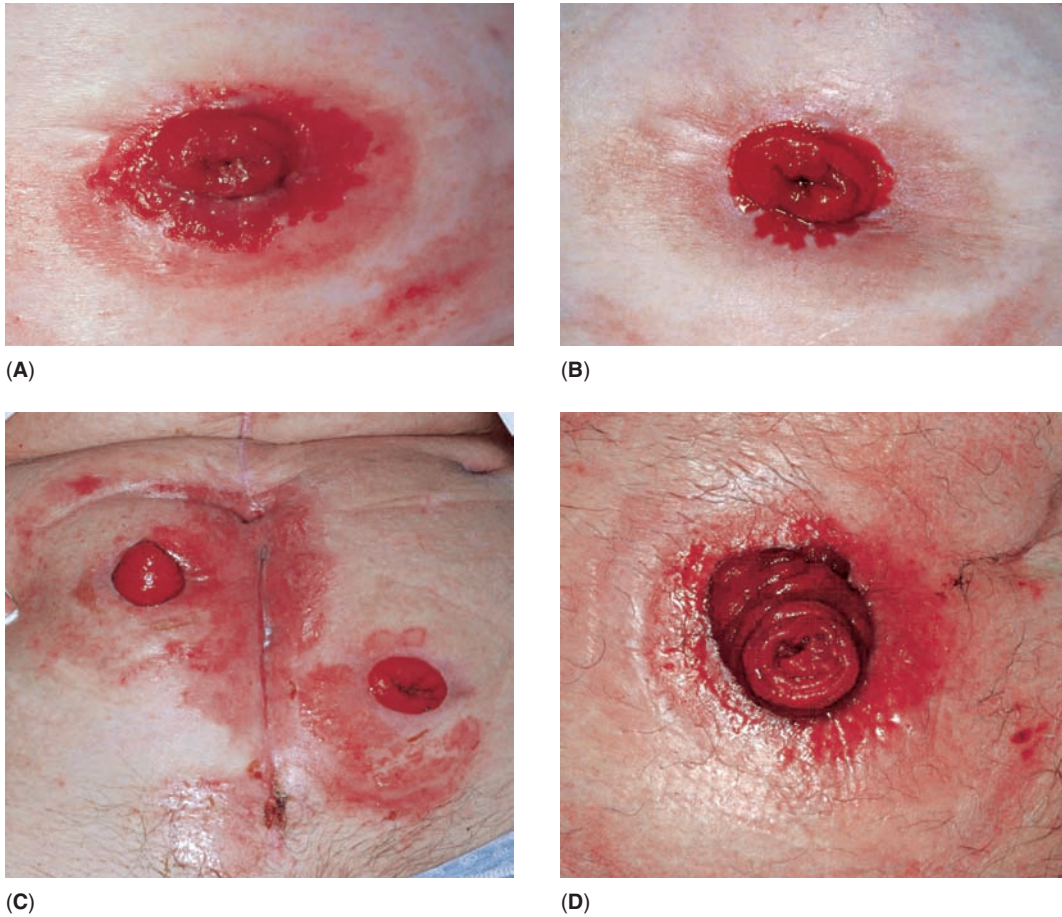
Figure 3.20 (**A** and **B**) "Before" and "after" pictures demonstrating the effectiveness of sucralfate powder in the management of fecal erosive dermatitis. Following several resections for Crohn's disease this patient had very little small bowel with the result that output was very high and leaks were frequent. The patient applied sucralfate powder daily to the eroded dermatitis. After six weeks (**B**), the rash has resolved. The areas of overgranulation (also an irritant reaction, see below) have also improved considerably. (**C**) Jejunostomy and ileal fistula in a patient with Crohn's disease. The extensive fecal dermatitis was due to leaks from these high-output stomas. Appliance modifications did not work and there was only a partial response to topical sucralfate. Fortunately, the disorder came under control when stoma output was reduced using codeine and loperamide orally. (**D**) Fecal erosions affecting a high-output jejunostomy. This resolved with daily topical sucralfate powder.

Histology. The lesions of CPD have a papillomatous histological appearance, with marked acanthosis, lengthening of the rete ridges and hyperkeratosis, together with moderate dermal inflammation, that is, nonspecific features that can all be seen in chronic dermatitis of any cause. The term PEH has been applied to CPD because the acanthosis often, but not invariably, shows deep projections into the dermis and there are increased numbers of mitoses. Thus, the appearance is superficially like that of a neoplasm (epithelioma) of the skin, although on close scrutiny there are no malignant features such as cellular atypia or dermal invasion by the epidermal strands. These pseudoepitheliomatous features are seen in many cases of CPD but in our experience not in all (Fig. 3.34). PEH is a general term for such reaction patterns and the process may be seen not only around stomas but also affecting chronic skin ulcers, fistulas, and in several distinctive oral and ocular disorders. CPD is, therefore, one clinical presentation of a common reaction pattern to irritation, which may be pseudoepitheliomatous in histological appearance. The clinical features that distinguish it from other such irritant reactions are determined not by

(A) **(B)**
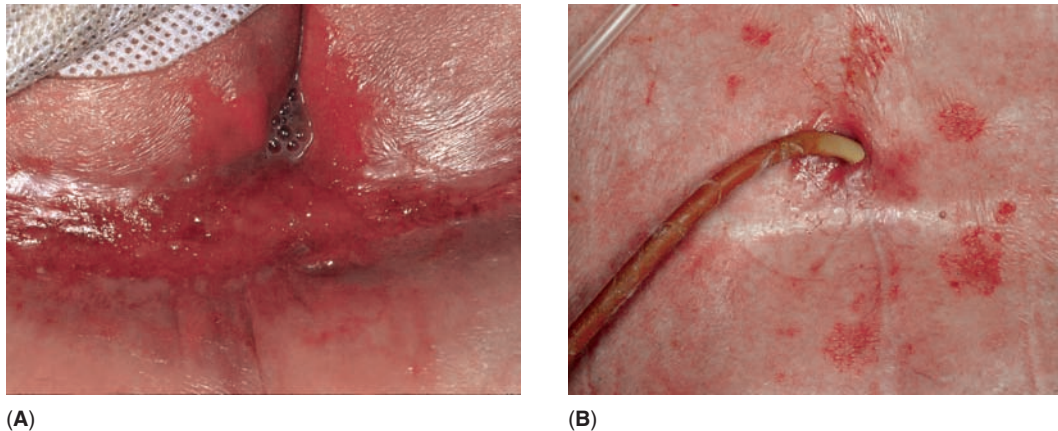
Figure 3.21 **(A)** Effluent can be seen bubbling from this gastric fistula. The corrosive nature of the effluent means that skin damage occurs after even brief intermittent contact. This fistula closed spontaneously but while active the dermatitis was controlled using topical sucralfate powder. **(B)** There is fecal erosive dermatitis around this feeding gastrostomy. Gastric contents occasionally emptied onto the skin because the catheter was not correctly positioned. It should be under very slight tension so that the balloon is held against the inner wall of the ostomy and effluent cannot pass around it to the skin.

these histologically defined processes but by the causative agent (urine), the body site, and the occlusion under a stoma appliance.

Clinical features. This rash consists of hyperkeratotic, warty papules, which may be numerous. They are sometimes itchy and can become eroded and tender. The lesions range in size from a few millimeters (Fig. 3.35) to large plaques of coalescent papules several centimeters in diameter (Fig. 3.36). If the area of skin is constantly soaked in urine, the lesions appear eroded and moist (Figs. 3.37 and 3.38). The irregular skin surface results in poor bag adhesion and further leaks, which perpetuate the problem so that CPD may become very severe (Fig. 3.38). Other morphologically distinct irritant papules, which are described in the next section, may coexist with CPD (Fig. 3.39), further emphasizing that these irritant reactions are all part of a spectrum of the same disease process. Indeed, irritant reactions with a very similar surface morphology to CPD may occur around ileostomies. It is important to be able to distinguish CPD clinically as it can superficially resemble viral warts or even carcinoma (e.g., Figs. 3.35 and 3.38), resulting in distress and unnecessary investigation for the patient. Nevertheless, if there is any doubt about the diagnosis, the lesions should be biopsied to rule out more sinister pathology, before treating the condition as CPD.

As described in chapter 1, these hyperkeratotic reactions may cause stenosis of the urostomy, necessitating surgical intervention (Fig. 3.40).

Management. CPD resolves within a few weeks if contact with urine is stopped. In less severe cases, this can usually be achieved by improving the fit of the appliance. This has certainly been our experience and it concurs with the findings of Bergman et al. (4) in their 10 patients. Where the lesions result from a recessed stoma, changing to a convex-backed appliance is effective in reducing leakage (Fig. 3.35B). Occasional stoma care assessments to ensure that an appropriate appliance is being used represent an important preventive measure for CPD, as well as other fecal/urine irritant reactions, because stomas do change shape and size with time. Given the apparent relationship to urinary pH, acidifying the urine may also help prevent CPD-like reactions; this can be achieved by encouraging the patient to regularly drink fruit juices or take oral vitamin C supplements. Topically applied acetic acid soaks (50% household vinegar, equivalent

(**A**)

(**B**)

(**C**)
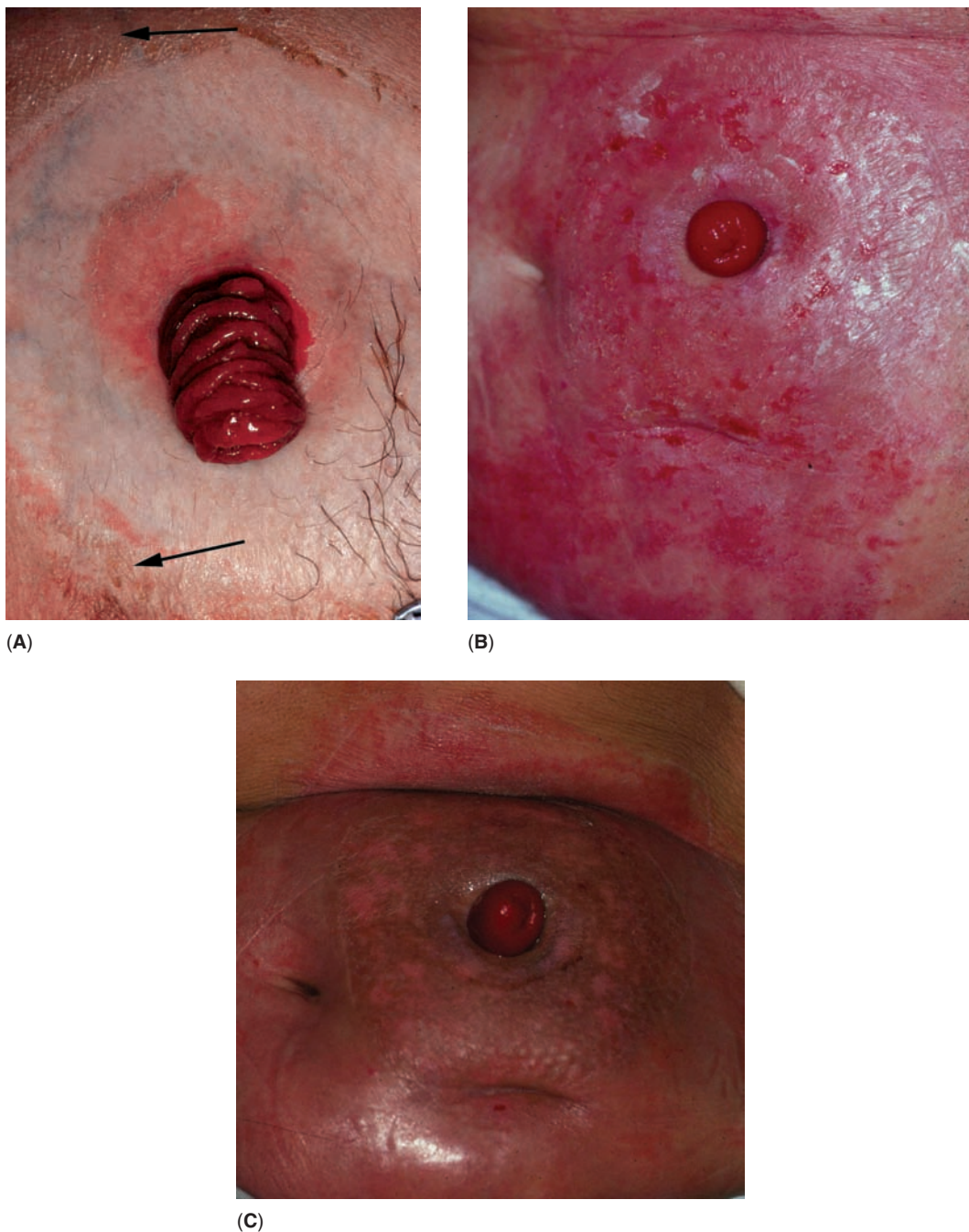
Figure 3.22 (**A**) This perimenopausal woman experienced flushes and increased perspiration that resulted in two peristomal skin problems. First, the sweating impaired bag adhesion so that there was mild fecal irritant dermatitis near the stoma. Second, it caused softening of the appliance's hydrocolloid so that the adhesive was difficult to remove at the periphery (arrows) when the bag was taken off. This was associated with an irritant dermatitis reaction. The patient used an unperfumed, roll-on antiperspirant when changing bags and the skin problems cleared. (**B** and **C**) Before and after pictures of a patient with a previous history of eczema who developed severe irritant dermatitis around the stoma following an episode of minor leakage. The dermatitis took four weeks to resolve using daily steroid applications (appendix 4) and post-inflammatory hyperpigmentation can be seen (**B**).

(A)   (B)

Figure 3.23 (**A**) This patient with a short urostomy had occasional leaks, resulting in the mild dermatitis illustrated immediately around the stoma. The patient became greatly concerned about the possibility of large, socially embarrassing leaks and began to change the appliance before every new social situation. Given the patient's profession working with the public, this was several times a day and resulted in the skin-stripping irritant reaction seen at the edge of the stoma bag area. (**B**) In this case, there was no preceding fecal leaks and dermatitis, but the patient was very anxious to pre-empt such problems and changed the bags several times daily producing similar irritation to that seen in (**A**).

to acetic acid 2.5%) are described as effective, particularly for those patients with a more encrusted or eroded appearance to the peristomal skin (6) (Fig. 3.41).

In more extensive cases, where proper bag adhesion is impossible because of the skin changes or absence of a protruding stoma, other measures may be necessary. Catheterization of the ileal conduit, until the skin changes have healed, has proven effective in some cases. Occasionally, surgical refashioning of the stoma may be required (Fig. 3.38).

Other Irritant Acanthomatous Reactions
Papules and plaques caused by fecal/urine irritation are occasionally seen, which do not fit exactly the clinical descriptions above, although the histology is similar and the causes are the same.

A reaction similar to severe napkin rash is occasionally seen, especially around urostomies (Figs. 3.39 and 3.42).

Occasionally, chronic irritation around colostomies and urostomies produces very prominent lesions with a distinctive, glandular surface appearance *suggestive* of a bowel neoplasm (Fig. 3.43). These start as acute irritant dermatitis and progress through a hyperkeratotic stage (cf. Fig. 3.19C) before becoming so prominent. Histologically, they show benign chronic dermatitis features only, despite their clinical appearance.

These reactions respond to appliance adjustments in the same way as other forms of fecal/urine irritation, although occasionally secondary barrier preparations are needed.

One important differential diagnosis of papules around a stoma is Crohn's disease, which may produce papules similar in configuration to overgranulation but without the red color (Fig. 3.44). Histologically, these show chronic inflammation with giant-cell granulomas rather than granulation tissue.

Physical Irritation
Clothing or Appliances
Definition
Physical irritation is skin irritation resulting from rubbing, pressure, or repeated penetrating injury to the skin from clothes or appliances.
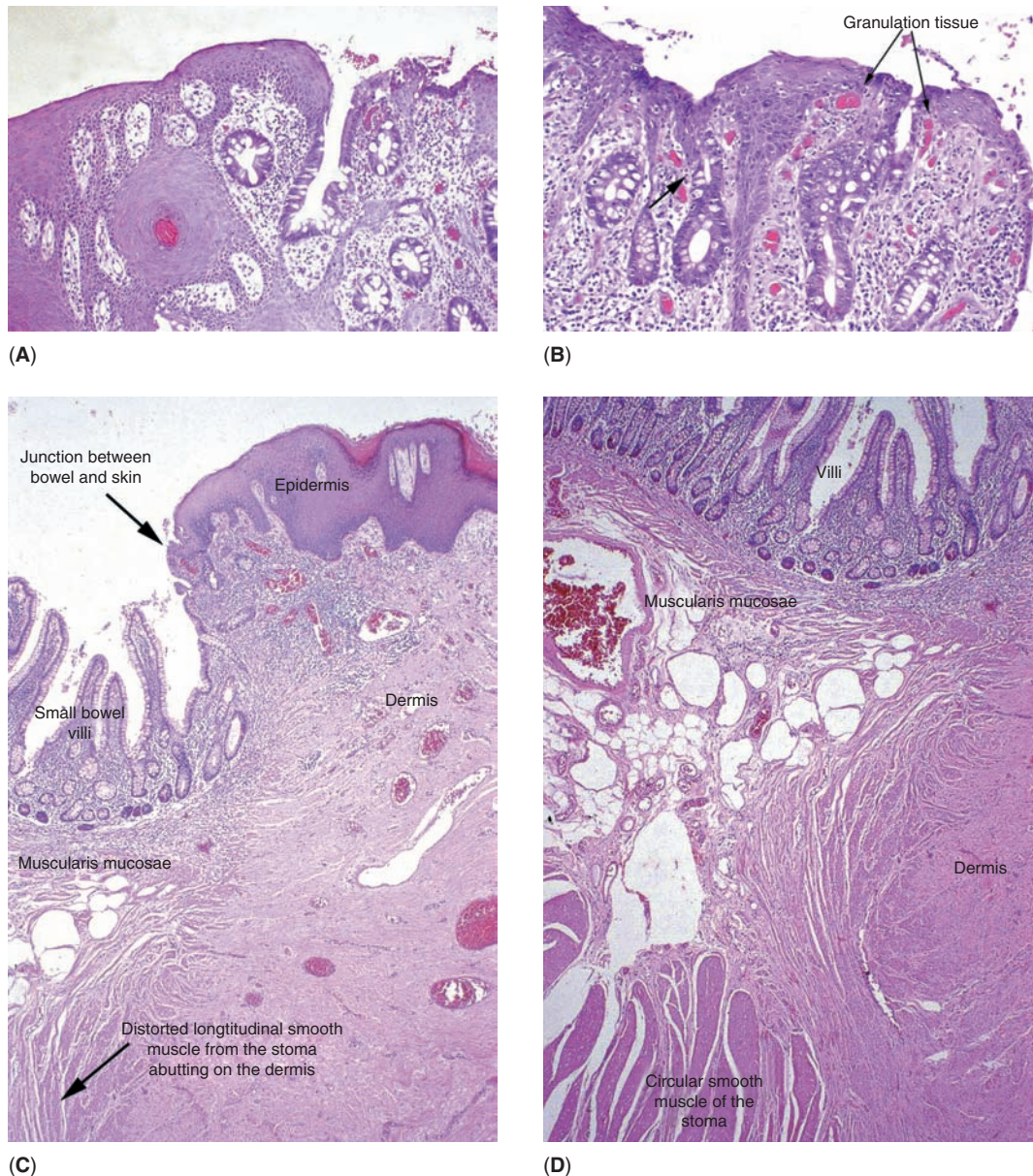
Figure 3.24 The histology of the mucocutaneous junction and peristomal overgranulation with bowel metaplasia of the skin. (**A**) A biopsy from a papule of overgranulation that arose several centimeters away from a colostomy. There are islands of bowel metaplasia within an area of acanthotic, inflamed skin. The prominent granulation tissue is a reaction to irritation and accounts for the red color of these lesions. (**B**) A biopsy specimen from a papule arising near an ileostomy. The same features are seen as in (**A**). The metaplastic bowel epithelium can be seen to be in direct continuity with the epidermis (larger arrow) indicating that the metaplastic change has occurred within it. (**C**) The junction between a normal ileostomy and the skin. Note the prominent blood vessels in the dermis that account for the red appearance of the mucocutaneous junction. (**D**) A section taken just to the left of (**C**), showing the junction between dermis and the deeper layers of the ileum.

(A)

(B)

Figure 3.25 (**A**) A papule of overgranulation around a normal colostomy. The fecal soiling and dermatitis seen have occurred because the bag aperture was too large. (**B**) This has been treated with silver nitrate (see text).
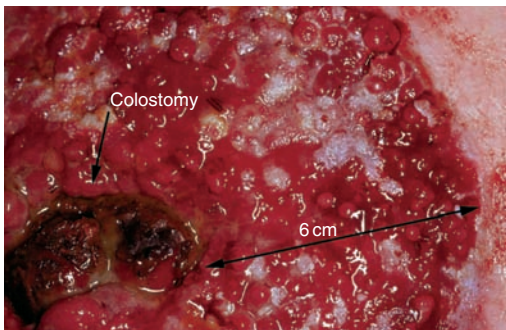
(A)

(B)

(C)

(D)

Figure 3.26 (**A**) This patient with a colostomy for bowel carcinoma cut the bag aperture larger to fit in a solitary papule of overgranulation. This exposed more skin to fecal irritation and new lesions developed. Over the succeeding 18 months, the patient cut the bag larger and larger as new lesions developed, thereby perpetuating the problem. The affected area was more than 12 cm in diameter and the problem warranted refashioning of the stoma. Large numbers of coalescent papules can be seen. In some areas, there is hyperkeratosis which appears as white translucency because of the moist conditions. A biopsy from a papule at the edge demonstrated dermatitis changes with bowel metaplasia and reactive granulation tissue. (**B**) Immunocompromised Crohn's patient with an ileostomy. This patient did the same as the patient above (**A**) and progressively enlarged the bag. Fortunately, the patient always put one area of the bag aperture next to the same place on the stoma such that the patient only had the proliferating granulomas between the 10- and 6-o'clock positions. (**C** and **D**) This meant that the whole area could be resected and the defect closed by bilateral rotation flaps. (Thanks to Mr. S. Chintapatla, consultant colorectal surgeon at York Hospital for his invaluable assistance in this case.) (D) The wound healed very well.

(A)

(B)

(D)

(C)
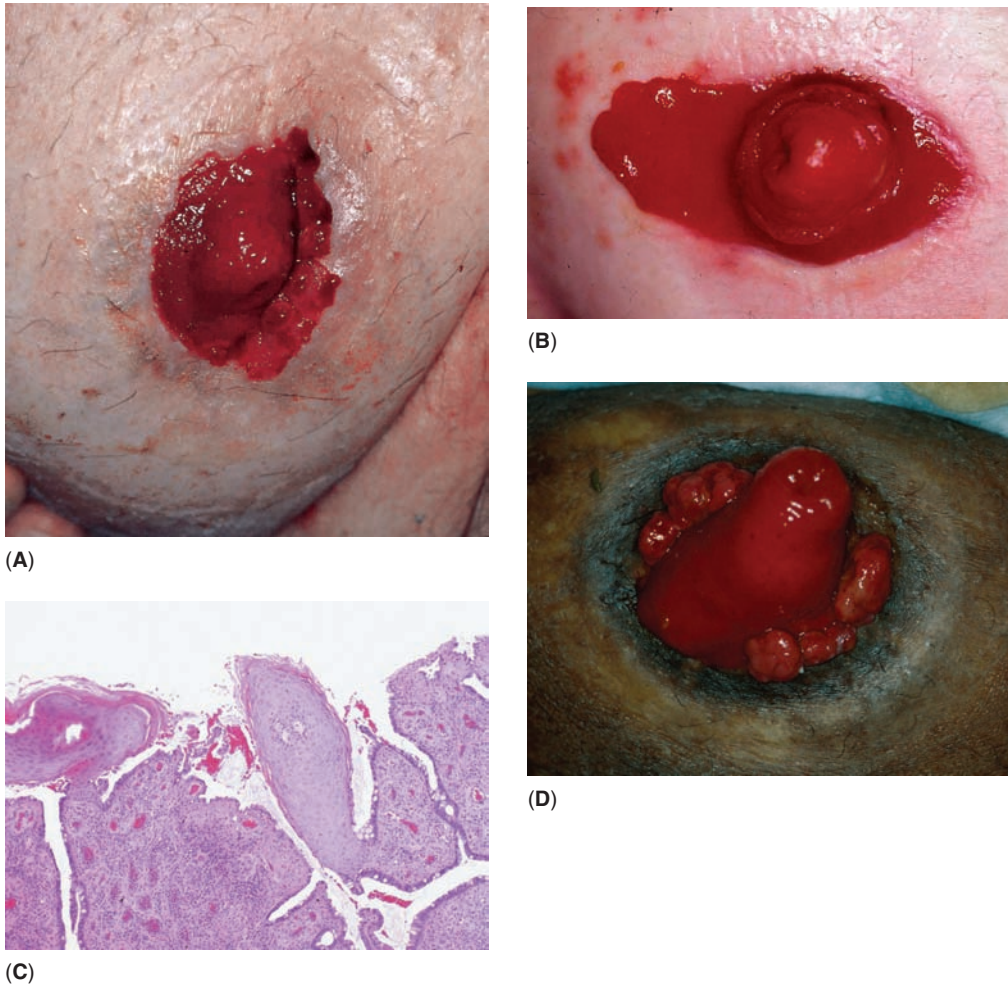
Figure 3.27 (**A**) Papular overgranulation affecting a short, distorted colostomy where fecal leakage onto the skin was a problem. As well as papules, there are flatter red areas extending into the skin. (**B**) In ileostomies, larger, flatter areas can be seen. In this case, the red tongue-shaped granuloma could be lifted up like a flap and was removed by shaving it off and cauterizing the base under local anesthetic. (**C**) Histology from the lesions illustrated in (**A**), showing hyperkeratosis, acanthosis, granulation tissue, and bowel metaplasia. (**D**) Despite the long spout, this is a colostomy in an Asian man who used a bag with a large aperture, resulting in soiling of the skin and development of these granulomas within an area of irritant dermatitis. The lesions are all at the mucocutaneous junction.

Etiology and Clinical Features

Damage to the peristomal skin may occur in the following ways:

- *Friction or pressure from clothing*: Some patients wear tight waist belts on their clothes in an attempt to affix the underlying stoma appliance more firmly and thereby gain added security against leaks. This can cause dermatitis or even pressure necrosis of the skin (see Fig. 6.25). Waistbands worn normally may in themselves exacerbate irritation from an appliance (Fig. 3.45).
- *Friction or pressure from the appliance:* Patients with parastomal hernias sometimes wear elasticated supports that may put pressure on the peristomal skin resulting in dermatitis (Fig. 3.46) or even ulceration (see Fig. 6.22C). An appliance with too small an aperture can constrict the stoma and cause dermatitis at the mucocutaneous junction (Fig. 3.47). The stoma may also be subjected to chronic irritation from hard parts of the appliance (Fig. 3.48).

- *Damage to the skin on appliance removal:* As described above under the section "Dermatitis," frequent bag changes will result in skin damage because of the repeated stripping of the top layers of the epidermis. This is usually seen as a dermatitis (e.g., Fig. 3.9); however, it may also cause superficial ulceration by stripping off the whole epidermis. This is seen particularly in older patients and those with large hernias where the skin is delicate (Fig. 3.49).

Management
Appliance modifications and advice about appropriate clothing are usually all that is needed to treat these problems and prevent recurrences. Ulcerated skin can be protected by a secondary hydrocolloid or vapor permeable membrane dressing used under the appliance until the ulcer heals.

Chemical Irritation
Chemical irritation may result from chemicals within the appliance, in topically applied prescription medicaments or in over-the-counter preparations.

Definition
This is skin inflammation caused by an irritant chemical. Several categories are described but essentially can be divided into acute inflammation caused by powerful, even corrosive
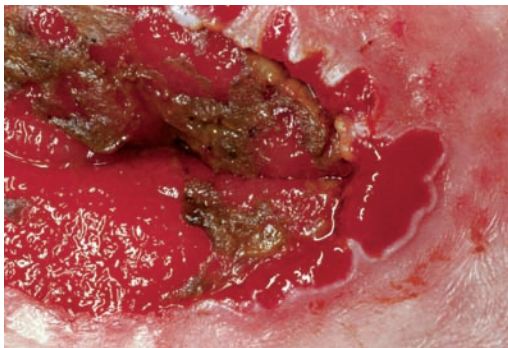
(A)   (B)

Figure 3.28   (**A** and **B**) Flat areas of overgranulation with bowel metaplasia involving two receding colostomies. The fecal soiling of the skin is evident in both cases.

(A)   (B)

Figure 3.29   (**A**) Papules of overgranulation with metaplasia around a colostomy that has become atrophic and retracted as a result of Crohn's disease. (**B**) Extensive coalescent papules around a Koch continent ileal pouch in a patient with colitis. The pouch was not continent and stoma effluent continually flowed onto the skin.

(A)

(B)

(C)

(D)

(E)
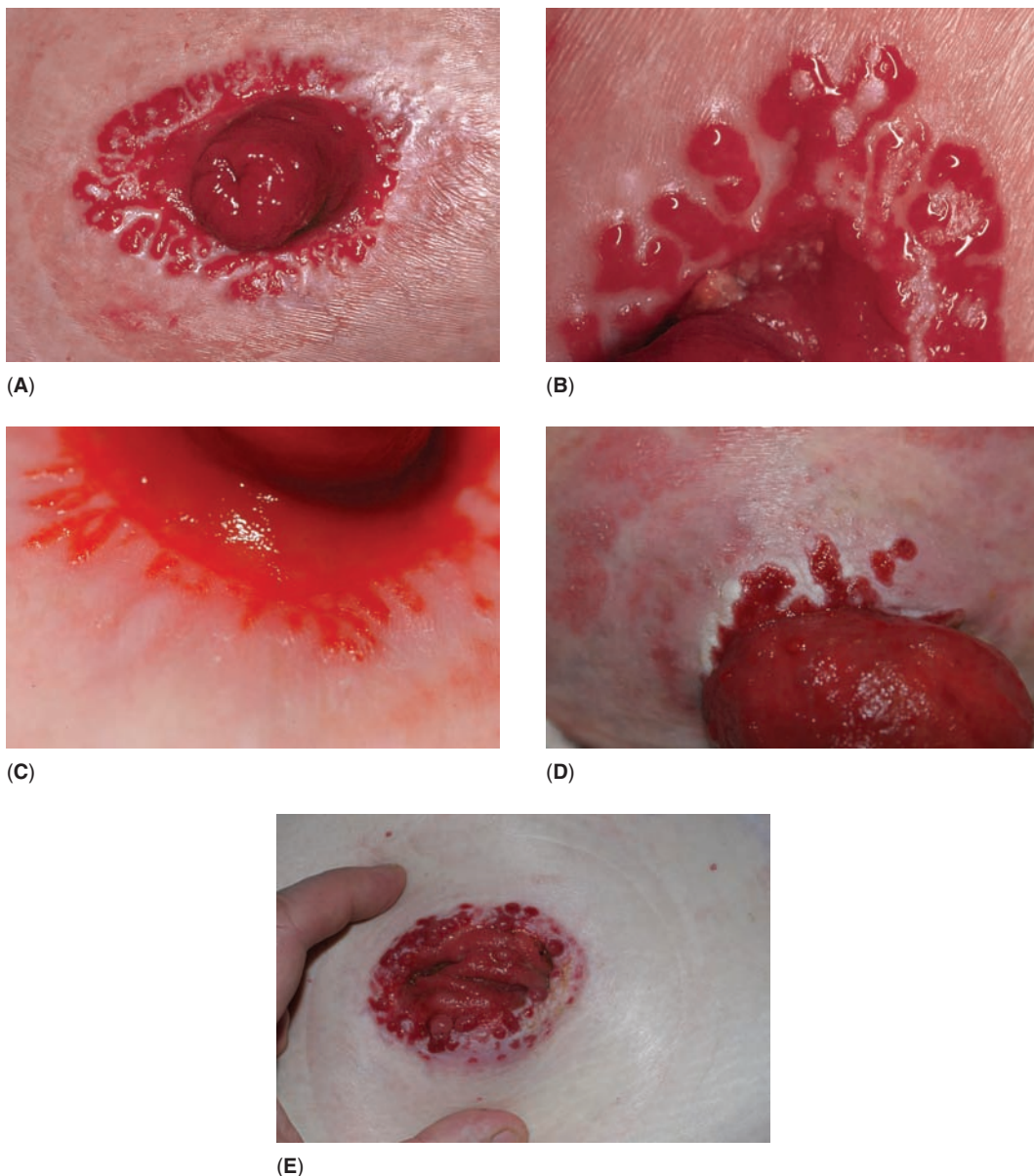
Figure 3.30 (**A** and **B**) Overgranulation with bowel metaplasia around ileostomies presenting as serpiginous plaques. (**C**) In this case, the lesions are finger-like. (**D**) Here, the flat lesions are within an area of irritant dermatitis caused by fecal soiling around an ileostomy. Compare these lesion shapes with the more typical polypoid ones that are seen around colostomies (**E**).

irritants such as bleach, or chronic inflammation caused by cumulative exposure to a less irritating chemical.

Etiology and Clinical Features

Most stoma appliance constituents are food grade chemicals so that irritation is most unlikely. Nevertheless, the manufacturing process may involve irritant chemicals such as solvents that should be present at only very low concentrations in the finished product. If they are present in

(A)   (B)
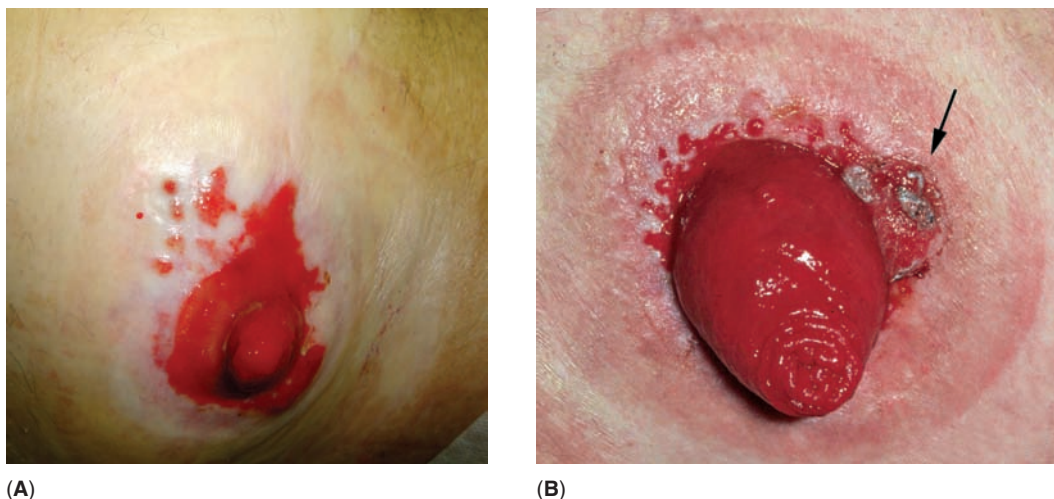
Figure 3.31   (**A**) In this patient with a longstanding ileostomy for colitis, the papules developed in areas of soiling and are all histologically comprised of small bowel mucosa as well as inflammatory tissue, even those at least 1 cm distant from the stoma per se. (**B**) In this case, a primary adenocarcinoma (arrow) has developed within such an area of metaplasia near an ileostomy formed 22 years earlier for colitis.

higher concentrations, irritation may result. We undertake usage tests (Fig. 3.50) in all patients with dermatitis. In one patient, we uncovered chemical irritation attributable to such a solvent in a stoma appliance (Fig. 3.51). In another (Fig. 3.52), it was caused by the adhesive fabric outer ring on the appliance.

Topical preparations are also manufactured using constituents selected to minimize the potential for skin irritation. However, some topical preparations, particularly those used for psoriasis are irritants (Fig. 3.51) as are some medicaments used to mask musculoskeletal pain or itch, but these should not be used in occluded sites such as the peristomal skin.

Full details of the patients' stoma care routine should be sought by questioning and by observation because the occasional patient uses potentially irritant, over-the-counter wipes or cleansers on their peristomal skin. Another source of chemical irritation is the use of reusable cotton wipes or cloths washed in powerful detergents or bleaches that are not properly rinsed out. This practice should be discouraged.

The clinical features of chemical irritant dermatitis are the same as those of other causes of dermatitis. The diagnosis is suggested by the distribution of the rash, which is usually limited to the skin in contact with the irritant, in the same way as it is in fecal/urine irritation.

Management
Practices likely to expose the peristomal skin to irritants should be discouraged, and the patients should receive both verbal and written advice about this in their general postoperative counseling. With careful assessment, the diagnosis of chemical irritation is established and the source is identified and thereafter avoided. The acute inflammation can be treated with a short course of topical corticosteroids (appendix 4) while definitive secondary preventive measures are undertaken.

Nonspecific Dermatitis
Definition
Nonspecific dermatitis includes all those cases of dermatitis in which irritant, allergic, and infective causes have been excluded and where there is no evidence of a primary skin disease such as eczema. It accounts for more than 10% of the persistent rashes that we see.

(**A**)
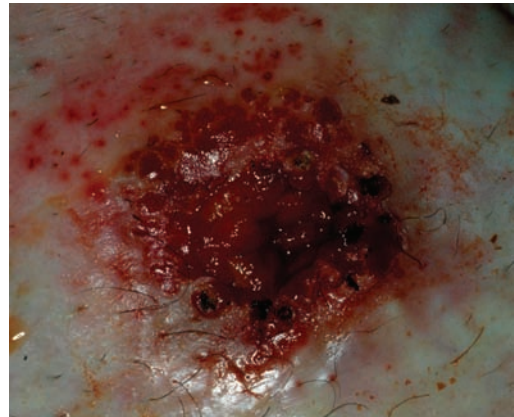
(**B**)

(**C**)

(**D**)

Figure 3.32 (**A** and **B**) Colostomy in a middle-aged man with a history of rectal carcinoma. The polypoid granulomas were proliferating and forcing him to cut the stoma bag aperture larger (compare with Fig. 3.26). They were, therefore, removed under local anesthetic by slicing them off flush with the skin and cauterizing the base to stop the bleeding. (**B**) This figure shows the result immediately afterwards. A stoma appliance can be fitted directly to the site as before, without any other dressing as the hydrocolloid is effectively a wound dressing itself. Infection after these procedures is very unusual. (**C** and **D**) The figures show another patient's colostomy at a much earlier stage when the lesions were fewer. The treatment was the same.

Figure 3.33 Chronic napkin dermatitis in an infant. The eroded papules represent a reactive, hyperplastic response (acanthosis of the epidermis) to chronic urine/fecal irritation.
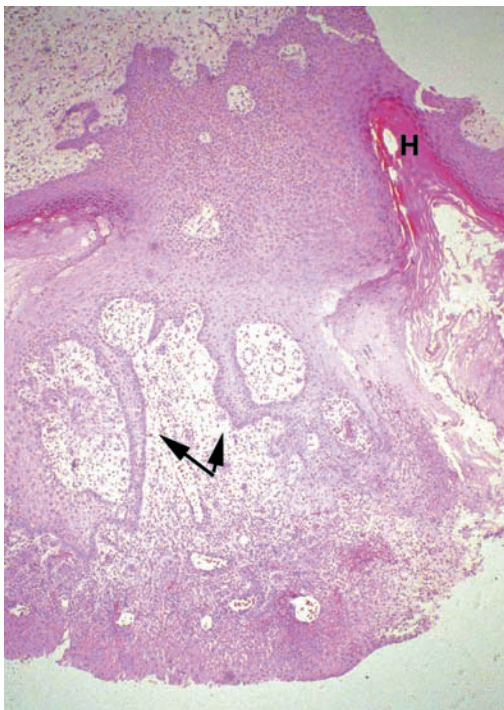
(**A**)
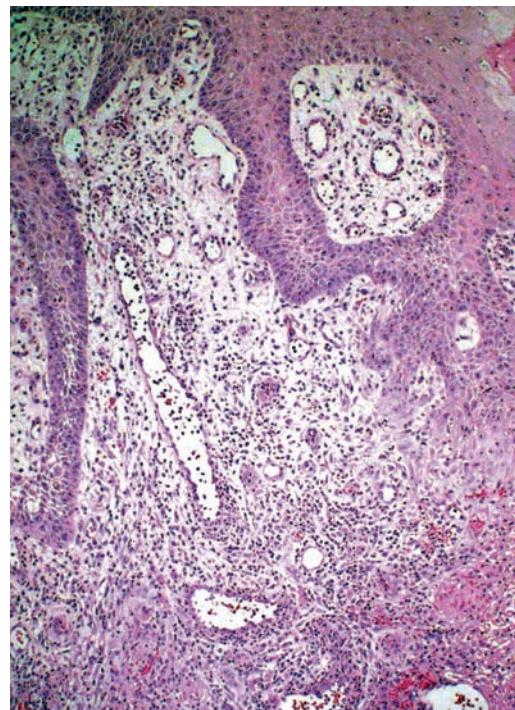
(**B**)

Figure 3.34 Histology from a chronic papillomatous dermatitis papule. (**A**) This specimen appears distorted because the lesion surface is convoluted and these folds have been crosscut on histological sectioning. There is marked hyperkeratosis (H), and papillomatous acanthosis of the epidermis with "pseudoepitheliomatous" strands extending into the dermis (arrows). There is no cellular atypia to suggest malignancy. (**B**) The dermis is inflamed and there is reactive proliferation and ectasia of capillaries that accounts for the red appearance of some CPD lesions.

(A)   (B)
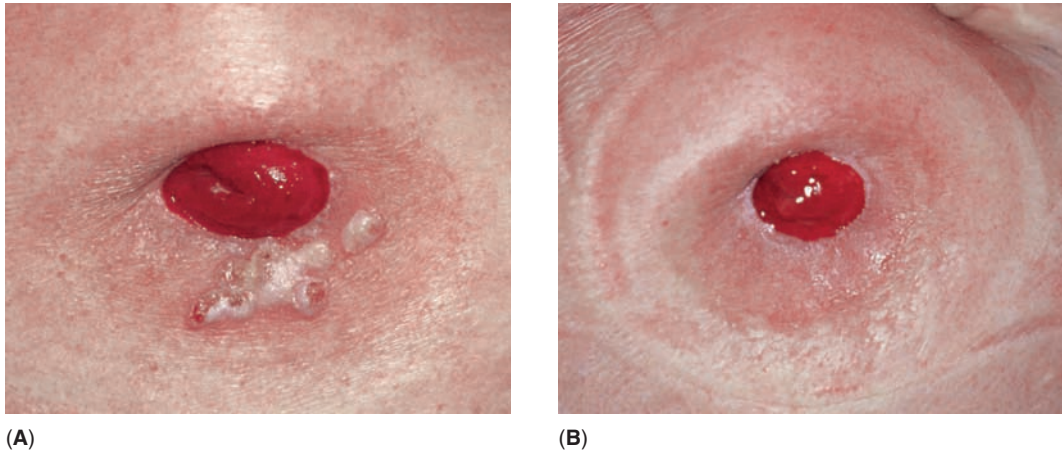
Figure 3.35 (**A**) Coalescing papules of chronic papillomatous dermatitis. The translucent white appearance is produced by moistening of the thick hyperkeratosis. Urine irritation of the skin has occurred because the stoma is buried in abdominal fat, making bag fitting difficult. (**B**) The urostomy bag was changed for one with a convex surface on the barrier, which filled the recess in the abdominal fat around the stoma, thereby increasing the effective length of the stoma spout extending into the collecting bag so that leaks were avoided. Four weeks later the papules had disappeared.

(A)   (B)
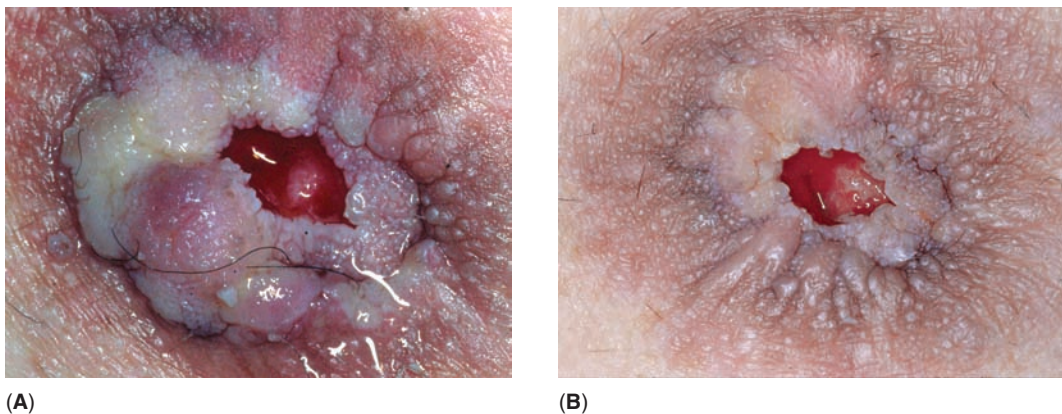
Figure 3.36 (**A** and **B**) This case began like that of the patient in Figure 3.35 and for the same reasons; however, this patient did not seek treatment and hyperkeratotic areas have proliferated. This has resulted in shrinkage of the stoma with impending stenosis. It responded to debridement of the dead skin scale (**B**) and changing to a convex-backed bag that prevented urine leaks. Note the hyperpigmentation around this irritated urostomy and the varying sizes of these warty papules.

Etiology

The etiology, by definition, has not yet been uncovered. Possible etiological factors under investigation include the following:

- Low-grade bacterial infection or colonization, where the skin responds to bacterial antigens with an inappropriate inflammatory response.
- A lower irritant threshold in affected patients compared with those who do not experience skin problems.
- Cumulative irritation from frequent bag changes.
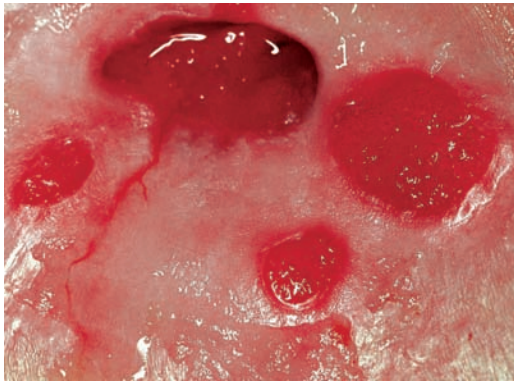
(A)

(B)

(C)

Figure 3.37 (**A**) This receding urostomy leaks continually onto the skin. The warty hyperkeratotic skin is moist and delicate and has three eroded areas on it, within which capillary loops of granulation tissue can be seen. This appearance is said to be associated with alkaline urine and urinary infection. Unfortunately, this patient failed to attend for reassessment so that we could not measure the urine pH. (**B**) Elderly man with a slightly receding urostomy for bladder carcinoma developed chronic papillomatous dermatitis associated with leaks. These were consistently lateral to the stoma such that he developed a wet and subsequently ulcerated area of hyperplasia (**C**). He was changed to a convex appliance that minimized leaks and was much improved four weeks later.
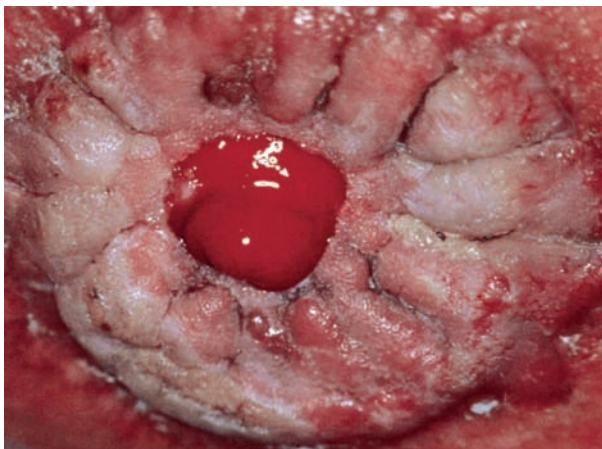
Figure 3.38 Hyperkeratotic encrustations of chronic papillomatous dermatitis around a urostomy. This patient had not sought treatment and the affected area expanded to become exuberant and circumferential. It was not possible to fit bags correctly and urine leaked constantly onto the skin. Fortunately, this patient had two urostomies, one connected to each ureter, so this one was closed and both ureters connected to the other.

(A)

(B)

(C)
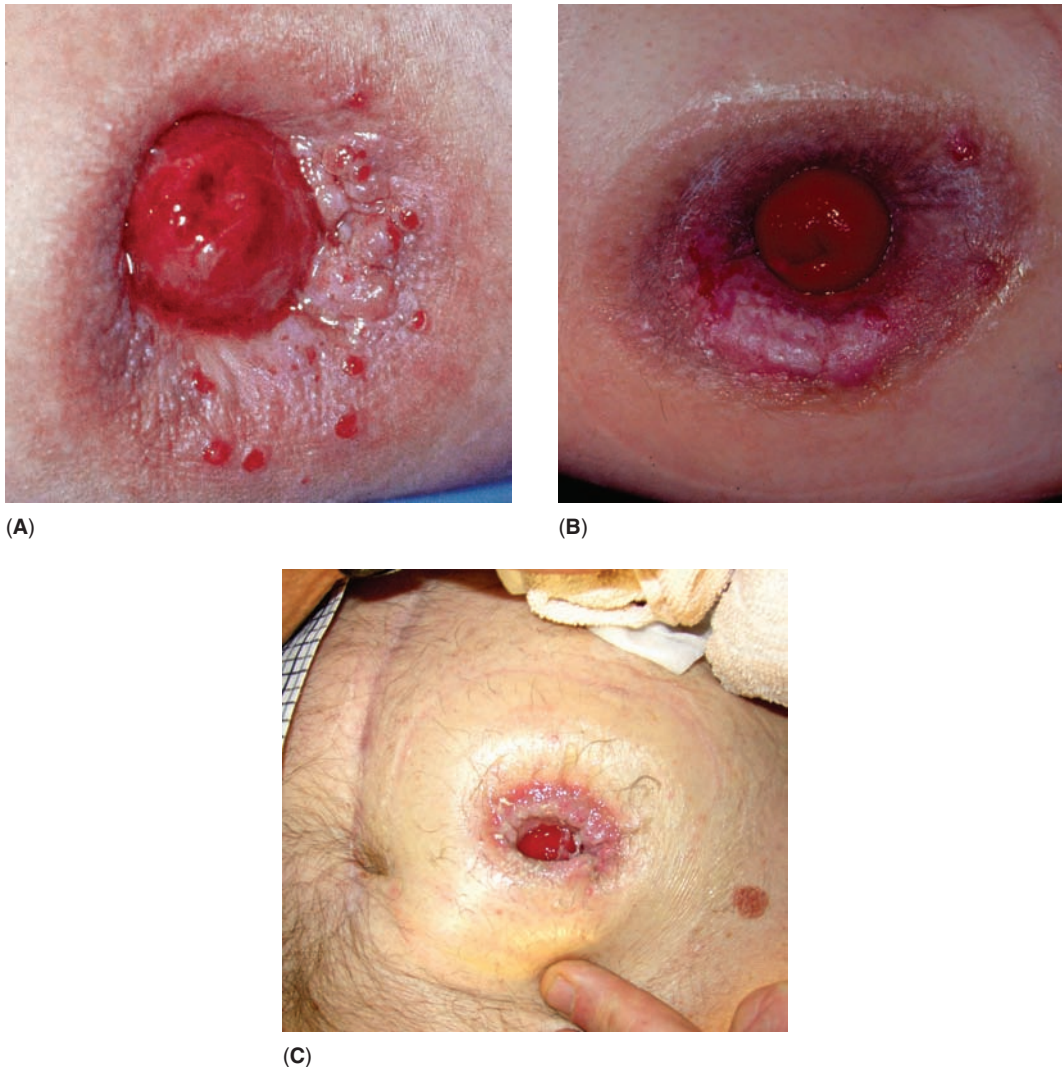
Figure 3.39 (**A** and **B**) Chronic papillomatous dermatitis affecting a receding urostomy. Some of the papules have an eroded appearance similar to the inflammatory acanthomas, described in napkin dermatitis (Fig. 3.33) and in other peristomal reactions without the background hyperkeratosis of CPD (Fig. 3.42B). This highlights the fact that, although the inflammatory papular reactions can be grouped into clinically defined categories, they are individual manifestations of the same disease process. (**C**) CPD affecting a receding urostomy. Note the excessive mucus which is often irritating and can cause leaks.

All the patients in this group have negative patch tests, usage tests (see section "Allergic Reactions"), and skin swabs for microbiological examination.

Clinical Features

The rash consists of dermatitis that is morphologically identical to dermatitis from other causes. It is usually restricted to the peristomal skin but, like other dermatitides, may become secondarily generalized (an id reaction). There are several patterns of distribution of nonspecific dermatitis (Fig. 3.53), some of which are suggestive of an irritant etiology although this remains to be proven. Patients with an inflammatory dermatosis elsewhere on their skin appear to be more likely to develop inflammation around the adhesive stoma barrier (Fig. 3.53G).

(A)

(B)

(C)

(D)

Figure 3.40 (**A** and **B**) (close-up) Marked hyperkeratosis and encrustation around a short Mitrofanoff urostomy. This appearance is said to be associated with alkaline urine and urinary infection. The stoma was stenotic and required surgical refashioning. (**C**) Chronic papillomatous dermatitis affecting a long-standing urostomy which has shortened and is becoming encrusted and stenosed. The papules around the stoma were amenable to (**D**) shaving off under local anesthetic and their bases cauterized.

Management

Fortunately, these reactions are often short-lived and the acute episode will respond to a short course of topical corticosteroids (appendix 4). Occasional patients experience repeated episodes, requiring further courses of topical corticosteroids. We have managed a small number of patients who require intermittent applications of topical corticosteroid on a longer-term basis in order to control the problem. This approach is used because, as with any other inflammatory dermato-sis, the affected skin impairs appliance adhesion, thereby causing leaks of stoma effluent that would compound the patient's problem by inducing an irritant dermatitis. Intermittent applica-tions of topical steroid should be no more frequent than every two weeks in order to minimize the potential for steroid-related side effects.

(**A**)   (**B**)

Figure 3.41   Elderly man with chronic papillomatous dermatitis (CPD) affecting his urostomy. Leaks were frequent and the area allowed pooling and stagnation of urine. (**A**) This patient applied vinegar soaks (see text) daily resulting in complete resolution of the CPD (**B**). *Source*: Photo courtesy of Dr. Graham Lowe.

(**A**)   (**B**)

Figure 3.42   (**A**) Eroded papules in severe napkin dermatitis. This type of problem is seen far less frequently since the introduction of disposable nappies (diapers). (**B**) Papules with a similar morphology around a urostomy. Although there is encrustation impinging on the stoma itself, there are no other features of chronic papillomatous dermatitis in the skin. The short encrusted stoma leaked under the bag so that the whole area was wet. The inflammatory papules and encrustation resolved by changing to a convex appliance.

ALLERGIC REACTIONS

Definition
Allergy is a specific hypersensitivity to particular chemical elements or molecules, which, once established, results in an inflammatory reaction if the agent responsible is ever encountered again. This specific immune system response has evolved as a protection against microorganisms and parasites, but in allergy is directed against chemicals, either artificial or naturally occurring, which are usually otherwise harmless.

Etiology
The pathogenesis of allergic reactions is conventionally divided into four types (Coombs classification). Type I or immediate hypersensitivity refers to IgE-mediated disease, that is, antibodies of the subclass IgE; type II is an antibody-mediated cytotoxic reaction; and type III is immune complex-mediated disease and type IV is delayed-type hypersensitivity. Other types of reaction have been added to the classification; however, as immune mechanisms are further elucidated,
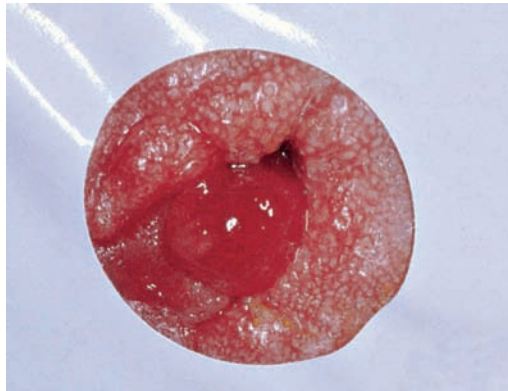
(A)

(B)

(C)
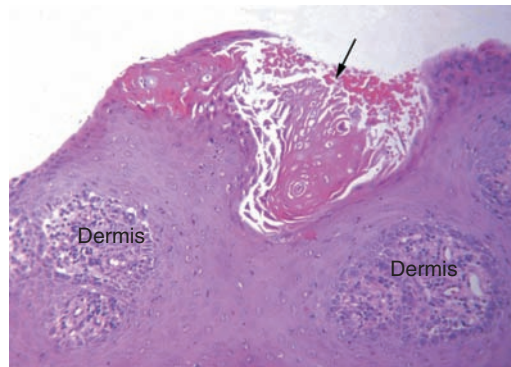
(D)

Figure 3.43 (**A** and **B**) Papules and plaques due to fecal irritation around a jejunostomy. The carrier from the patient's appliance has been placed over the stoma to demonstrate that the affected area corresponds with the area of skin exposed by the excessively large aperture. (**C**) In this patient with a colostomy, the etiology is the same. The coalescing papules are very prominent. (**D**) Although the appearance suggests glandular or mucosal tissue, a biopsy demonstrated acanthosis, hyperkeratosis, and inflammation in the dermis. The dermis appears as islands in this picture because the convoluted specimen has been crosscut. The yellowish-white areas on the clinical photos correspond to hyperkeratotic plugs (arrow) rather than to any bowel-related structure.

(A)
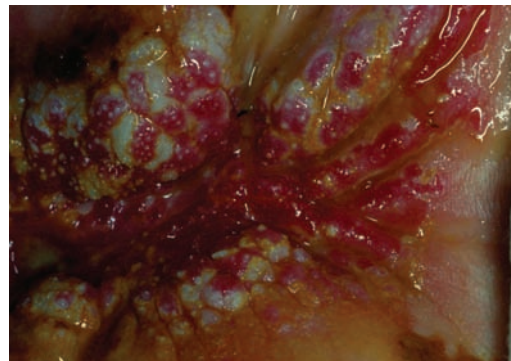
(B)

Figure 3.44 (**A**) Crohn's disease affecting an ileostomy. The stoma is shrunken and distorted by the inflammatory process. All around the stoma are numerous flesh-colored papules with a granulomatous appearance. This is one type of cutaneous Crohn's disease. The patient required resection of ileum and refashioning of the stoma. (**B**) Fistula in Crohn's disease. The inflammatory papular reaction is secondary to fecal irritation. There was no evidence of Crohn's disease on skin biopsy.

Figure 3.45 Physical irritant dermatitis at the upper edge of the stoma appliance. The stoma barrier at this site was in the waist skin fold and added friction from trouser waistbands exacerbated the problem. It resolved when the appliance was changed for one with an oval-shaped barrier that did not overlie the skin fold.
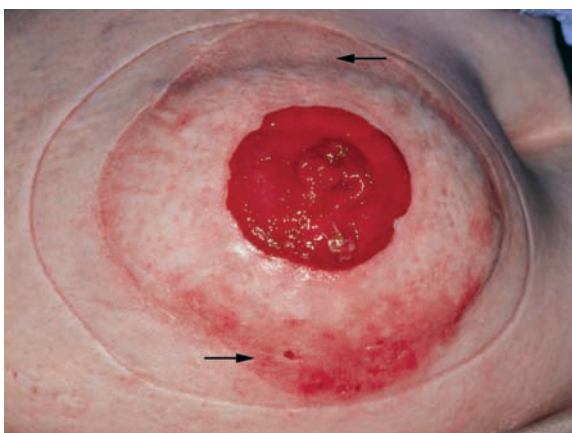
Figure 3.46 This patient used an elasticated hernia support and the impression from the edge of the stitched hem can be seen. An impression can also be seen in the skin where this appliance overlay the stoma bag and exerted the greatest pressure (arrows). The effect of this chronic irritation has been to produce a dermatitis reaction.
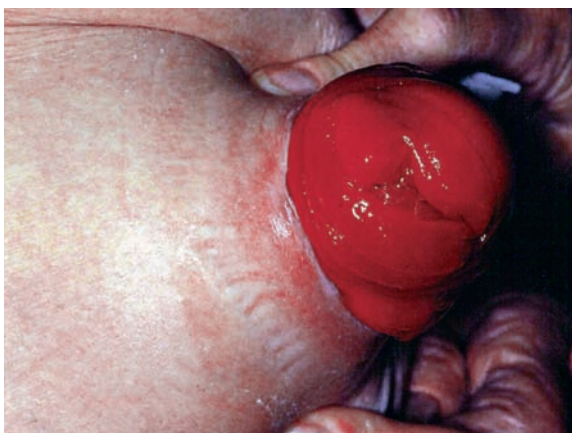
Figure 3.47 This stoma appears engorged because it was constricted by a tight appliance, pressure from which has also caused a mild dermatitis at the mucocutaneous junction.

(**A**) (**B**)
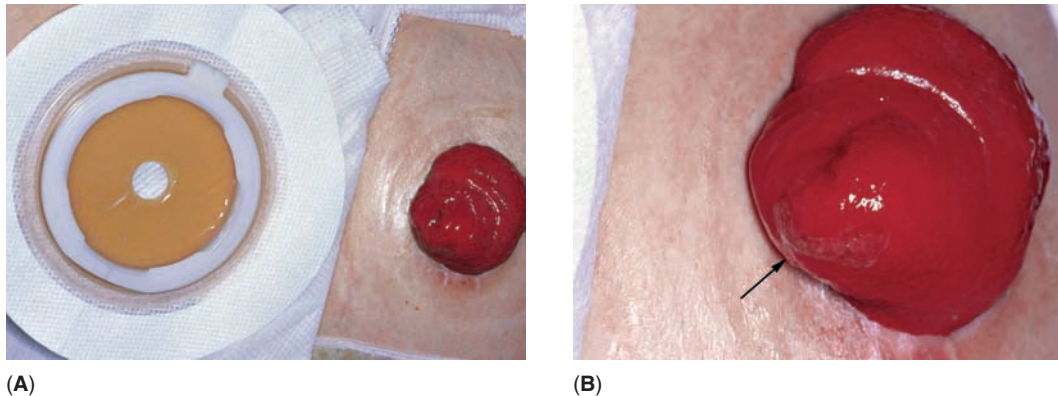
Figure 3.48 (**A** and **B**) This patient wore a two-piece appliance with a hard plastic fitting to attach the bag. Because of the shape of this stoma and the folds on a rather obese abdomen, the stoma rubbed continually on the hard plastic when the patient leaned forwards. This produced a plaque of squamous metaplasia (**B**) of the mucosa (arrow). The yellowy color is caused by keratin in the metaplastic area. Because there is little or no sensation in the stoma itself, the patient was not aware that this problem was occurring.
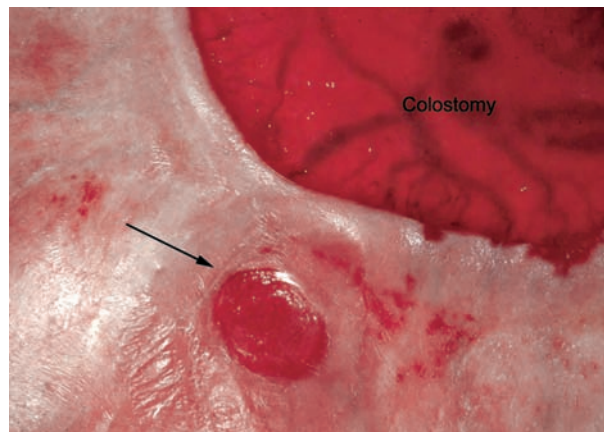
Figure 3.49 An ulcer (arrow) near a colostomy. This patient had a massive parastomal hernia that stretched and thinned the skin. The delicate skin was ulcerated when a section of epidermis detached on removal of an appliance. Healing was slow because of the persistent skin tension and friction on the skin resulting from the hernia.

it appears that individual diseases do not fit exactly into these classes. Types IV and I are of particular relevance to the skin.

ACD is a type IV reaction. In this condition, the allergen is a reactive chemical small enough to cross the skin's outer barrier. As part of normal immune surveillance, it is taken up and processed by antigen-presenting cells (usually Langerhans cells), which then migrate to local lymph nodes. Some sensitizers (chemicals which can cause allergy), termed haptens, only generate a response if they bind to a skin protein before being taken up by Langerhans cells; nickel is the commonest example and nickel allergy, as exemplified by dermatitis under cheap metal jewellery, is the commonest reason for ACD. Sensitization via Langerhans cell migration is more likely if the skin is inflamed (e.g., by irritation), causing the skin barrier to be damaged. At the lymph nodes, processed antigen is presented to circulating lymphocytes. In individuals whose lymphocytes are programmed to recognize the chemical structure as foreign, an immune response is generated and sensitization ensues. This process involves proliferation of T-lymphocytes, which are then primed to recognize the allergen if it is ever encountered again. Subsequent exposure to the allergen therefore triggers an inflammatory

Figure 3.50 Usage testing, as applied to peristomal dermatitis, involves the patient placing an appliance and all other materials to the normal side of their abdomen, at the same time and in the same way as on the stoma side, for a period of five days. The patient illustrated developed a vesicular dermatitis due to allergy. Usage testing is not diagnostic of allergy. It shows only that the patient is sensitive to some component of their stoma products. The other positive usage tests we have observed have been the result of irritant reactions presumed to be due to residual solvents in individual batches of product.

response at the site of contact (elicitation). Activated lymphocytes and other cells are directed to the skin, a process that takes up to 72 hours, hence the term delayed hypersensitivity.

Type I hypersensitivity, in contrast to type IV, is immediate (occurring within minutes of exposure). In this disorder, sensitization to the antigen mainly involves the proliferation of B-lymphocytes that produce antibodies specific to the antigen. The antigens involved are often plant or animal derived, such as animal dander and nut or latex proteins. On subsequent exposure, the antigen binds to locally produced antibody (IgE) on mast cells in particular. These respond by releasing histamine and other inflammatory mediators such as kinins and eicosanoids. This results in increased local blood flow, increased blood-vessel permeability causing tissue edema, and itch, all within 30 minutes of contact. In some sensitized individuals, the response can become generalized with widespread edema that can produce hypotension from loss of blood volume and life-threatening respiratory distress as a result of airway edema or an asthmatic response (anaphylaxis). Chronic exposure to an antigen causing a localized skin response can result in dermatitis (protein contact dermatitis), although this has not been reported in peristomal skin.

Clinical Features

The general clinical features are described in the introduction to this chapter. The distribution of dermatitis is often the greatest clue in differentiating between the different causes of dermatitis (Fig. 3.1). Around a stoma, ACD presents as an itchy, excoriated erythema indistinguishable

(A)

(C)

(B)

Figure 3.51 (**A**) This patient with a colostomy for adenocarcinoma developed chemical irritant dermatitis to a new batch of hydrocolloid washers that the patient used under the appliance to prevent leaks. The affected area is restricted to the skin covered by the washer and the patient had a positive usage test confirming that the washer was responsible. (**B**) The dermatitis settled when the patient changed to a different batch of the same product. Although we were unable to confirm it with the manufacturer, this was probably due to unacceptably high levels of residual solvent in one batch of the finished product. (**C**) Irritant dermatitis to a topical psoriasis treatment. This scaly dermatitis affects only the areas where the treatment was applied.

from ICD and some types of skin infection (see chap. 4 "Infections"). We have seen six cases of ACD, including reactions to Oakmoss fragrance in stoma bag deodorizers (Fig. 3.54).

Management
Cutaneous allergy is investigated by patch testing (type IV hypersensitivity), prick testing (type I hypersensitivity), and usage tests (Figs. 3.50, 3.55, and 3.56). Patients are usually referred for patch testing to a specialist dermatology department that has expertise in performing this

Figure 3.52 This patient developed severe irritant dermatitis to the white fabric outer ring on the appliance. The usage test was positive as can be seen on the non-stoma side of the abdomen. With the use of an all hydro-colloid barrier for the stoma, the skin has returned to normal. Patch testing did not uncover any allergies.

investigation. ACD is proven as a cause of peristomal dermatitis if patch testing is positive; the rash resolves when exposure is stopped and the rash recurs on subsequent exposure.

Several chemicals have been shown to cause peristomal ACD and these have been described in case reports (10). In our own practice, we have patch tested and prick tested all patients with persistent peristomal dermatitis of unknown cause together with all suspected cases of contact dermatitis over the last 10 years. This was undertaken with the help of several stoma appliance manufacturers (Dansac, Conva Tec, Salts, Hollister, Bullens, Medlogic, Clinimed, Coloplast, and AH Shaw & partner), each of whom provided detailed product infor-mation and supplied samples for testing (Table 3.1). In addition to the fragrance sensitive patients, we have seen ACD to chlorocresol (a biocide in skin gel), ACD to methylchloroisothi-azolinone (a preservative in wet-wipes) (Fig. 3.57), a case of acrylic adhesive allergy (Fig. 3.58A), and a patient sensitized to rosin-based tackifiers (Fig. 3.58B).

The fact that we have few positive results (with most to fragrance and preservatives) is not surprising, given the results of several European studies showing that these agents are second only to nickel as a cause of ACD.

These findings emphasize the importance of careful history-taking and, in particular, observation of the patient performing bag changes, washing, etc. This may reveal, as in our two cases, that the patients were misusing products such as deodorizers. In addition, some patients use perfumed cleansers, medicated wipes, or napkin wipes (Fig. 3.59) to clean peris-tomal skin. Many such products contain potential sensitizers (fragrances and preservatives) and irritants more likely to cause problems under the occlusion of an appliance. We advise all patients to wash with water alone, avoid perfumed products and, if they can do without, not to use barrier preparations. Adhesive removers deserve special mention because, while we advise using the minimum of cleansers and other products on the skin, these agents have their place in minimizing stripping trauma to the skin in patients who experience excessive adhesion of their appliances.

With regard to the treatment of ACD, true allergic dermatitis will resolve when the patient is no longer exposed to the allergen. The acute rash may be treated with topical steroid lotions in the short term to hasten resolution (appendix 4).

OTHER SKIN CHANGES

Pigmentation

Hyperpigmentation of the skin may occur after any skin disease, particularly conditions that disrupt the basal epidermis where the pigment is produced. The discoloration occurs because the cells that normally disperse the pigment (melanophages) are affected by the inflammatory

(A)   (B)

(C)   (D)

(E)
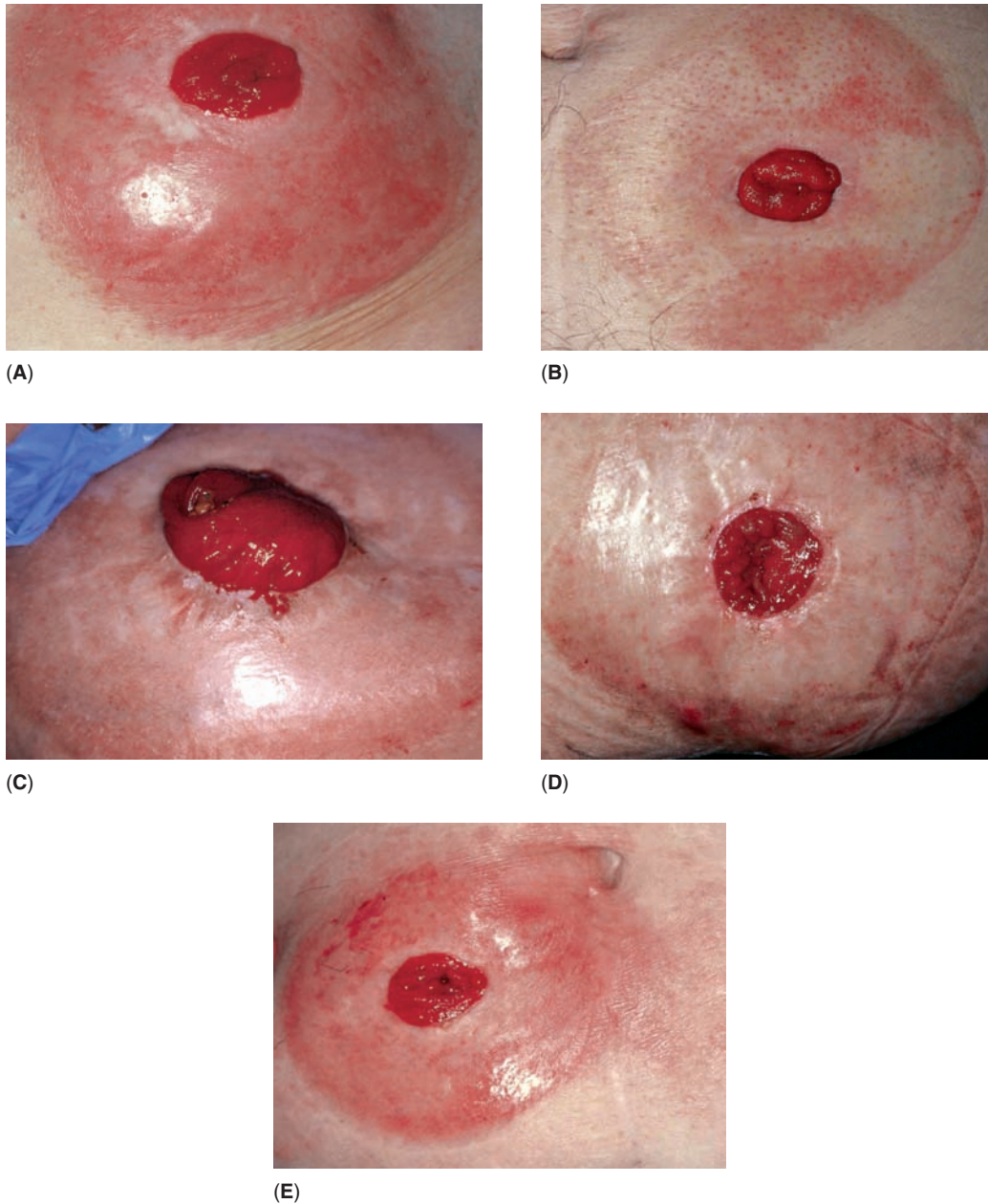
Figure 3.53 The different distribution patterns of nonspecific dermatitis (i.e., dermatitis for which no allergic, irritant, infectious, or other cause can be proven). (**A**) Nonspecific dermatitis affecting a colostomy. The inflammation uniformly affects the skin covered by the appliance. This rash resolved over two weeks with daily applications of betamethasone valerate lotion and has not recurred. (**B**) In this patient with a colostomy for adenocarcinoma, there is mild nonspecific dermatitis with a patchy distribution over the peristomal skin. It did not respond to topical corticosteroids but, fortunately, it was asymptomatic and did not affect appliance adhesion. (**C**) This patient developed a nonspecific dermatitis around an ileostomy performed for carcinoid syndrome. There is uniform erythema over the whole peristomal skin. The rash cleared with topical corticosteroid therapy but recurred on two occasions, requiring further treatment courses. (**D**) Nonspecific dermatitis around a colostomy. The erythema is restricted to one section of the skin near the edge of the appliance barrier. This is possibly an irritant reaction to the edge of the woven adhesive barrier that may contain sharp fibers. However, this was not proven, and the patient has required intermittent applications of betamethasone valerate lotion, every 14 days to keep the rash under control. (**E**) Nonspecific, peristomal dermatitis sparing the skin immediately around the stoma. The patient used an all-hydrocolloid bag and it is not clear why this pattern has occurred. (*Continued*)

(F)

(G)

(H)

(I)

(J)
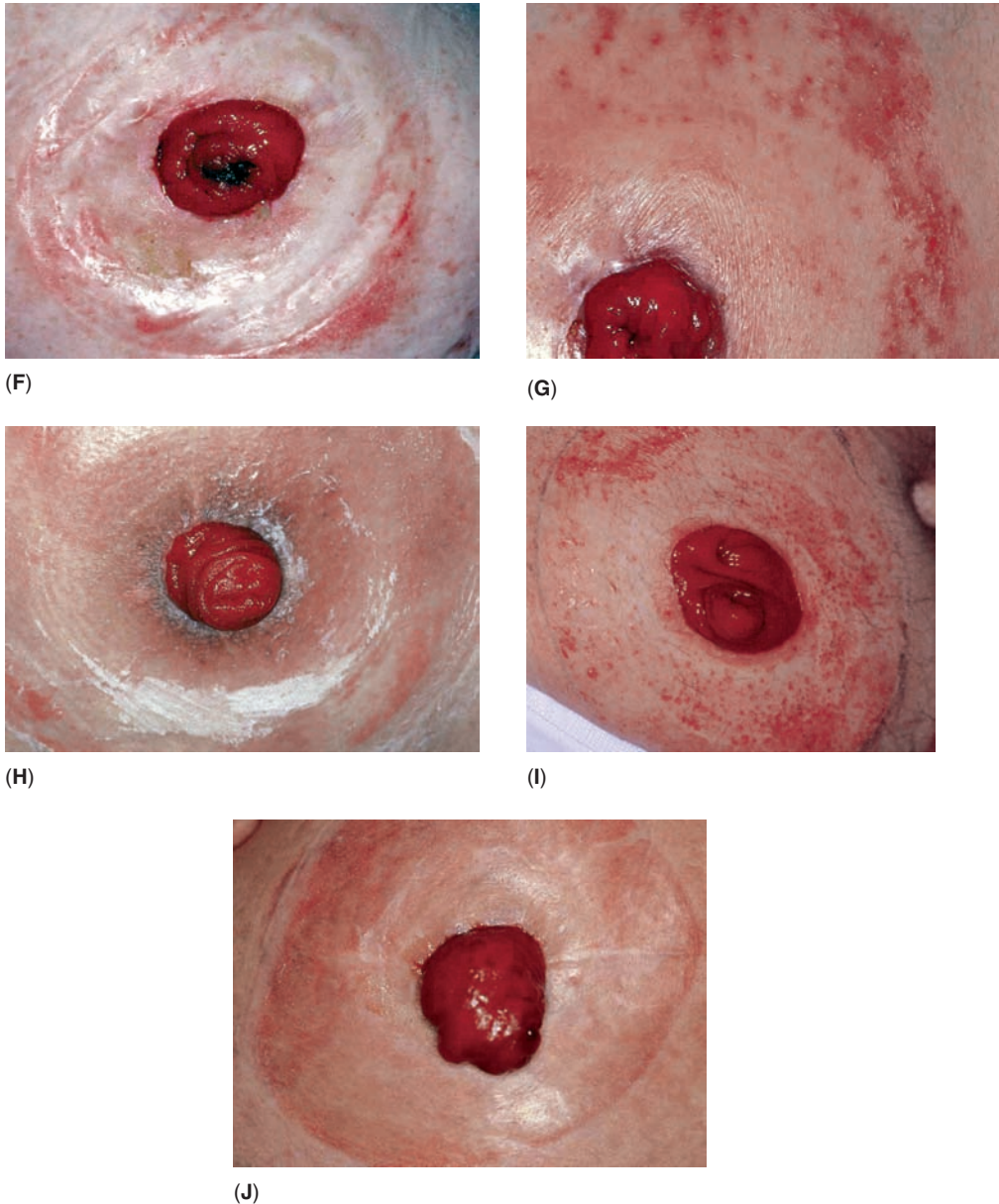
Figure 3.53 (*Continued*) (**F**) Itchy dermatitis most prominent at the edge of the peristomal area, similar to (**D**). There is some adherent adhesive from the appliance that has just been removed and it is possible that this pattern is an irritant reaction to skin stripping from a sticky adhesive. Another possibility is that the adhesive has become sticky because of excessive perspiration, the high humidity from which has also caused an irritant rash in a patient predisposed by a low skin irritancy threshold. (**G**) Similar distribution of dermatitis concentrated at the edge of the peristomal area. This more vesicular eczema is similar to that seen around any medical adhesive dressings in individuals with a low irritancy threshold (Fig. 3.55D). (**H**) Dermatitis with a similar distribution to (**F** and **G**). Note also the pigmentation around this urostomy. There was a history of urine irritation but it had not occurred recently and could not account for the more peripheral dermatitis. (**I**) Acute dermatitis with vesicle formation affecting a colostomy. There was no evidence of infection or of previous skin disease. The patient continued to use their usual appliances and the rash resolved over seven days using topical corticosteroid lotions. It has not recurred. (**J**) Mild dermatitis with a more peripheral distribution but concentrated above the ileostomy, making fecal leakage an unlikely cause (there was no evidence of leaks). The focal distribution also makes chemical irritation or allergy unlikely. The patient had negative patch tests and usage tests and there was no evidence of infection. Fortunately, the rash resolved over two weeks using daily applications of topical corticosteroid lotion and it has not recurred.

Figure 3.54 Allergic contact dermatitis to fragrance in a stoma bag deodorizer. In this case, the patient was allowing the deodorizer to come into contact with the skin. The rash persisted when the patient stopped the practice but resolved when the patient stopped using the product altogether.
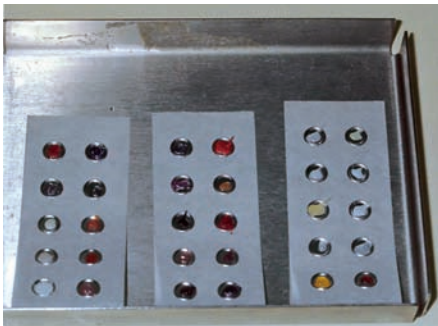
(A)

(C)

(B)

(D)

Figure 3.55   (**A**) Patch test reagents are usually made up in petrolatum. They are prepared in concentrations low enough to prevent an irritant reaction and samples are placed in aluminum cups on adhesive tape. (**B**) These are then placed on the patients back and (**C**) removed two days later (note the red marks indicating positive reactions). (**D**) The patients are reassessed after a further two days and any positive reactions noted. Note also the mild irritant reaction to the adhesive tape seen at the lower edge.

process. The clearing process may therefore take several weeks once the inflammation has settled; however, the pigmentation will persist if the inflammation persists, for example, in conditions such as chronic irritant dermatitis. This post-inflammatory hyperpigmentation is more marked in those with darker skin (Fig. 3.60). The condition can affect any stoma (Fig. 3.61) but is particularly common around urostomies (Fig. 3.10D and 3.36).

Whether pigmentary reactions occurring around urostomies are post-inflammatory or due to other types of pigment is not clear, as this would require extraction of the pigment from a skin biopsy specimen for chemical identification in order to demonstrate the presence of melanin.

(**A**)   (**B**)
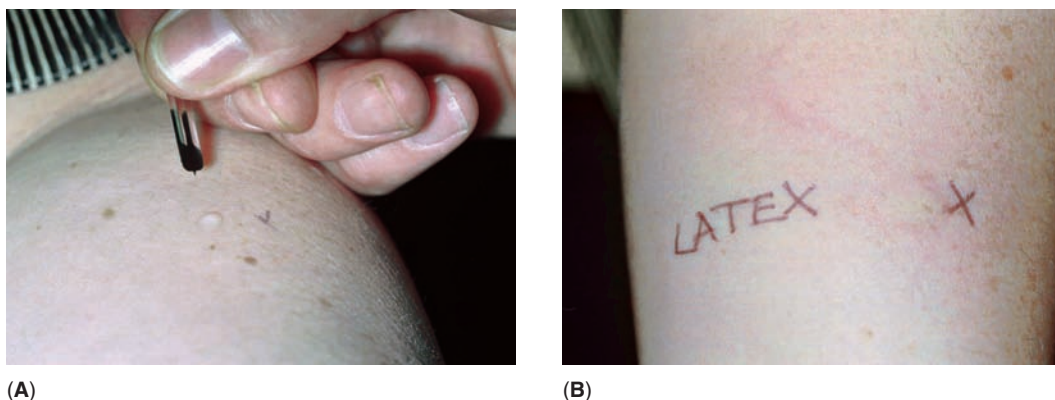
Figure 3.56   (**A**) In prick testing, the reagent is placed on the skin and the underlying skin is pricked with a lancet. (**B**) A positive reaction is usually seen within 30 minutes as a wheal surrounded by an erythematous flare. Care should be taken in selecting patients for prick testing as anaphylactic reactions have been observed, particularly to natural rubber latex.

Table 3.1   The Series of Agents for Patch Testing Patients with Persistent Peristomal Dermatitis[a]

Patch testing reagent	Concentration and vehicle	Relevance to stomas	Source of materials
Standard series of chemicals (similar to the European standard series)	Various	A variety of preservatives and fragrances in the series may be found in stoma medicaments, barriers, etc.	Chemotechnique Diagnostics, Malmö, Sweden
Acrylic adhesive series	Various	Some of these adhesives may be used in appliance manufacture.	Chemotechnique Diagnostics, Malmö, Sweden
Gantrez resins; ES-225, ES-425	5% in petrolatum	Used as wet-grab adhesives in some pastes.	ISP chemicals, Guildford, Surrey, U.K.
Isopropanol	2.5% in water	Solvent in some wipe-on barriers and adhesive removers	Available undiluted from chemicals suppliers
Cetrimide	0.1% in water	Disinfectant in some wash preparations	Available undiluted from Caldic (U.K.) Ltd., Chesterfield, Derbyshire, U.K.
Karaya	10% in water	Naturally occurring polysaccharide used in appliance barriers, washers, and filler pastes	Available undiluted from Hollister Ltd., Wokingham, Berkshire, U.K.
2-Bromo-2-nitropropane-1,3-diol	0.5% in petrolatum	Preservative in topical preparations	Chemotechnique Diagnostics, Malmö, Sweden

(*Continued*)

Table 3.1 The Series of Agents for Patch Testing Patients with Persistent Peristomal Dermatitis[a] (*Continued*)

Patch testing reagent	Concentration and vehicle	Relevance to stomas	Source of materials
Povidone-iodine	10% in ethanol	Skin disinfectant	The solution is commercially available, for example, Betadine™ from Seton-Scholl, Oldham, Lancashire, U.K.
Propylene glycol	20% in water	A humectant vehicle in topical preparations	Chemotechnique Diagnostics, Malmö, Sweden
Chlorhexidine digluconate	0.5% in water	Skin disinfectant	Chemotechnique Diagnostics, Malmö, Sweden
2-Ethylhexyl acrylate	0.1% in petrolatum	Monomer in some tape adhesives	Chemotechnique Diagnostics, Malmö, Sweden
Diaminodiphenylmethane	0.5% in petrolatum	Widely used in the manufacture of epoxy, rubber, and other plastics	Chemotechnique Diagnostics, Malmö, Sweden
Patients own materials[b]			

[a]This list is the result of our investigation of over 70 patients who were patch tested to more than 100 agents. All patients were patch tested to a standard series of common sensitizers and to materials from their own stoma equipment.

[b]It is very important to find out about all the materials used by the patient, including over-the-counter and cosmetic preparations. Samples of these can then be used for patch testing at appropriate dilutions. Cyanoacrylate-based barrier wipes can be tested as is. With regard to deodorizers, where information from the manufactures is not forthcoming, we test the products at 1% and 5% in petrolatum. Many deodorizers contain irritant surfactants and if tested at higher concentrations will result in irritant reactions.

Figure 3.57 This patient used wet toilet tissue wipes to clean the stoma and developed the dermatitis demonstrated. Patch testing revealed that the patient was sensitive to the preservative in the wipes (methylchloroisothiazolinone). The dermatitis resolved completely when the patient ceased using the product. These products can also cause simple irritation (Fig. 3.59).

There are reports of blue/gray discoloration of urine, appliances, or periurostomy skin resulting from oxidized tryptophan derivatives (11,12) or from chemical modification (by bacterial enzymes) of urinary indican (indoxyl sulfate). Chronic constipation may play a role as it allows for the greater degradation into indole and skatole of the essential amino acid l-tryptophan from the diet. Indole is subsequently absorbed and enzymatically modified by the liver into water-soluble salts (indoxyl sulfate) that are excreted in the urine (13). These salts are further modified in the urine by bacterial enzymes into indigo-related pigments. It is probable that these other

(**A**)

(**B**)

Figure 3.58 (**A**) This patient developed a reaction to the outer ring of adhesive on the barrier. This is usually an irritant reaction but in this case patch testing confirmed a reaction to an acrylic adhesive in the tape. (**B**) This patient was sensitive to oxidized rosin-based tackifier in the barrier (pentalyn^{TM}), which was confirmed on patch testing and with a positive usage test (illustrated). The patient was changed to an appliance with an entirely synthetic adhesive and the skin problem resolved.

Figure 3.59 This patient developed an irritant dermatitis when using wet wipes to clean the stoma. The rash resolved when the patient stopped using them.

pigments absorbed into the skin account for the discoloration around some urostomies, particularly as some pigmented urostomies do not appear to have had a preceding dermatitis. Those most likely to develop the pigment are therefore patients with a tendency to constipation and a urostomy that allows pooling of stagnant urine onto the skin (Fig. 3.62).

Vascular Proliferation

Peristomal skin is highly vascular and, in some patients, marked proliferation of small vessels occurs. This is more common if the skin is inflamed, for example, by irritation. Close examination

Figure 3.60   Post-inflammatory hyperpigmentation affecting an ileostomy in an Afro-Caribbean woman. She had mild fecal dermatitis, which had resolved after appliance adjustments. The pigmentation cleared after nine months.

(A)

(B)

Figure 3.61   (**A**) Hyperpigmentation around a receding ileostomy prone to fecal irritant dermatitis. (**B**) Hyperpigmentation around an ileostomy following fecal irritant dermatitis. The associated capillary proliferation has darkened the appearance.

of the vessels reveals that the direction of flow is from the stoma to the skin (Fig. 3.63), although this situation is not the same as the large peristomal varices seen in patients with portal hypertension (see chap. 1). The capillaries may be quite tortuous (Fig. 3.63 and Fig. 5.33, chap. 5 "Pre-existing and Coincidental Skin Disease"), impart a purple discoloration to the skin (Fig. 3.64) or, more commonly, appear as a pink blush (Fig. 3.65). This condition does not require treatment

(**A**)

(**B**)
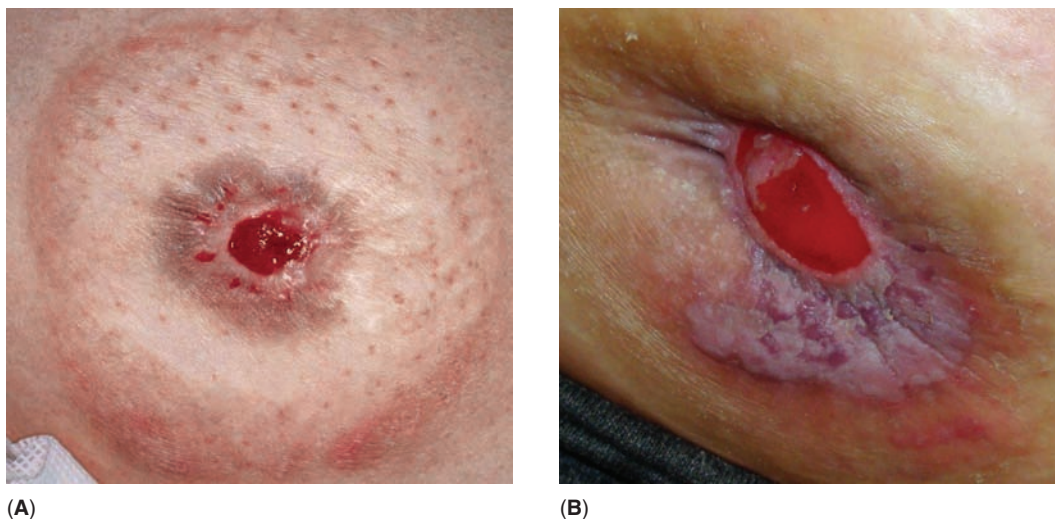
Figure 3.62 (**A**) Pigmentation around a urostomy. Apart from occasional erosions on removing the appliance, the patient had no skin problems suggestive of dermatitis. This may represent non-melanin pigment; however, there is pigmentation at the edge of the area of skin covered by the appliance, a common site for mild dermatitis. (**B**) Indigo colored pigmentation around a long-standing urostomy in a patient with a spina bifida and sluggish bowel transit prone to constipation.

Figure 3.63 Prominent capillary proliferation around a short, irritated ileostomy.

Figure 3.64   Purple discoloration around an ileostomy due to vascular proliferation.

Figure 3.65   The pinkish blush around this colostomy is a very common finding. In this case, the increased blood flow was secondary to mild, chronic irritation.

unless the superficial vessels are prone to bleeding, in which case cautery would be appropriate. The possibility of portal hypertension should be borne in mind and investigations performed, particularly in those patients with more extensive involvement and where larger, dilated vessels are apparent (Fig. 3.63). A variety of rare, often genetic vascular abnormalities exists that are characterized by telangiectasia. We have seen only one with relevance to the stoma patients. This is termed essential telangiectasia and presents with a striking clinical picture (Fig. 3.66).

(A)

(B)
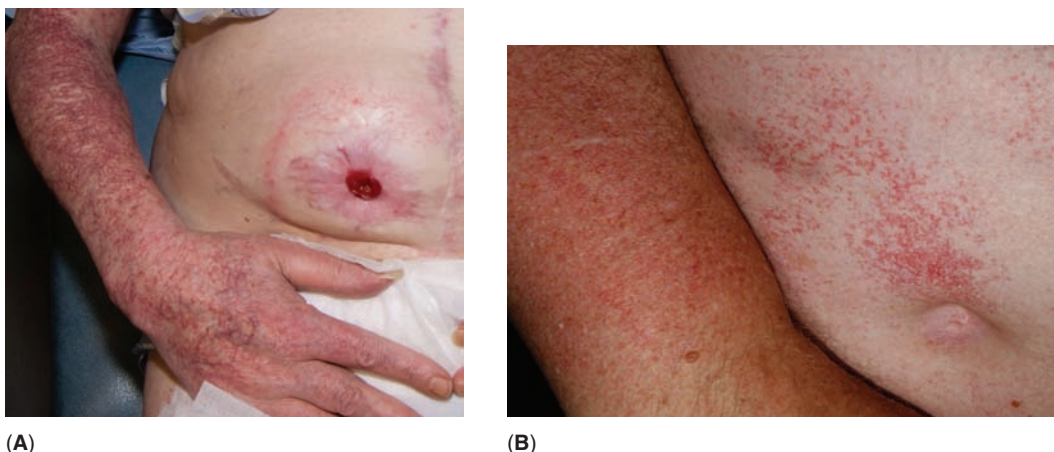
Figure 3.66 (**A**) A patient with essential telangiectasia who was referred because of a bleeding tendency (often profuse) around the urostomy. Note the prominent peristomal vessels. The patient was referred for laser coagulation of these vessels. (**B**) Essential telangiectasia in a patient without a stoma. This shows that as well as the limbs the condition does involve abdominal skin, often periumbilical.

KEY MESSAGES

Allergy to Appliances or Topical Preparations Is an Uncommon Cause of Peristomal Skin Problems

- Allergy can be investigated using specialist techniques undertaken by a dermatologist.
- To minimize the risk of allergy, patients should avoid perfumed cleansers and deodorizers and wash peristomal skin only with water.

Irritant Reactions Are the Commonest Cause of Peristomal Skin Problems

- Irritant dermatitis from feces or urine is the most common single cause of peristomal skin problems.
- The size and shape of stomas alter with time, so the stoma specialist should undertake regular assessments in order to ensure that an appliance that will not permit leaks onto the skin is being used.
- Papular reactions to fecal/urine irritation also occur and these result from the same pathological mechanisms as dermatitis.
  - CPD is a clinically distinctive pattern of papular irritant reaction that affects urostomies.
  - Papules of overgranulation associated with bowel metaplasia of the skin occur in response to fecal irritation.
- All fecal or urine irritant reactions will resolve if further contamination is prevented.
  - This can usually be achieved by appliance modifications or by using barrier preparations.
  - The acute inflammation can be treated with topical corticosteroid lotions.
  - Sucralfate powder is an effective treatment for eroded fecal dermatitis and can be used long term in those cases where leaks are inevitable.
- Dermatitis or ulceration may be produced by friction from clothing or appliances.
- Chemical irritation from the following potential sources should be considered when assessing a patient with peristomal dermatitis.
  - Over-the-counter preparations.
  - Residual detergent or bleach in reusable cloths used to wash the peristomal skin.
  - Perfumed stoma deodorizers put directly onto the skin rather than into the bag.

- A significant proportion of patients have peristomal dermatitis for which no cause can be identified by the investigations currently available. These dermatoses usually respond to a short course of topical corticosteroid lotions.
- Bizarre or otherwise unexplained lesions may occasionally be the result of deliberate self-harm. If this is suspected, careful, considerate enquiry is needed to uncover the root cause of this behavior.

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4 | Infections

Calum C. Lyon

The skin under a stoma appliance is warm, humid, and intermittently soiled, providing an ideal environment for microbial growth. Some stoma patients may also be at an increased risk of skin infection because of general ill health or immunosuppressive therapy given for malignancy or inflammatory bowel disease. We have swabbed, for microbiological investigation, the peristomal skin of all the patients attending our clinic and have identified a range infections as well as a number of bacterial and fungal organisms colonizing the area without causing skin disease. We recommend that all peristomal skin disorders are swabbed for bacterial and fungal culture as many rashes (e.g., psoriasis) can become infected and because infections under stomas can present as a range of eczema and psoriasis-like rashes. Over the last 10 years, we have seen very few viral infections affecting peristomal skin. In fact, apart from viral warts the only viral infection we have seen is shingles affecting the abdominal skin. Nonetheless, viral infections are a potential problem and are briefly discussed here. Overall, however, we do see more infections (11% of referrals), particularly fungal. In some series, fungal infections are among the more common peristomal skin problems (1).

The three major groups of microorganisms will be considered in turn as follows:

- Bacterial
  ○ Folliculitis
  ○ Impetigo and other rashes caused by bacterial infection
  ○ Secondary infection
  ○ Cellulitis
  ○ Gangrene
  ○ Others
- Viral
  ○ Herpes zoster
  ○ Viral warts
  ○ Molluscum contagiosum
  ○ Herpes simplex
- Fungal
  ○ Candidal infection
  ○ Tinea (dermatophytes) "ringworm"
  ○ Malassezia (Pityrosporum) infections

BACTERIAL INFECTIONS

Folliculitis
Definition
Folliculitis is a pustular inflammation of hair follicles usually caused by *Staphylococcus aureus* or streptococci, or occasionally both.

Etiology
Around stomas, folliculitis commonly results when frequent shaving, and possibly repeated stripping of the skin from frequent bag changes, introduce infection. As a result, it is often seen in men with hairy abdomens who shave their peristomal skin. Occasionally, bacterial folliculitis occurs because of frequent applications or protracted courses of topical corticosteroids.

Clinical Features
The principal lesions are pustules affecting hair follicles. They progress from erythematous papules through pustules to encrusted, erythematous areas as they resolve. Lesions are usually

multiple and so all stages will be seen in an individual patient (Figs. 4.1–4.3). The rash may be itchy and individual lesions are often painful.

Management

Skin affected by bacterial folliculitis should be swabbed for microbial culture and antibiotic sensitivities. The disorder usually resolves within a few days on treatment with specific oral antibiotics based on antibiotic sensitivities. In many cases, *Staphylococcus aureus (S. aureus)* is the causative organism and this typically responds to flucloxacillin or erythromycin (250 mg four times a day for seven days, in each case). Oral treatment may be combined with daily, topical antiseptic washes containing triclosan or other disinfectants (e.g., cetrimide). A small number of patients can develop irritant reactions to these agents and patients should be advised that, if their rash deteriorates, they should stop topical treatment. In those who shave their abdomen, we have observed that reducing their frequency of shaving to no more than once a week makes recurrent infections very unlikely. Diabetes mellitus should be considered and investigated for in all patients with recurrent or unusual infections.

(A)   (B)

Figure 4.1   (**A**) Staphylococcal folliculitis affecting the skin around an ileostomy in a man who shaved his abdomen daily. (**B**) In close-up, the small follicular pustules can be seen in all stages of their evolution.

(A)   (B)

Figure 4.2   (**A**) Staphylococcal folliculitis affecting the skin around an ileostomy in a man who shaved his abdomen daily. There are also areas of impetigo (arrow) with denuded skin and honey-colored crusting (see section "Impetigo and Other Bacterial Rashes"). (**B**) In close-up, the small follicular pustules can be seen in all stages of their evolution.

(A)   (B)
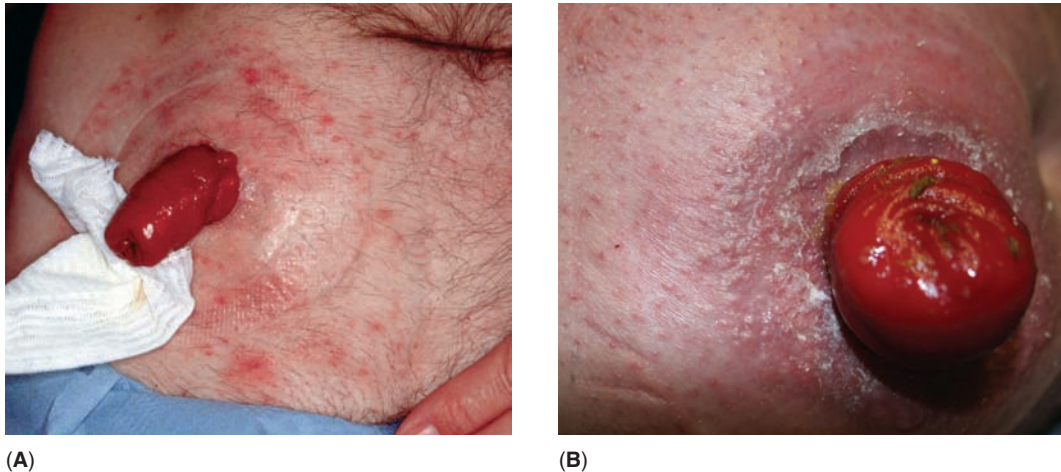
Figure 4.3 (**A**) Staphylococcal folliculitis affecting the skin around an ileostomy in a man who does not shave his abdomen. There are also areas of infection extending beyond the peristomal skin. Shaving is not the only route by which infection occurs. In this case, it may have been due to plucking of the hairs when stoma bags were peeled off. (**B**) This patient does shave daily and has chronic, infected papules similar to a barber's rash (sycosis barbae).

Impetigo and Other Bacterial Rashes

Definition
Impetigo is a superficial skin infection caused by *S. aureus* or Streptococcus sp. Superficial infection with other bacteria may also produce rashes in peristomal skin.

Etiology
The bacteria infect the upper layers of the skin and may cause superficial sloughing, which results in denuded or occasionally blistered skin. Infection is more likely in traumatized skin where the physical barrier is breached. Where this involves a pre-existing skin disease, the term impetiginized is used (see below).

Clinical Features
Impetigo typically begins with flaccid blisters that rupture to leave denuded skin, which then develops an adherent honey-colored crust (Fig. 4.4). In the peristomal skin, however, blisters are not seen, presumably because they are deroofed when appliances are removed. Similarly, crusting is less obvious and usually limited to the more peripheral areas (Fig. 4.2A). The clinical features of bacterial infection at this occluded site are erythema, weeping denuded areas, and occasional pustules (Figs. 4.5–4.7). Impetigo is contagious and more than one body site may be affected as the patient transfers infection on their hands. Because infection is very superficial, the affected areas do not produce scars when they heal. That an erythematous rash is due to infection is not usually as obvious as in Figure 4.7. Infections can mimic other dermatoses and swabs should always be taken (Fig. 4.8). Methicillin-resistant *S. aureus* infection is on the increase and, like other infections, is not always easy to diagnose without microbiological proof (2).

In addition to *S. aureus*, we have seen other superficial bacterial infections causing erythematous rashes on the peristomal skin in a small number of patients. The organisms responsible include Streptococcus sp. (Enterococci) (Fig. 4.9), *Proteus mirabilis*, and *Pseudomonas aeruginosa* (Fig. 4.10). In all cases, the appearance of the rash is similar to that of peristomal impetigo, although other features such as ulceration can also be present. We regard the microorganisms as the causative agents for these eruptions because they are isolated in high numbers from bacterial swabs and because the rashes resolve within a few days on specific antibiotic therapy.

P. aeruginosa is a soil dwelling organism which is sometimes found in the human intestine. It can colonize and infect cutaneous wounds and ulcers, particularly in diabetic or infirm

(A)   (B)
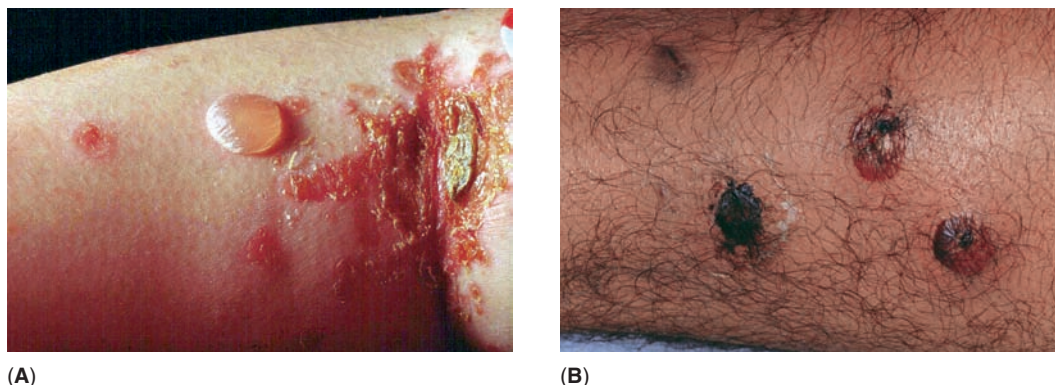
Figure 4.4 (**A**) Impetigo of the arm. Note the typical features of a flaccid blister and denuded skin (deroofed blister) with adherent, honey-yellow crusting. (**B**) In dark-skinned Asian patients, impetigo can present with very dark crusts and blistered areas.

Figure 4.5 Peristomal impetigo. There is weeping erythema with some crust formation affecting the peristomal skin in a patient with an ileostomy for Crohn's disease.

patients and should always be looked for in peristomal lesions. It can also cause a folliculitis in some patients and it is probable that the patient in Figure 4.10 initially had follicular Pseudomonas infection which progressed, under the occlusion of a stoma appliance, to a confluent erythematous rash.

Management
All peristomal lesions should be swabbed for microbial culture and antibiotic sensitivities. These disorders resolve within a few days on treatment with specific oral antibiotics (see section "Folliculitis"). Oral treatment may be combined with daily topical antiseptic washes containing triclosan or similar washes (e.g., cetrimide). A small number of patients can develop irritant reactions to these agents and patients should be advised that, if their rash deteriorates, they should stop topical treatment. Diabetes mellitus should be considered and investigated for in all patients with recurrent or unusual infections.

Secondary Bacterial Infections
Definition
This refers to bacterial infection of an existing dermatological disorder, particularly eczema, psoriasis, and seborrhoeic dermatitis. The secondary infection makes the primary skin disease worse.
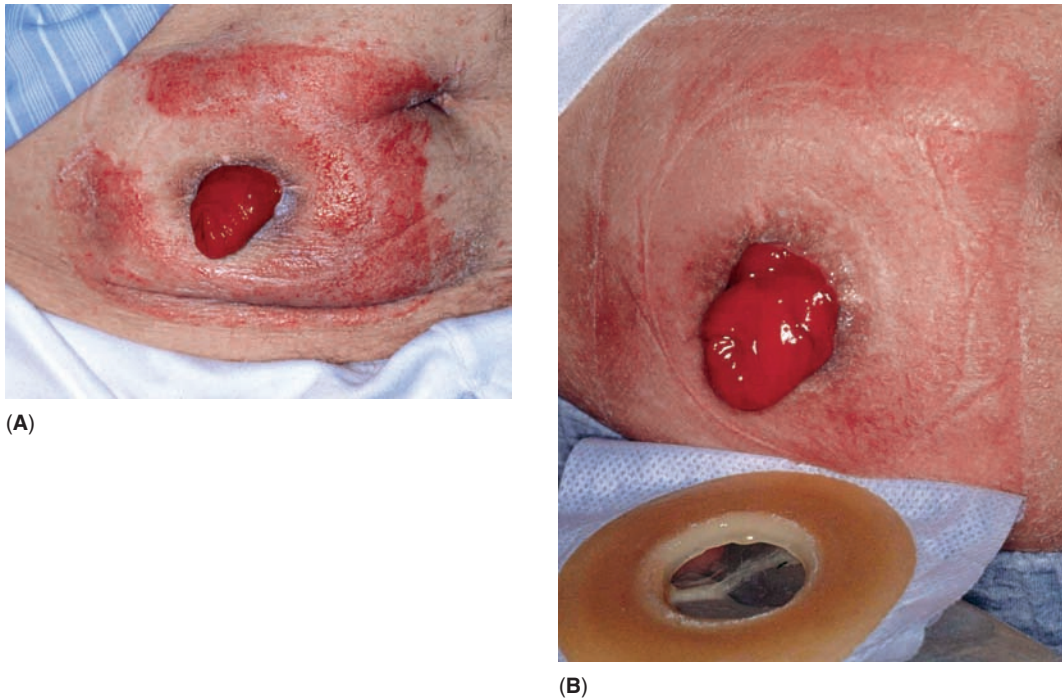
Figure 4.6 (**A**) Peristomal impetigo. There is crusted, weeping erythema affecting the peristomal skin. The distribution and appearance are similar to some cases of irritant dermatitis; however, there was a heavy growth of *S. aureus* on bacterial culture and the rash resolved (**B**) over 10 days on oral antibiotic treatment (flucloxacillin 250 mg four times a day).
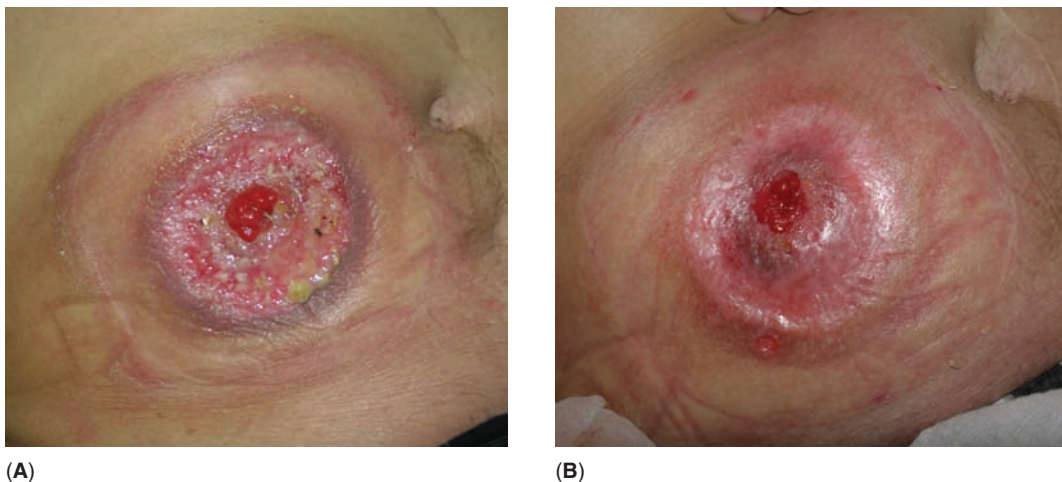
Figure 4.7 Peristomal impetigo. (**A**) Acute staphylococcal infection around a stoma. The whole area is denuded and exuding typical yellow pus. (**B**) The infection responded rapidly to specific antibiotics.

Etiology

This is commonly the result of staphylococcal or streptococcal infections, which may produce a yellow-crusted inflammation of the primary skin disease, the so-called impetiginized skin disease (see section "Impetigo and Other Bacterial Rashes"). Patients with atopic eczema are particularly susceptible to skin colonization by potentially pathogenic bacteria so that secondary

(A)   (B)

Figure 4.8 (**A**) Flaking erythematous rash reminiscent of psoriasis. The patient had complained of a sore and itchy rash for many weeks. A swab demonstrated that this eruption was caused by methicillin-resistant *S. aureus* (MRSA), and it cleared completely with oral antibiotics and topical triclosan wash. (**B**) MRSA positive folliculitis which has become a florid impetigo. The patient rarely shaved his abdomen.

(B)

(A)

(C)

Figure 4.9 (**A** and **B**) Two patients with ulcerative infection caused by *Streptococcus pyogenes*, an enterococcus. In both cases, the problems resolved within 14 days following specific antibiotics. Case (**A**) developed the infection in a small traumatic ulcer near his stoma caused by an appliance belt clip. (**C**) Impetigo-like rash caused by streptococcal infection that resolved completely on oral penicillin.

Figure 4.10 Superficial skin infection with *P. aeruginosa*. The rash is similar in appearance to impetigo, although there are some small non-follicular pustules at the edge of the affected area. The rash resolved over 10 days on oral antibiotic treatment (ciprofloxacin).

infection is also common. Several other bacterial species may colonize and infect existing skin disease and damaged skin, particularly Pseudomonas sp. and *P. mirabilis*.

Clinical Features
In patients with a primary skin disease, particularly eczema, skin infection may cause a sudden and marked worsening of the existing rash, which then extends to involve other areas of skin. Psoriasis, on the other hand, is not usually associated with significant secondary infections; however, peristomal psoriasis can become infected, presumably because of the occluded environment. The most common secondary infection in our practice is impetiginization caused by staphylococci. This may affect seborrhoeic dermatitis (Fig. 4.11) and psoriasis (Figs. 4.12 and 4.13) as well as eczema. Damaged skin has an increased susceptibility to infection, and ulcerative conditions may become secondarily infected (Fig. 4.14).

Management
All peristomal rashes should be swabbed for microbial culture and antibiotic sensitivities even when general examination indicates that the rash is a primary skin disease such as psoriasis. This is because those peristomal rashes that are secondarily infected will improve or even resolve entirely after antibiotic therapy. Oral antibiotic choice should be guided by the antibiotic sensitivities. For first line treatment, streptococci typically respond to penicillin or erythromycin. Staphylococci may be covered by erythromycin or flucloxacillin.

Cellulitis
Definition
Cellulitis is bacterial infection of the subcutaneous tissues and upper dermis usually caused by *Streptococcus pyogenes.*

(A)   (B)
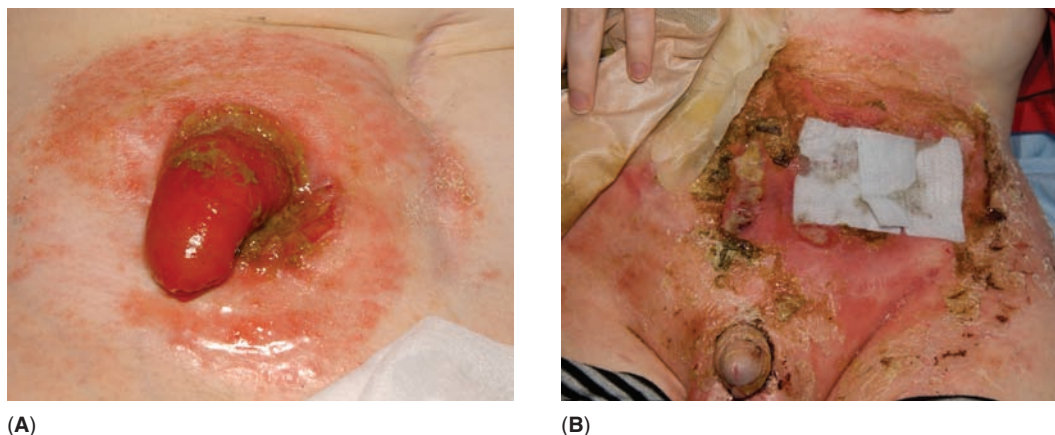
Figure 4.11 (**A**) Infected seborrhoeic dermatitis in a patient with ulcerative colitis. There is orangey, crusted, superficial inflammation, which was heavily infected with a mixed *S. aureus* and streptococcal infection. The flaking seborrhoeic dermatitis can be seen medially. This rash resolved after one week on treatment with oral antibiotics. The small traumatic ulcer took a further month to heal. Mild seborrhoeic dermatitis, however, recurred occasionally at the same sites. (**B**) Heavily infected (*S. aureus*) sebo-psoriasis on the abdomen of an adolescent Crohn's patient. This improved with specific antibiotics but some sebo-psoriasis persisted.

(A)   (B)
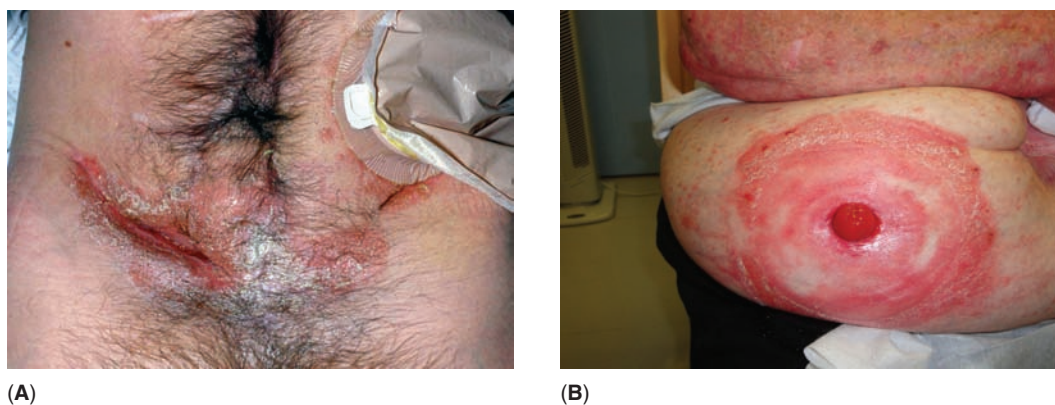
Figure 4.12 (**A**) Infected psoriasis. This patient with Crohn's disease has psoriasis affecting abdominal skin from the umbilicus to the pubic area. There is involvement of both a right-sided fistula and left-sided ileostomy. At both sites, the classical yellow crusting of secondary staphylococcal infection is seen. Specific oral antibiotic therapy produced a rapid improvement and the psoriasis has subsequently been controlled by intermittent courses of calcipotriol ointment. (**B**) This patient with mild psoriasis developed a severe exacerbation around his stoma associated with staphylococcal infection. The exacerbation settled with specific oral antibiotics. There are obvious features over and above those of psoriasis, highlighting the point that it is worthwhile swabbing all rashes, at least on initial presentation.

Etiology

Infection is introduced through skin trauma, often minor. The infection may occur in those who have had recent surgery or in those who are chronically unwell or immunosuppressed, although most patients who develop cellulitis are otherwise well. Areas of skin where there has been lymphatic damage are more likely to develop the infection but this will not usually apply to stomas.

Clinical Features

The onset is sudden and patients are almost always systemically unwell with fever, malaise, and rigors similar to influenza symptoms. The affected skin is erythematous, tender, and edematous

Figure 4.13 Infected psoriasis. This woman with ulcerative colitis had skin eruptions consistent with both psoriasis and seborrhoeic dermatitis. The peristomal rash developed rapidly and was heavily infected with *S. aureus*. At this occluded site, the typical yellow crusting is not seen. The peristomal disease resolved after 10 days' treatment with specific antibiotics, although skin disease at other sites persisted.
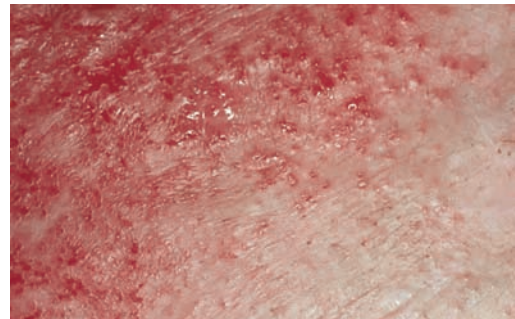
(**A**)   (**B**)

Figure 4.14 This patient developed a mixed bacterial infection of a pyoderma gangrenosum ulcer on the abdomen while using potent topical corticosteroids. The infection has spread to involve the peristomal skin (**A** and **B**). The eczematous appearance is nonspecific. The rash resolved on oral antibiotic therapy.

and if the infection is more superficial, involving the dermis, there may be a well-defined, raised edge (Fig. 4.15). Such streptococcal infections can very rarely produce a life-threatening, rapidly destructive necrotizing cellulitis or fasciitis.

Management

This condition requires urgent treatment, usually with intravenous penicillins or erythromycin, for which the patient is usually admitted to hospital. Severe streptococcal infections may be complicated by glomerulonephritis, so the patients require careful observation. The attacks may be recurrent because the initial inflammation may permanently damage lymphatic channels, thereby predisposing to further attacks. Care should be taken to reduce the chance of recurrence by minimizing peristomal skin trauma, which might permit further infection.

Gangrene and Necrotizing Fasciitis

Definition

The term gangrene derives from the Greek word for "gnawing sore" and usually refers to rapidly destructive subcutaneous infection caused by either Clostridium sp. or a combined bacterial infection, which is termed synergic or synergistic gangrene.

(A)

(B)

(C)

Figure 4.15 (**A**) Streptococcal cellulitis affecting a recently formed colostomy. The stoma itself is affected. The patient was systemically unwell and required systemic penicillin treatment to clear the infection. (**B**) Bacterial cellulitis on the arm of a middle-aged man. This painful indurated plaque was caused by infection that possibly entered through an insect bite. (**C**) Streptococcal cellulitis affecting a newly formed stoma. This began as mucocutaneous separation. Note the sharp edge to the erythema and the pustules in the affected areas.

Etiology
The predisposing factors are the same as for cellulitis.

Clinical Features
Clostridial infection is usually caused by the organism *Clostridium perfringens*, which is found in both the human gut and the soil. It produces a progressive, necrotizing cellulitis and, as for other causes of cellulitis, the patient is usually systemically unwell. The necrotic process generates gas that can be felt as a bubbling under the skin when it is palpated (crepitus). True gas gangrene occurs when infection causes destruction of muscles and their blood supply. These anaerobic organisms then thrive in the consequent hypoxia and extensive tissue destruction ensues. The more superficial infections are relatively painless and, apart from gas production, have a similar clinical appearance to other bacterial cellulitis infections.

Synergic gangrene is a rapidly progressive necrotizing, subcutaneous infection caused by a combination of anaerobic cocci, Bacteroides sp., and some non-pathological organisms, the presence of which boosts the proliferation of the other species. As with the other serious

subcutaneous infections, the patient is toxic and unwell. The advancing edge of inflammation moves rapidly and the resulting necrotic skin may form an adherent black scab or eschar (Fig. 4.16). Necrotizing fasciitis results form infection with group A streptococci, *S. aureus*, and sometimes other mixed infections. Patients present with a hot tender swollen area, bullae, and necrosis then appear (Fig. 4.17)
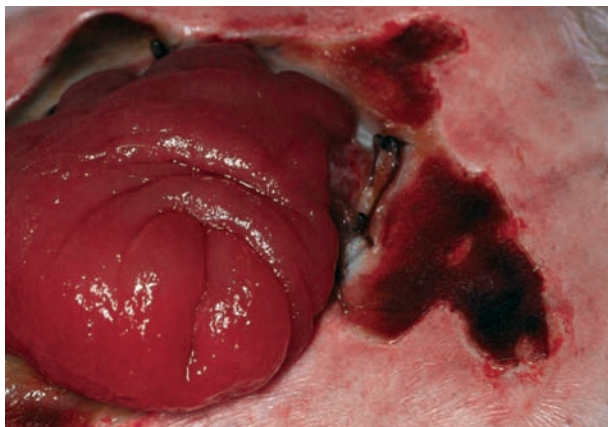
Figure 4.16 Synergic gangrene affecting a recently formed ileostomy in a patient with Crohn's disease. Note the erythema surrounding necrotic skin, which is covered by a dark eschar.

(A)

(B)
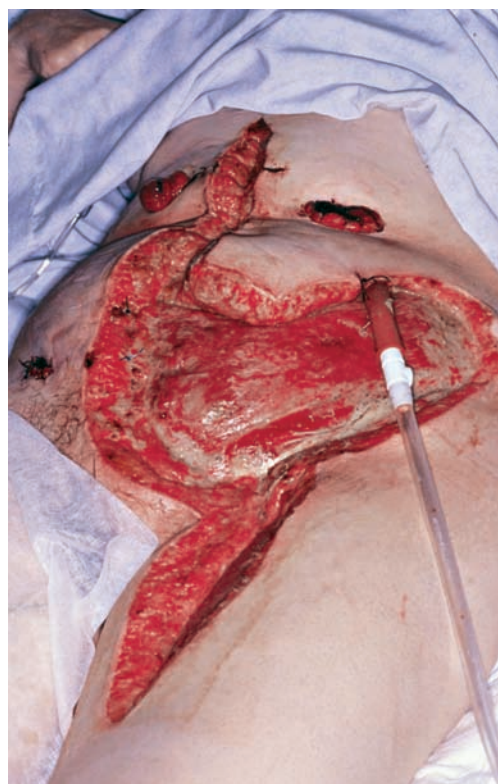
(C)

Figure 4.17 (**A**) After bowel resection and formation of a loop ileostomy for Crohn's disease, this patient developed necrotizing fasciitis necessitating debridement. (**B**) The wound healed over many months with irregular scarring that made stoma appliance fitting very problematic. (**C**) This patient developed gas gangrene a few days after surgery to form an ileostomy. The patient required extensive surgical debridement, the infection having caused necrosis of the abdominal wall from sternum to thigh within a few hours of the appearance of the first symptoms.

Management

Clostridial cellulitis may respond to high-dose, intravenous penicillin alone. The clinical distinction, however, may be difficult between cellulitis and true gas gangrene.

Gas gangrene and necrotizing fasciitis (Fig. 4.18) are emergencies that require surgical debridement of infected tissue in addition to intravenous penicillin. Bacteriological examination of swabs and tissue specimens may be unhelpful without bacterial cultures and this should not delay surgical management. The debridement may have to be extensive (Fig. 4.16). Other additional measures, which have been used, include clostridial antitoxin and hyperbaric oxygen.

Synergic gangrene also requires urgent surgical debridement. The patient is also treated with systemic antibiotics including metronidazole to cover anaerobic infection.

Other Bacterial Infections

There are several other bacterial skin infections, any of which might involve peristomal skin. Most of them are uncommon and we have not encountered them in our clinic over the last 10 years. *Erythrasma*, however, is one infection that should be mentioned because it is relatively common and because it involves skin folds such as the groin where the environment is similar to the occluded skin under a stoma appliance. Erythrasma is caused by *Corynebacterium minutissimum*, a gram-positive bacillus, that forms part of the normal skin flora in many individuals but can become pathogenic in humid, warm conditions. The rash is characterized by brownish-pink patches, which often have an associated fine scale. Occasionally, it can become generalized with plaques appearing on the trunk and limbs away from body folds (compare with pityriasis versicolor under the section "Fungal Infections"). One distinctive feature is that the patches or plaques fluoresce pink under ultraviolet light (Wood's light). It responds to treatment with topical fusidic acid, imidazoles such as clotrimazole, or oral erythromycin.
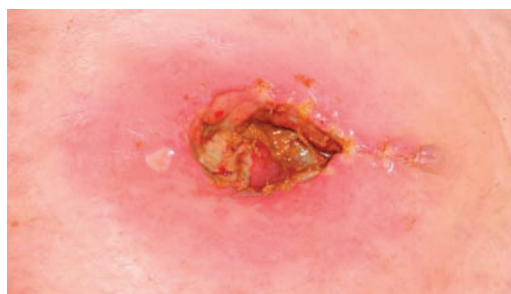
(A)
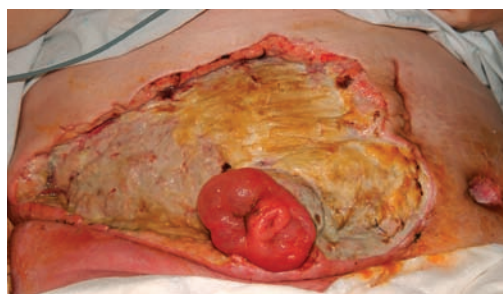
(B)

(C)

(D)

Figure 4.18   (**A**) Retracted colostomy in a patient who developed complications following gynecological surgery. The effluent emerged below skin level. (**B**) The patient developed necrotizing fasciitis (*S. pyogenes*) requiring surgical debridement and systemic antibiotics. (**C** and **D**) It healed over many months to leave an irregular and fragile abdominal skin that made stoma appliance fitting difficult.

VIRAL INFECTIONS

A number of systemic viral infections such as measles, rubella, and roseola are characterized by generalized erythematous rashes (exanthemas). In addition, a variety of skin reaction patterns may be associated with certain viral infections, for example, erythema multiforme associated with herpes simplex infection. These eruptions might cause peristomal skin problems, but the majority are self-limiting and will be diagnosed by their general features rather than by scrutiny of the stoma.

Chickenpox is a systemic viral infection transmitted by the respiratory route. It is characterized by widespread vesicular skin lesions, which may shed the virus. Once again, although it may involve peristomal skin, it would be diagnosed by appreciation of the generalized rash. It may, however, recur later in life as herpes zoster, a localized skin infection [see section "Herpes Zoster (Shingles)"]. There are several other localized cutaneous viral infections which may be of relevance to peristomal skin, although in our practice we have only encountered viral warts affecting stomas.

Herpes Zoster (Shingles)
Definition
Shingles is a painful, localized, vesicular rash which results from the reactivation of varicella-zoster infection (chickenpox) in the cutaneous distribution of one spinal or cranial sensory nerve.

Etiology
Following chickenpox infection (Fig. 4.19), the causative agent, varicella-zoster virus, remains dormant in the sensory nerve ganglion of spinal and cranial nerves. It can become active again, sometimes after many years, causing a vesicular rash in the area of skin supplied by that nerve

Figure 4.19 Chickenpox lesions on the chest of an infant. The patient is initially febrile and unwell, but these symptoms subside as the lesions appear progressively. The rash is characterized by a transient generalized erythema followed by the appearance of small fluid-filled vesicles surrounded by erythema, the so-called "dew drop on a rose petal" appearance. Individual lesions may heal to leave a depressed scar.

(dermatome). Usually only one dermatome is affected by an attack. Shingles is more common in the immunosuppressed and elderly people and local skin trauma is sometimes cited as the trigger for virus reactivation; however, the condition can occur at any age, and in many cases, the patient is otherwise well.

Clinical Features

Thoracic and lumbar dermatomes are the most commonly affected, making the condition relevant to stomas. The first symptoms are of local pain and discomfort, and the patient may feel unwell. The rash appears as red macules evolving into vesicles (Fig. 4.20). These may coalesce to produce larger blisters that burst to leave denuded skin (Fig. 4.21). The vesicles shed virus so that nonimmune individuals who come into contact with an affected patient may develop primary chickenpox infection. Because only one nerve root is affected, the rash does not cross the midline, although occasionally a few satellite lesions may appear outside the affected dermatome, including on the contralateral side of the body. Widespread cutaneous and systemic dissemination may occur in the immunosuppressed. The lesions may be hemorrhagic and, not uncommonly, become secondarily infected, often by staphylococci. The affected skin may scar (Fig. 4.22), particularly if secondary infection is severe. Herpes zoster may be complicated by postherpetic neuralgia in which the patient experiences pain and discomfort in the affected dermatome, sometimes long after the acute episode has healed. In immunosuppressed individuals, herpes zoster might become generalized and behave like a very severe form of chickenpox. This might very occasionally be of relevance to the bowel. We have had one patient receiving fludarabine for chronic lymphocytic leukemia who was admitted with small bowel obstruction, requiring resection of a length of necrotic bowel and temporary stoma formation. This bowel necrosis was secondary to varicella-zoster virus (Fig. 4.23) as became apparent when widespread chickenpox lesions appeared on the day of surgery.

Management

Antiviral treatment is effective only if started within 72 hours of the onset of symptoms. Aciclovir (800 mg orally five times a day for seven days) is one of the more commonly used agents. As well as arresting the progression and reducing the severity of shingles, therapy may reduce the likelihood of postherpetic neuralgia, although evidence is conflicting. Analgesia is very important for acute symptomatic relief and for persistent neuralgia. Postherpetic neuralgia often responds to oral carbamazepine or amitriptyline.

Herpes zoster is a self-limiting disorder with attacks lasting two to four weeks; however, severe peristomal skin involvement would significantly inhibit normal appliance use because of pain and poor bag adhesion. If possible, nonadhesive appliances supported by a waist belt

Figure 4.20   Herpes zoster affecting the first thoracic dermatome with typical lesions on the right forearm. Note the coalescing and hemorrhagic vesicles.

Figure 4.21　Herpes zoster affecting the left fourth cervical dermatome. Note the coalescing vesicles, which have become deroofed over the shoulder to leave denuded skin.

Figure 4.22　Scarring of the skin following shingles of the left 10th thoracic dermatome.
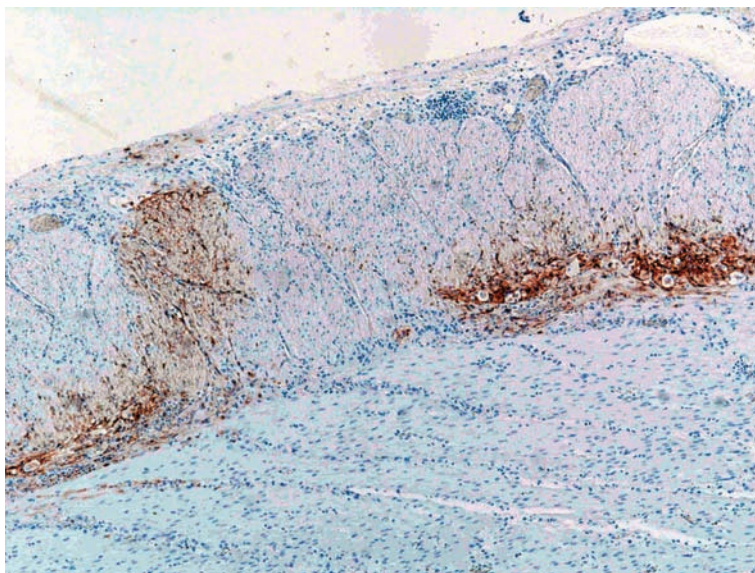
Figure 4.23　Histological section showing staining for varicella virus within the nerve plexus of the small bowel in a patient with disseminated zoster. The virus caused dysmotility and ultimately necrosis of a short segment.

should be used. Such appliances have been shown to be beneficial in other blistering peristomal conditions (3). The possibility of secondary infection should be borne in mind and affected peristomal skin should be swabbed for bacterial examination.

Viral Warts

Definition

Viral wart is a viral infection of the skin or mucous membranes caused by human papilloma viruses (HPVs). Warts are so common that most people would have seen them if not suffered from them themselves, particularly as children.

Etiology

Several HPV types have been identified and are distinguished by their DNA sequences. HPV types 1–4 cause the common cutaneous warts, while genital warts are caused by types 6, 16, and 18. The latter two are associated with malignant transformation in some cases and have been linked to carcinoma of the cervix. More than 70 HPV types have been identified to date and some of these have been found in warts of the human gastrointestinal tract, including in some stoma lesions (4).

Warts are contagious and are readily transmitted from person to person. New lesions may occur around an affected site if the lesions are traumatized, for example, by attempted surgical removal. The patient may also spread the virus manually to other areas of their own skin. As with other cutaneous viral infections, the lesions may become widespread in immunocompromised patients.

Clinical Features

Common warts are flesh-colored papules with a roughened surface that are most commonly found on the hands and feet as well as other areas (Fig. 4.24). They may coalesce to produce large lesions called mosaic warts. Plane warts are flat-topped papules that are only just palpable above the skin surface. These lesions are frequently found on the limbs and face. Some facial warts are composed of long thread-like projections (filiform warts). Similar lesions may be seen affecting the perianal and genital region. In this occluded situation, the warts are composed of many moist-looking flattened projections. Genital warts are frequently, but not invariably, spread by sexual contact.

Wart virus infection might be manually transferred to the peristomal skin by the patient if they have warts elsewhere. It is therefore important to examine the skin generally if there are peristomal wart-like lesions in order to look for signs of HPV infection. Chronic papillomatous dermatitis affecting urostomies may be mistaken for viral warts if the lesions are discrete and few in numbers (see chap. 3).

In their clinic, the authors have seen only mucosal warts affecting the stoma and mucocutaneous junction rather than the skin. They present as papules with a yellowish, moist surface (Figs. 4.25 and 4.26). Histologically, there is a benign proliferation of keratinizing squamous epithelium. The lesions were caused by the mucosa-associated viruses, HPV-6, -11, or -72. HPV-6 and -11 are associated with genital warts, although there was no evidence of sexual transmission in our patients and no such such cases have been reported in the medical literature. Papular lesions, which are clinically indistinguishable from these warts, may be caused by repeated trauma, typically by anxious patients who habitually pick at their stoma or appear to occur spontaneously (Fig. 4.27) (5).

Management

Cutaneous viral warts tend to resolve spontaneously within two to three years in more than half of cases, except in immunocompromised patients. It is unclear whether mucosal warts on stomas will also resolve spontaneously and over what time. Our patients have had stomal warts for up to four years prior to presentation. Individual lesions have cleared in each patient but new ones have appeared to replace them in each case. Given that the viruses responsible so far are not thought to carry a risk of malignant transformation, vigorous treatment is probably not

Figure 4.24   (**A**) Multiple viral warts on the fingers. (**B**) Close-up of viral warts on the fingers showing the rough "verrucous" surface. (**C**) Viral warts on the hands. The linear appearance has occurred because the patient scratched the warts and seeded the virus in the excoriations. (**D**) Mosaic warts on the feet. (**E**) Viral warts on the lips. These lesions are smoother surfaced, similar to what one might see around a stoma. Several are also filiform, that is, thread-like.

indicated unless the lesions are symptomatic. We have used liquid nitrogen cryotherapy once weekly to treat larger warts that interfere with appliance use.

Most wart treatments are destructive and topical salicylic acid preparations are among the most widely used. These preparations dissolve the thick keratin of warts, but they are strong irritants, making them unsuitable for use near stomas. If viral warts, which do not resolve spontaneously, are identified on peristomal skin, we would recommend liquid nitrogen treatment for them.

Molluscum Contagiosum
Definition
Molluscum contagiosum is a contagious, self-limiting skin infection caused by a pox virus of the genus Molluscipox.
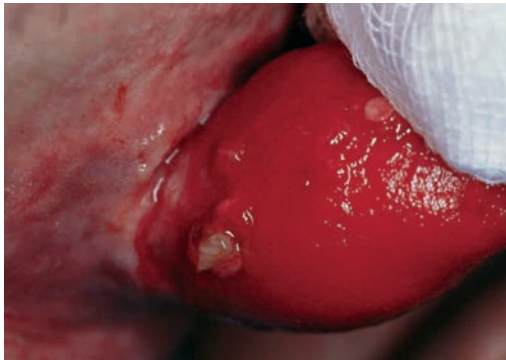
(A)   (B)

Figure 4.25 (**A**) Grouped viral warts caused by HPV-72 on an ileostomy. Note the irregular yellowish surface. (**B**) More extensive human papilloma virus warts.

Figure 4.26 Viral warts caused by HPV-6 on a colostomy and at the mucocutaneous junction.

(A)   (B)

Figure 4.27 (**A**) Warty papule that was indistinguishable from a viral papule but no human papilloma virus was found. (**B**) These are similarly nonviral and presented as closely-packed frond-like warts that required trimming away under local anesthetic every few months because they bleed and cause leaks.

Etiology

The infection is transmitted by physical contact and, like warts, may be acquired at communal swimming pools and sports changing facilities. Most infections are seen in children; however, a second peak of incidence occurs in adulthood and is probably the result of transmission by sexual contact. Second infections are uncommon except in the immunosuppressed individuals.

Clinical Features

Molluscum lesions might involve the peristomal skin and will be diagnosed by appreciating the general features of the infection. The rash appears without systemic symptoms and consists of multiple, sometimes widespread, papules, each of which is 5 to 10 mm in diameter. Individual papules have a depressed center (umbilicated) and contain a whitish keratinous material. As they begin to resolve, lesions become inflamed (Fig. 4.28) and may have a surrounding eczematous reaction. This is particularly true of molluscum in occluded areas such as flexures and therefore, potentially, the peristomal skin. Solitary lesions are more common in adults and may be difficult to diagnose without histological examination.

Management

Molluscum contagiosum often heals with scarring similar to that seen in chickenpox. This potential is enhanced if certain destructive treatments are used, although gently squeezing the lesions to express the keratinous material appears to speed up healing without increasing the

(A)

(B)

(C)

Figure 4.28   (**A**) Inflamed molluscum lesion. The papule resolved within four weeks. (**B**) Non-inflamed molluscum lesions on the neck of a young girl, showing the typical umbilicated surface. (**C**) Multiple molluscum lesions in the groin of a man who was susceptible to viral infections because of a hereditary T-helper cell abnormality.

severity of scarring. As scarring is minor anyway and cosmesis is not important peristomally, troublesome molluscum could be treated with liquid nitrogen cryotherapy at this site. The inflammation seen in resolving lesions is, in most cases, the result of immune attack on the virus; however, topical antibiotic preparations such fusidic acid are sometime advocated to treat presumed secondary bacterial infection.

Herpes Simplex
Definition
Herpes simplex is an acute and often recurrent mucocutaneous infection caused by herpes simplex viruses (HSVs).

Etiology
HSV-1 has been associated more with oral and facial infection and HSV-2 with genital infection, although in practice both may cause disease at either site. Furthermore, herpes simplex infection is not restricted to these two sites and may affect any area of the body depending on the area primarily infected. The virus is transmitted by physical contact and by droplet infection from body fluids. HSV targets sensory nerves and, like the virus that causes chickenpox, may become dormant in ganglion cells. Reactivation occurs, for example, because of physical trauma to the area or general ill health of the patient.

Clinical Features
The primary infection may produce a markedly febrile illness associated with lymphadenopathy and the appearance of painful grouped vesicles (Fig. 4.29A). Pain and discomfort may be more severe when mucous membranes are involved, as in oral and genital infection (Fig. 4.29B). Some patients with recurrent herpes do not recall a primary infection, implying that it may be subclinical in some cases.

Recurrent attacks occur at the original site and are often preceded by a tingling discomfort. We have not managed a patient with peristomal herpes but the diagnosis should be borne in mind as infection can occur at any body site. All active lesions are infectious and health workers should take care to avoid acquiring infection from attending affected patients (Fig. 4.30).

Management
The virus is readily identified on viral swabs and blister fluid, and should be looked for in suspected cases. The severity and length of recurrent herpes attacks can be reduced if treatment is started at the onset of symptoms with topical antiviral therapy (aciclovir cream). Severe primary and recurrent infections warrant treatment with systemic aciclovir 200 mg five times a

(A)

(B)

Figure 4.29   (**A**) Herpes simplex infection on the neck of a middle-aged woman, presenting as grouped papules and vesicles. The infection was acquired by handling her affected grandson. (**B**) Painful ulceration on the lips caused by acute Herpes simplex infection in a 14-year old girl.

Figure 4.30   Acute herpes simplex of the fingers in a nurse who contracted the disease from an infected patient.

day for five days. Systemic treatment would also be indicated for peristomal herpes, given the difficulties of using topical treatments at this site.

FUNGAL INFECTIONS

The fungi that cause superficial skin infections thrive in warm humid conditions so that infection is more common in intertriginous areas such as between the toes and in the groins or perineal areas. The external environment is also important, and stoma therapists in some tropical countries regard fungal infections as a common problem. In Northern Europe, they are probably a lot less frequent but we have identified increased numbers of fungal infections in the clinics.

Candidiasis (Moniliasis)
Definition
Candidiasis is a cutaneous or mucosal infection caused by the yeast *Candida albicans*.

Etiology
C. albicans is a common commensal organism found in the mouth, gut, and vagina. Overgrowth with skin infection, particularly in intertriginous areas, is more common in the elderly, immunosuppressed individuals, diabetics, and in people receiving antibacterial drugs by mouth (Fig. 4.31).

Clinical Features
Infection commonly affects the mouth and vagina, where it produces an uncomfortable, itchy inflammation of the mucosa associated with adherent white plaques. The periorificial skin may also become involved. This typically presents as a macerated erythema at the angles of the mouth in oral candidiasis (Fig. 4.32) and in the groin folds in the case of genital involvement (Fig. 4.31). Candidal intertrigo may extend more widely onto trunk or limb skin, where it causes a glazed erythematous rash with surrounding satellite lesions, many of which are pustular and have a collarette of scale.

Swabs taken from peristomal skin indicate that colonization with Candida sp. is common, although frank infection is less so. When it occurs, it has a similar appearance to candidal intertrigo (Fig. 4.33). It may be difficult to distinguish from vesicular irritant dermatitis, further emphasizing the need for microbiological studies in all patients with peristomal rashes.

Management
Candida infections respond to topical treatment with nystatin or imidazoles such as miconazole or clotrimazole, and the latter is available in a spray form, which is useful for treating peristomal rashes. A single oral dose of fluconazole 150 mg is very effective, however, and given the

(A)

(B)

(C)
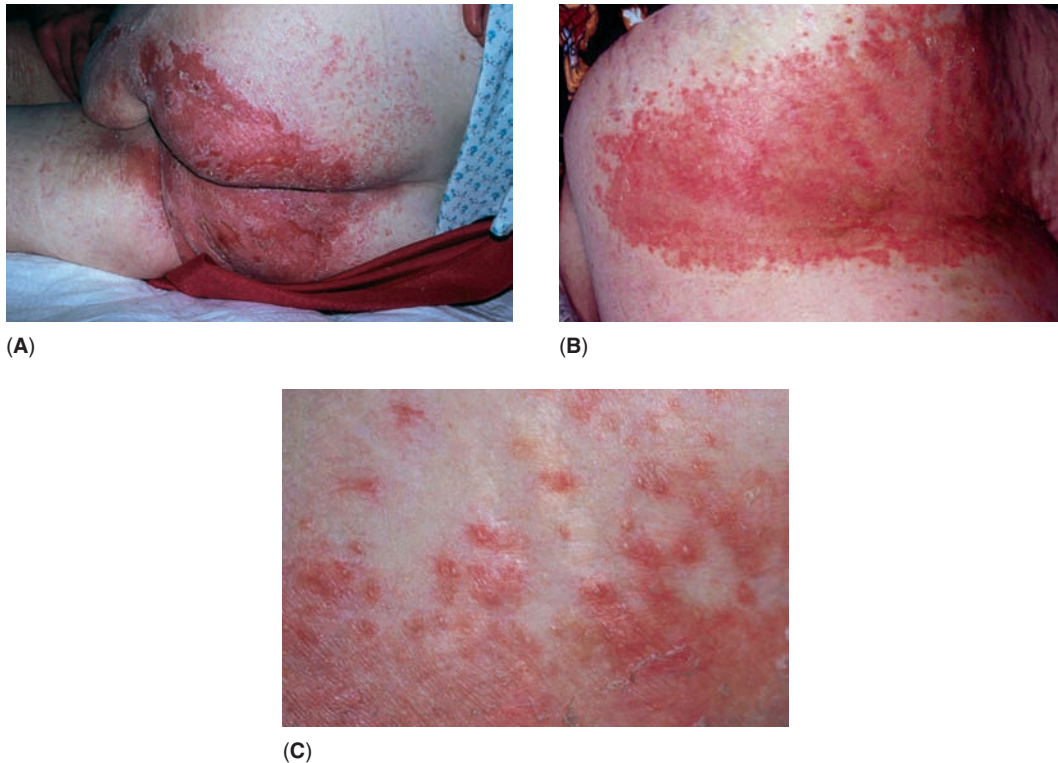
Figure 4.31 (**A**) Candidal intertrigo involving the groins and natal cleft in a patient with Crohn's disease receiving systemic corticosteroids. Note the satellite lesions that show peripheral scaling. (**B**) Candidal intertrigo extending onto the trunk in a patient with advanced leukemia. (**C**) The same patient showing a close-up of the satellite lesions and pustules at the edge of the rash.

Figure 4.32 Candidal infection of the corners of the mouth.

problems associated with topical treatments on peristomal skin, this therapy is used as first-line treatment despite its expense.

Dermatophyte (Ringworm) Infections
Definition
Dermatophyte infections are superficial fungal infections of the keratin of skin, hair, and nails caused by a variety of fungal species adapted to growing on human or animal skin.

(A)

(C)

(B)

Figure 4.33 (**A**) Candidal infection of the skin around an ileostomy. Note the typical pustules. (**B**) Heavy candidal infection around a nephrostomy. The rashes in (**A** and **B**) both cleared rapidly with systemic antifungal treatment (one oral dose of fluconazole 150 mg). (**C**) Vesicular dermatitis in a patient with a history of eczema. There was no infection.

Etiology

A wide range of organisms belonging to the genera *Trichophyton, Epidermophyton,* and *Microsporum* may cause infections. Infection is acquired by skin-to-skin contact or by contact with inanimate objects that have been contaminated by an infected individual. Nail and hair involvement is common and should be looked for. Only skin infection is considered here (Fig. 4.34). When organisms adapted to animal hosts cause infection, the inflammation is more marked because these fungi have not evolved to evade the human immune system.

Clinical Features

The terminology can be confusing; in addition to the words *dermatophyte* and *ringworm*, the term *tinea* is often applied to these infections, usually to describe the site of infection. For example, tinea capitis, tinea pedis, tinea cruris, and tinea corporis refer to dermatophyte infections of the hair, foot, groins, and trunk, respectively. Tinea pedis is probably the most common infection and manifests as an itchy, macerated, and peeling rash between the toes; it is associated with an unpleasant, sweet, musty odor (Fig. 4.35A). Infection is typically acquired in sporting facilities,

Figure 4.34 Tinea corporis. These lesions are typical erythematous plaques with accentuated red margins and they tend to be annular and are often itchy.

(**A**)   (**B**)

Figure 4.35 (**A**) Athlete's foot. A fungal infection caused by dermatophyte fungi. Note the maceration of the skin in this intertriginous area. (**B**) Tinea cruris: a dermatophyte infection of the groin fold. This rash is itchy and composed of annular lesions with an accentuated advancing edge and central clearing.

hence the common name "athlete's foot." Tinea cruris is another common intertriginous infection (Fig. 4.35B), the appearance of which is similar to peristomal infection (Fig. 4.36). The infecting fungus tends to advance outwards in the skin, resulting in an inflammatory edge that is well defined and scaly. The resulting annular lesions may show central clearing. Similar infections

(A)

(B)

(C)

(D)

(E)

Figure 4.36 (**A**) Peristomal dermatophyte infection caused by *Trichophyton rubrum*. The ulceration in this patient is coincidental and was caused by pyoderma gangrenosum. This rash produced the characteristic odor associated with "athlete's foot" (tinea pedis). (**B**) The rash was treated with daily applications of topical terbinafine cream and resolved within seven days. (**C**) Typical marginated erythema of tinea corporis affecting the skin around a nicorandil ulcer. The patient also had tinea cruris. (**D** and **E**) This little boy was thought to have irritant dermatitis to the appliance adhesive but skin scrapings confirmed dermatophyte infection.

are seen under other appliances that are worn regularly, including artificial limbs and even wristwatches. A number of other annular dermatoses enter the differential diagnosis and, if there is diagnostic doubt or lack of response to treatment, a dermatological opinion should be sought.

If tinea infection is wrongly diagnosed and treated with topical corticosteroids, it may spread rapidly as a confluent erythema with pustule formation and reduced scaling (tinea incognito).

Management

The clinical diagnosis should be supported by mycological evidence of infection from skin scrapings taken from the advancing edge, particularly if systemic therapy is being considered. Many dermatophyte infections will respond to over-the-counter preparations containing tolnaftate or undecanoates. More effective treatments include the imidazoles such as clotrimazole and miconazole, which are available in spray form suitable for peristomal use. Terbinafine is a more expensive treatment available topically as a cream, however, it may be more rapidly effective than the others, warranting the relative inconvenience of using a cream preparation under a stoma appliance. We have found it highly effective in managing our patients with tinea infection.

Systemic treatments are usually only required for nail or scalp involvement, tinea incognito, or severe skin infections unresponsive to topical therapy. Agents used include terbinafine, itraconazole, and griseofulvin.

Malassezia (Pityrosporum) Infections

Malassezia organisms are commensal skin yeasts that may proliferate under certain conditions to produce distinct patterns of skin disease. These dermatoses include pityriasis versicolor (Fig. 4.37), pityrosporum folliculitis (Fig. 4.38), and exacerbations of seborrhoeic dermatitis (see chap. 5), any of which could potentially impinge upon peristomal skin; however, diagnosis would be made on scrutiny of the generalized rash.

There are individual differences in host response to these organisms, making some people more susceptible to infection; however, external factors might also be important and those working or living in warm humid environments might be at greater risk. Topical treatment alone are usually effective and these include selenium sulfide shampoo and the imidazoles (e.g., ketoconazole), although the former is too irritant for peristomal use. Systemic treatments may be necessary, especially in the immunocompromised patient, and itraconazole (200 mg daily for seven days) is commonly used.

Figure 4.37   Pityriasis versicolor, a superficial fungal infection caused by *Malassezia orbiculare*, which affects the trunk and limbs proximally. The rash consists of a finely scaling erythema that is orangey red on pale skin but fails to darken after sun exposure and remains paler than sun-tanned skin.

Figure 4.38   Pustular, follicular inflammation caused by malassezia infection. The rash particularly affects the upper trunk and is more common in those exposed to a warm humid environment. This patient worked as a chocolate mélangeur in a hot humid mixing room.

KEY MESSAGES

- All peristomal rashes should be swabbed for microbiological examination because
    - a small number of these rashes are due to bacterial infection and they will resolve if the infection is treated with oral antibiotics and antiseptic washes, and
    - secondary infection of pre-existing skin disease is common and the peristomal rash will improve or even clear up if infection is treated.
- Viral infections are rare, although a small number of patients will develop benign, mucosal warts caused by HPV.
- Fungi thrive in the humidity and warmth provided by covering the skin with a stoma appliance. Infection may be caused by Candida sp. or dermatophyte (ringworm) fungi. These respond rapidly to standard topical treatments.

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5 | Pre-existing and Coincidental Skin Disease

Firas Al-Niaimi and Calum C. Lyon

In theory, any one of the 2000 or so documented skin diseases might affect the skin around a stoma. Reports in medical and nursing journals have concentrated on descriptions of rare rashes or tumors affecting peristomal skin. In cases such as these, dermatological expertise would probably be required to make a diagnosis. However, in our experience, it is a small number of easily recognized and common, coincidental skin conditions that continue to predominate in the stoma clinics. Together, they account for nearly one-fifth of all the peristomal dermatoses seen. More than any other, this group emphasizes the importance of a thorough general history and physical examination of the patient. Trying to make a diagnosis, by focusing on the peristomal skin alone, is rather like trying to decide the model of a car by scrutinizing its hubcaps; sometimes you will get it right, often you will not. The diagnoses are only made by an appreciation of the symptoms and clinical signs at sites other than the peristomal skin. The dermatoses will be described in the following order:

- Psoriasis
- Eczema
  - Atopic
  - Discoid
  - Asteatotic
  - Dyshidrotic
  - Varicose
- Seborrhoeic eczema
- Lichen sclerosus
- Pemphigoid
- Drug eruptions
- Dermatitis artefacta
- Other skin disorders

PSORIASIS

Definition
A benign, hyperproliferative skin condition characterized by well-defined red plaques that are usually symmetrical. There are several morphological subtypes, although, in general, the plaques have adherent thick, white scale. Psoriasis may be associated with a symmetrical, deforming arthropathy referred to as psoriatic arthropathy, which may precede the skin involvement in about 10% to 15% of patients.

Etiology
Psoriasis is very common, affecting 1% to 2% of the British population. It is found more frequently in Caucasians (including the Indian subcontinent) than in those of Negroid or Mongoloid descent (including native North Americans). There is a strong genetic element and, although the causative agent(s) are not known, it is supposed that the disease represents a genetically determined response to an environmental agent such as a virus infection. Further evidence for the importance of genetics is the strong association between inflammatory bowel disease (IBD) and psoriasis (1). In our patients, those with IBD are twice as likely to have psoriasis as those without. Genetic research suggests that susceptibility genes for both conditions may reside on the same chromosome. It can occur at any time of life, but there are two peaks of incidence, one in adolescence and one in late middle age. While indistinguishable, the latter is less likely to have a genetic influence, that is, there may be no family history of psoriasis.

Clinical Features

Before describing peristomal psoriasis, it is useful to discuss the general clinical features of psoriasis. While any part of the body may be affected, the typical patient has symmetrical plaques on the extensor surfaces, particularly the elbows, knees, buttocks, and shins but also umbilicus (Figs. 5.1–5.4). The scalp (Fig. 5.5) and lumbosacral region are also commonly affected (Fig. 5.3C). Nail changes are frequently seen and range from mild "thimble pitting" (Figs. 5.6 and 5.7) to severe dystrophy (Fig. 5.8), sometimes associated with isolated hand and foot disease

(A)

(B)

(C)

Figure 5.1 (**A**) Typical plaque psoriasis on the left elbow of a young man with Crohn's disease. Note the well-defined edge and adherent silvery scale. He was more concerned about the two tiny plaques of psoriasis near his ileostomy. (**B**) Typical untreated plaques of psoriasis more extensively distributed on the trunk. (**C**) This patient has treated psoriasis on his trunk with vitamin D based topical therapy and the plaques are less scaly. On his amputation stump psoriasis is more marked because of the trauma from the weight bearing contact of his artificial limb socket (Koebner phenomenon, see text).

(Fig. 5.8B). The genitalia may be affected (Figs. 5.9 and 5.10), and it is important to ask the patient about genital rashes if psoriasis is suspected as they may not mention these spontaneously. A less common presentation of psoriasis affects the flexures particularly axillae, groins, natal cleft, perianal area, and folds of skin beneath breasts and on the abdomen of obese individuals (Fig. 5.11). This flexural psoriasis is similar in appearance to peristomal psoriasis. It often coexists with psoriasis at more typical sites. Flexural and peristomal psoriasis should

Figure 5.2　Well-demarcated, indurated plaque psoriasis at a typical site involving the umbilicus.

(**A**)　　　　　　　　　　　　　　　　　　　　　(**B**)

Figure 5.3　(**A**) Typical untreated plaque psoriasis on the arm. Note the accentuation around an old tattoo. It also involves old scars presumably a manifestation of the Koebner effect. (**B**) Multiple plaques of psoriasis on the legs. Psoriasis usually improves with sun exposure, occasionally it worsens as in this patient. (*Continued*)

(**C**) (**D**)

Figure 5.3 (*Continued*) (**C**) Inflamed psoriasis affecting the buttocks and legs. In such cases, scaling may be minimal. Inflamed psoriasis can worsen with irritant topical therapies like tar and simple emollients initially are best to use. (**D**) Psoriasis can affect infants.

Figure 5.4 Plaque psoriasis on the knees that has been treated with mild tar-containing ointment. Note the deforming psoriatic arthritis of the hands.

always be swabbed to rule out infection, particularly fungal, as the clinical features may be very similar and secondary infection is not uncommon.

Any form of psoriasis may become severe and generalized with erythroderma (Fig. 5.12A and B). Guttate psoriasis is a more benign generalized form of psoriasis. It presents with a rapid onset of small plaques usually following systemic infection, particularly tonsillitis (Fig. 5.12C). As many as 50% of these patients will go on to develop chronic plaque psoriasis. Life-threatening, generalized pustular psoriasis may follow the abrupt withdrawal of systemic steroid therapy such as one might receive for IBD, and this is the main reason why psoriasis should not be

(A)   (B)

(C)

Figure 5.5 (**A**) Scalp psoriasis. The scalp behind and above the ears is the most commonly affected site. The patient illustrated has general scalp involvement and illustration shows a typical appearance at the frontal hairline. (**B**) The scaling in scalp psoriasis may build up, becoming very thick and hard. (**C**) Typical scaly, inflamed scalp psoriasis near the ears in a young girl.

treated with systemic steroids (Fig. 5.13). Localized pustular psoriasis affecting the palms and soles is a distinct condition and we are yet to see this associated with peristomal psoriasis.

Psoriasis is far more common than expected in stoma patients. This is probably due to the association between psoriasis and IBD. The prevalence of peristomal psoriasis per se is probably further enhanced by the Koebner (isomorphic) phenomenon. This occurs in about one-third of psoriasis patients and describes the situation, whereby even minor skin injury can precipitate new plaques of psoriasis in previously uninvolved skin. It is likely that the irritant trauma of repeated skin stripping by appliance adhesives is sufficient to trigger the Koebner phenomenon in some stoma patients. However, it is important to remember that, even if a stoma patient has psoriasis elsewhere, it does not necessarily follow that a peristomal rash is also psoriasis. A quarter of our stoma patients with typical extensor psoriasis on the trunk and limbs had a peristomal rash caused by a different skin disorder. The morphological features that support the diagnosis of psoriasis are described in Figures 5.14 to 5.23.

Management

Lifestyle issues should be addressed; in recent years, an association with severe psoriasis and metabolic syndrome (hypertension, obesity, and insulin resistance) has been highlighted, making this

Figure 5.6   Psoriasis under the nail causes the distal portion to lift (onycholysis).

Figure 5.7   Psoriatic pitting of the nail plate.

(**A**)

(**B**)

Figure 5.8   (**A**) Psoriatic nail dystrophy affecting all the nails. The nail folds are indurated and inflamed. The nail plates are thickened and distorted. The big toenail has been shed. (**B**) Hand psoriasis presents as thickened fissuring plaques and is worse in manual workers because of the Koebner phenomenon.
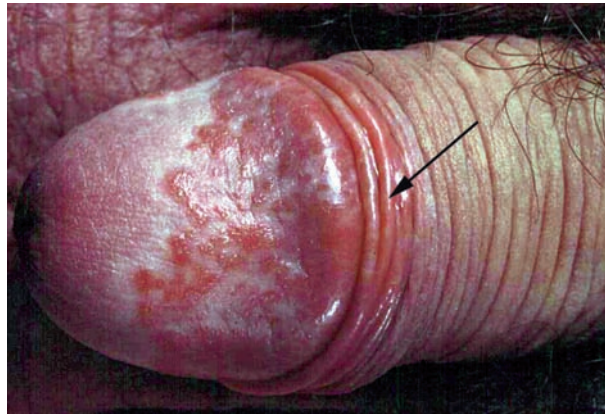
Figure 5.9 Psoriasis of the glans penis. There are typical, well-demarcated plaques and areas of confluent, glazed erythema affecting the occluded areas of the foreskin (arrow).
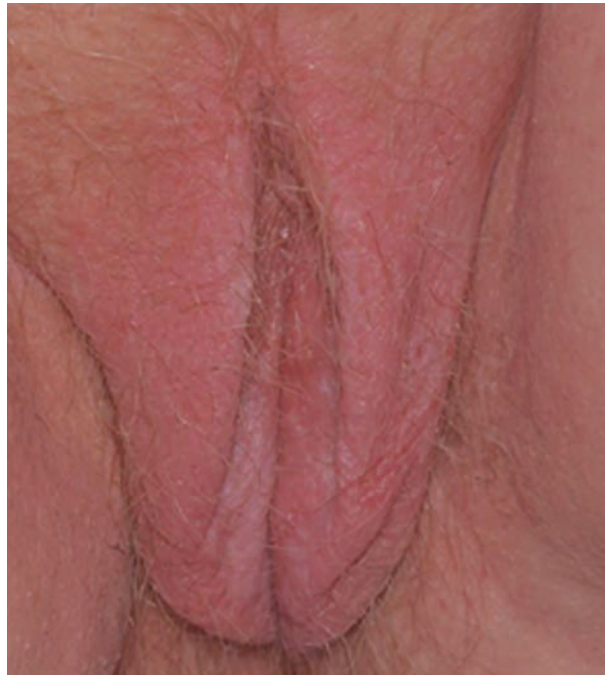
Figure 5.10   Vulval psoriasis. There is erythema of both labia majora. This condition may be very itchy.

issue even more pertinent. Psoriasis is exacerbated by excess alcohol consumption and probably by tobacco smoking. Psychological stress is a very important trigger for flares of psoriasis.

In most patients, psoriasis is controlled using topical treatments containing tar, dithranol, or vitamin D analogues. These are usually too irritant to be used on occluded areas such as peristomal or flexural skin. In these situations, topical steroids are used instead. However, creams and ointments are not appropriate for peristomal skin because appliances will not stick. As an alternative, we have used aqueous/alcohol lotions containing betamethasone valerate 0.1% (appendix 4). The lotion is applied to affected peristomal skin once daily for a maximum of four weeks to control the psoriasis. In most cases, this treatment clears the rash, although repeated courses may be needed every few months in some individuals. A number of patients may require occasional applications to control the psoriasis even after a full four weeks of treatment. We restrict the frequency of applications to a maximum of once or twice per week to minimize the risk of

(B)

(A)

Figure 5.11 (**A**) Flexural psoriasis under and between the breasts. The plaque is well demarcated but is not scaly. The uniform glazed red appearance is typical. Unlike candida infection (chap. 4), there are no satellite lesions. Typical peristomal psoriasis is also evident. (**B**) Flexural psoriasis in a groin fold.

steroid-related skin damage (Fig. 5.22) (see appendix 4 for recommendations and precautions). In the last 10 years, new topical treatments have been introduced combining calcipotriol (vitamin D analogue) and betamethasone (corticosteroid); for scalp psoriasis, the product Xamiol™ (Leo Pharma), which is in a gel base, may be used cautiously in peristomal psoriasis. Dovobet™ ointment (Fig. 5.15) is a similar combination useful for psoriasis at typical extensor sites but can be used with caution in perineal areas and has been well tolerated by some patients.

Most patients find that their psoriasis improves with sun exposure and this has been exploited medically as ultraviolet phototherapy. Two wavelengths of light can be used, UVB and UVA. The latter is used in conjunction with drugs called psoralens, which become active in the skin under the influence of UVA light. This combination gives rise to the term PUVA (Psoralens and UVA). Courses involve one or more treatments per week, each treatment lasting from a few seconds to minutes. Unfortunately, only a minority of stoma patients (usually colostomists) feel able to stand in the phototherapy booths with their stoma unprotected, in case the stoma works and causes soiling. However, it is a very effective treatment and patients should be given the option if appropriate. The stoma itself must be shielded from the light and one easy method devised by a patient is to place a toilet roll inner tube over the stoma with the end filled with a piece of gauze. The patient holds this in place with a finger. It also serves to prevent any mess should the stoma work during the short time in the light booth.

Systemic treatments such as ciclosporin and methotrexate are reserved for more severe and disabling psoriasis. Biological therapies with anti-tumor necrosis factor (anti-TNF) activity are licensed for use in severe psoriasis, although fortunately our patients have responded adequately to other measures such that we have not required them. The agents are called etanercept (Enbrel™, Wyeth), infliximab (Remicade™, Schering-Plough), and adalimumab (Humira™, Abbott). These are indicated for IBD and are discussed in chapters 6 and 7.

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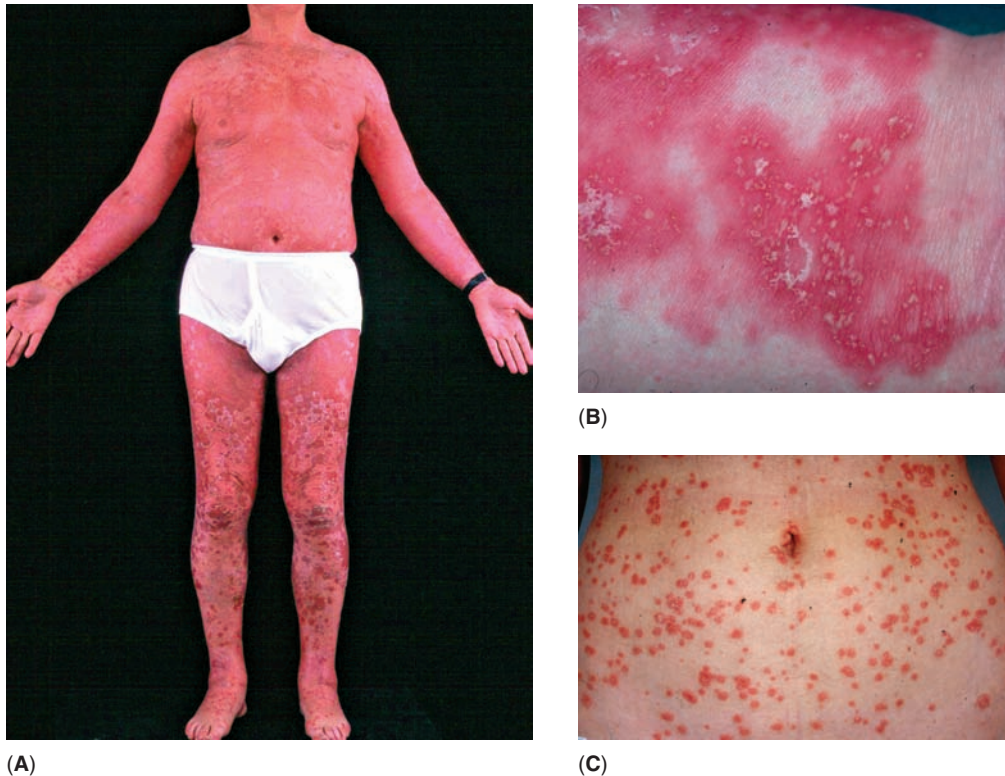
Figure 5.12 (**A**) Generalized, suberythrodermic psoriasis. The reasons why this patient's skin disease became suddenly so severe were not discovered. Erythroderma is a dermatological emergency requiring inpatient management to prevent the complications of high-output cardiac failure, hypothermia, and secondary infection. Erythroderma may be due to causes other than psoriasis, including drug reactions and malignancy, particularly lymphomas. These should be considered and excluded even in a patient known to have psoriasis. (**B**) Close-up of a plaque showing pustules. Generalized pustular psoriasis (as opposed to hand and foot pustular psoriasis) is an emergency as it can become very unstable very rapidly. (**C**) Guttate psoriasis in a young woman following a bacterial throat infection. These attacks are usually short-lived but may be recurrent, particularly in those with recurrent tonsillitis. These patients are predisposed to typical chronic psoriasis (Fig. 5.1); however, many patients have no further problems after an acute attack of guttate psoriasis. It is unlikely that patients with guttate psoriasis would present initially because of peristomal problems alone.

Figure 5.13 Incipient, generalized pustular psoriasis. This patient with ulcerative colitis underwent colectomy and ileostomy seven days prior to this photograph. Until surgery, the patient was receiving oral prednisolone for colitis and this was stopped abruptly after the operation. The patient's skin was clear until two days before this photograph was taken. The patient required systemic retinoid therapy to control the psoriasis and prevent life-threatening erythroderma. In psoriasis patients who must receive systemic steroids treatment should be very gradually reduced before stopping and any recrudescence of psoriasis treated early.

(A)

(B)
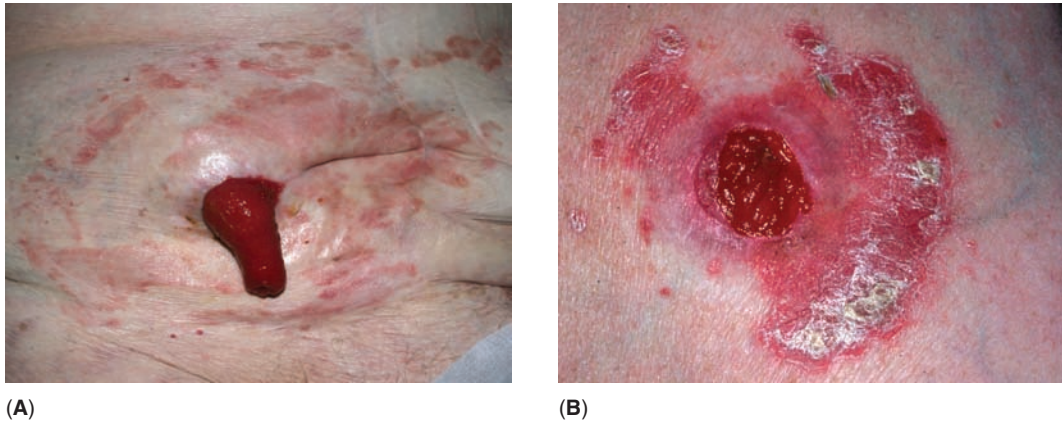
Figure 5.14 (**A**) Minimal small plaque psoriasis in a patient with an ileostomy. The patient had extensive psoriasis elsewhere but the peristomal disease was milder as a result of the occlusion and did not affect appliance use. (**B**) In this patient with an ileostomy for colitis, the psoriasis presents as a typical scaly plaque in the area covered by the fabric portion of the appliance and is clearer under the area covered by the inner hydrocolloid ring. This is a typical finding (Figs. 5.18 and 5.19).

ECZEMA

Definition

The word eczema is derived from the Greek word for "boiling" and refers to the bubbling appearance of acutely inflamed eczematous skin. Most dermatologists now regard the terms eczema and dermatitis as synonymous and we will follow that convention in this text. However, many dermatologists use the word eczema to refer to constitutional eczema (i.e., where no outside cause is known) and the word dermatitis for eczema where there are demonstrable exogenous causes such as allergens or irritants. Irritant eczema and allergic eczema (dermatitis) are considered in chapter 3. Seborrhoeic eczema is discussed separately in this chapter because its presentation and relationship with IBD are distinctive.

The rashes observed clinically as eczema probably represent a reaction to one of several triggers. In all cases, there is highly pruritic inflammation of the skin, which progresses through several stages (Fig. 5.24). Acute eczema is characterized by intense inflammation, vesiculation, weeping skin, and even blistering. With time, the plaques become more red, crusted, and scaly, then dry and thickened, sometimes with fissures as the condition becomes chronic.

Etiology

With the exceptions of allergic and irritant eczema, the causes are not known. Atopic eczema has an important genetic element, with most patients having a strong family or personal history of the atopic conditions, asthma, and hay fever, as well as eczema. There is an increased incidence of sensitivity to aeroallergens, particularly house dust mite and animal dander. Many atopics have a tendency to dry skin and an increased susceptibility to bacterial infection. Thus, the etiology of eczema is multifactorial, where genetic and environmental factors interact at a complex level. *Staphylococcus aureus* infection can result in florid exacerbations of atopic eczema due to a "superantigen" mechanism, whereby antigenic proteins from the bacteria can bypass the usual immune system processes and trigger severe inflammation. This is one of the common causes of a flare-up of eczema, and it responds to systemic antibacterials.

Clinical Features

As with psoriasis, it is important to appreciate the general features of eczematous conditions, because the diagnosis of constitutional peristomal eczema is usually made only after a general skin examination. Typical eczema plaques are illustrated and described in Figure 5.24.

Atopic eczema is the most common. It usually begins within the first few months of life, running a relapsing and remitting course and becoming relatively less common in adulthood.

(A)

(B)

(C)

(D)
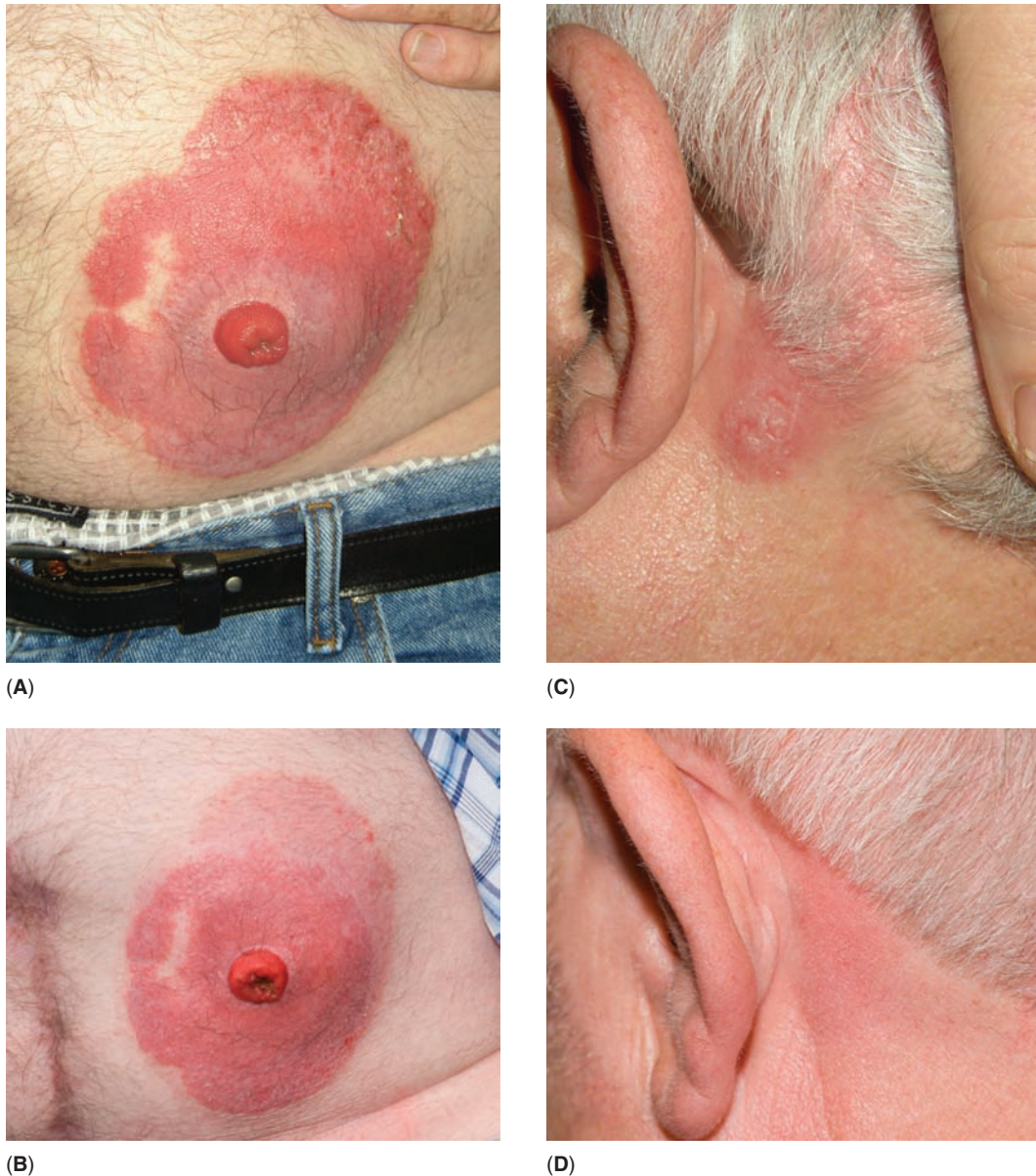
Figure 5.15   (**A–F**) Before and after pictures of psoriasis in a patient with extensor involvement, scalp psoriasis, and pericolostomy psoriasis. The patient's scalp and knee were treated with an ointment containing the corticosteroid betamethasone and calcipotriol (Dovobet™, Leo Pharma). This is too irritant under occlusion and the patient applied steroid lotion to the peristomal skin for one week, then occasionally afterwards (appendix 4). Although there is still some peristomal involvement evident, the patient is now able to use the stoma bag without fear of it detaching and leaking.

A small minority of atopic patients may present with eczema for the first time in adulthood. The typical affected sites are flexural areas at the elbows, wrists, knees, and ankles. It also commonly affects the face, especially in children. It readily becomes generalized particularly if an area of skin is infected, for example, with *S. aureus* ("impetiginized eczema" Fig. 5.25), herpes simplex, or varicella zoster viruses ("eczema herpeticum"). In adults, atopic eczema may become relatively more extensor in distribution (Fig. 5.26). The features of atopic eczema affecting the peristomal skin are shown in Figures 5.27 to 5.29.

(E)　　　　　　　　　　　　　　　　　　　　　(F)

Figure 5.15 (*Continued*).

Discoid or nummular eczema refers to discrete disk-shaped plaques of eczema. In young adults, it is probably a manifestation of atopic eczema (Fig. 5.26), while in the older individuals it is a distinct condition of unknown cause. It is more common in men and can become extensive, occasionally involving the peristomal skin.

Asteatotic eczema or eczema craquelé is a condition particularly of the elderly where constitutionally dry skin is predisposed to eczematous inflammation, especially in colder weather (Fig. 5.30).

Vesicular palmar eczema (syn. dyshidrotic or pompholyx eczema) is a vesicular eczema that principally affects the palms and soles, although it may become more extensive. It may also be recurrent and unrelated to a background of atopy. A similar appearance can be seen in the palms in patients with contact dermatitis or fungal infection of the feet, so these should be excluded. When extensive, dyshidrotic eczema can involve the trunk and peristomal skin (Fig. 5.31).

Varicose eczema is an eczematous inflammation of the legs of patients with venous insufficiency. It can occur in any stage of venous disease from simple varicose veins to venous leg ulceration. It is not known why it occurs in association with venous hypertension. Like most other forms of localized eczema, it can become generalized and may involve peristomal skin (Fig. 5.32).

Many people with active skin inflammation, particularly eczema, have a low threshold for irritation from any adhesive appliance or dressing. This usually manifests as a band of inflammation around the edge of the adhesive (Fig. 5.33). This is further discussed in the chapter 3.

Management

The general principles of management apply to all types of eczema. Any triggers or exacerbating factors should be identified and treated or avoided. These might include infection, dry skin, irritation, venous hypertension, or allergens.

Emollient therapy may be all that is required for asteatotic eczema, but it is also of crucial importance in the management of most other types of eczema. It involves regular application of emollient preparations, oil-based bath or shower emollients, and the use of soap substitutes such as aqueous cream. Clearly, this approach is not possible for peristomal skin, as oils and other emollients will impair bag adhesion.

(A)

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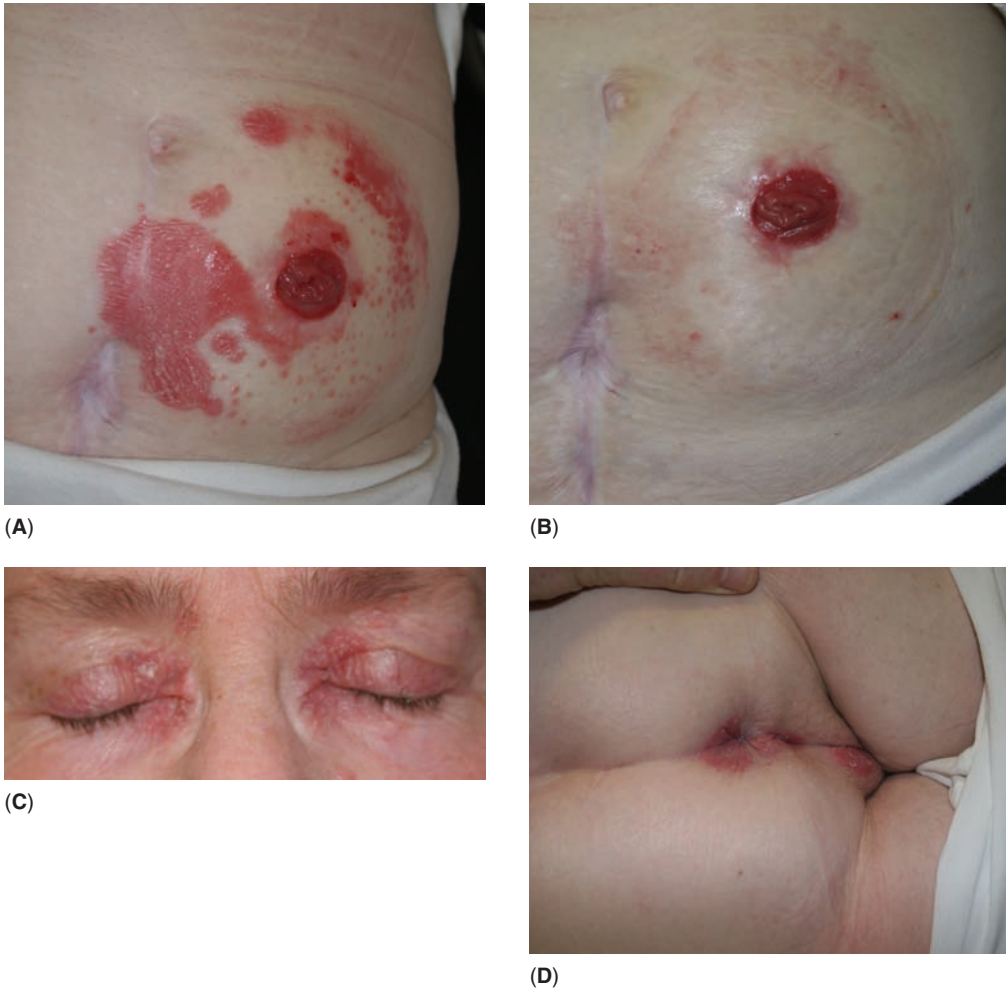
Figure 5.16   (**A** and **B**) Before and after pictures of peristomal psoriasis in a patient with long-standing ulcerative colitis. The patient used topical steroid lotions daily for two weeks and required intermittent applications on average weekly to maintain clearance. (**C** and **D**) The features of psoriasis elsewhere were very subtle presenting as typical vulval and perianal psoriasis and mild eyelid involvement.

Figure 5.17   In this patient with Crohn's disease, there is marked weeping eroded psoriasis akin to flexural psoriasis. This patient suffered repeated bag failures and required systemic therapy in order to achieve control of this psoriasis.

Figure 5.18 Typical plaque psoriasis is affecting skin immediately outside the area usually covered by the stoma appliance's hydrocolloid barrier. There is only minimal erythema around the ileostomy itself. This demonstrates the therapeutic effect of hydrocolloid occlusion on plaque psoriasis (Fig. 5.17).

(**A**)

(**C**)

(**B**)

Figure 5.19 (**A**) In this patient, the demarcation between psoriasis outside the area covered by stoma appliance (Fig. 5.17) and normal skin around the ileostomy is very sharp. (**B**) There is a small area of affected skin immediately adjacent to the ileostomy that probably represents the Koebner phenomenon of psoriasis appearing in irritated skin. (**C**) The same patient four years later showing recurrent psoriasis in the same pattern, controllable with topical therapy.
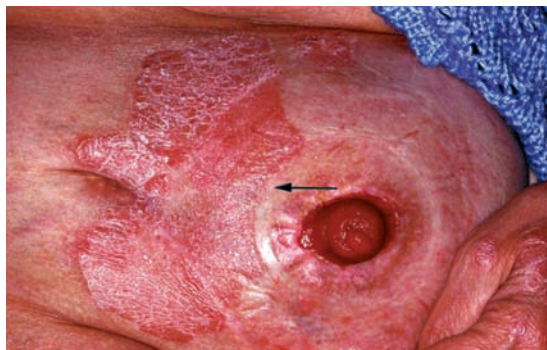
Figure 5.20 This patient wears a stoma appliance that has a barrier composed of a central ring of hydrocolloid and an outer square area of woven material impregnated with adhesive. There is typical plaque psoriasis involving skin immediately outside the area covered by the appliance. This becomes thinner and less scaly where the skin is covered by the woven material and it disappears abruptly where the hydrocolloid ring begins (arrow). Peristomal psoriasis in this patient resolved on changing to an appliance with a barrier composed entirely of hydrocolloid. The psoriasis outside the appliance area was treated with calcipotriol ointment. Note the psoriatic plaques on the hands and around the umbilicus, a typical site.

Figure 5.21 Infected psoriasis. This patient with Crohn's disease has psoriasis affecting abdominal skin from the umbilicus to the pubic area. The psoriasis has probably been exacerbated by irritation form the discharging fistula in the wound on the right side and from fecal leakage related to the ileostomy on the left (Koebner phenomenon). At both sites, the classical yellow crusting of staphylococcal infection (impetigo) is seen. Specific antibiotic therapy (see chapter 4 "Infections") produced a rapid improvement and the psoriasis has subsequently been controlled by intermittent courses of calcipotriol cream.

As the causes of eczema are unknown, once the above measures have been taken, ongoing inflammation is usually treated with topical corticosteroid preparations. As greasy preparations cannot be used, we have found aqueous/alcohol lotions and gels most effective (appendix 4) for peristomal eczema. Lotion or gel containing corticosteroid is applied to affected peristomal skin once daily for a maximum of four weeks to control the inflammation. In most cases, this treatment clears the rash, although repeated courses may be needed every few months in some individuals. If inflammation persists after a four-week course of treatment, we restrict the frequency of continued applications to a maximum of once every two weeks to minimize the risk of steroid-related skin damage (see appendix 4 for recommendations and precautions). The treatment is thus similar to peristomal psoriasis.

Systemic anti-inflammatory treatments are occasionally required, for example, for acute pompholyx eczema or persistently severe atopic eczema. These include tapering courses of systemic corticosteroids and short courses of systemic ciclosporin. Phototherapy with UVB can also be helpful in severe widespread disease. We have occasionally found systemic treatments necessary for peristomal eczema. Full details of management protocols for eczema are available in general dermatology texts (see "Further Reading").

Figure 5.22 Steroid atrophy. This patient with psoriasis overused topical corticosteroid therapy against instruction and has permanent thinning of the skin. Note the stretched and thinned skin with prominent blood vessels below the patient's stoma (see appendix 4 for information on topical therapy).

(A)

(B)

(C)

Figure 5.23 (**A** and **B**) Severe peristomal psoriasis in a patient with diverticular disease. The patient suffered repeated appliance failures because of poor adhesion and resorted to using multiple tape strips which appeared to have exacerbated the skin problem. As for many patients using hydrocolloid, there was some sparing in the area covered by the hydrocolloid barrier. (**C**) The patient applied Dovobet™ ointment at night for two hours while seated and immobile according to the method described in appendix 4 (Fig. 5.3) and achieved clearance within six weeks.

(A)

(C)

(D)

(B)

Figure 5.24   (**A**) Acute vesicular eczema of the palm (syn. dyshidrotic or pompholyx eczema). Note the eczematous vesicles that have coalesced centrally to produce a blister. (**B**) Subacute atopic eczema at a typical flexural site, the antecubital fossa. There are coalescent red papules but no active vesicles. (**C**) Dry, fissuring chronic eczema in an atopic individual. The distorted nails are the result of inflammation affecting the skin adjacent to the nail apparatus. (**D**) Chronic atopic eczema in a young woman.

SEBORRHOEIC DERMATITIS

Definition
Adult seborrhoeic dermatitis is an eczematous process with a distinctive pattern of distribution affecting the scalp, face, chest, and flexures.

(**A**)

(**B**)

Figure 5.25 (**A**) Impetiginized atopic eczema. This plaque is infected with *S. aureus* giving rise to the honey-colored crusting. (**B**) Eczema in a child with chickenpox (Kaposi's varicelliform eruption).

Figure 5.26 Chronic atopic eczema in a young man. The plaques are concentrated on the extensor surfaces of the arms. Note the typical discoid (nummular) eczema on the lower back and left forearm.
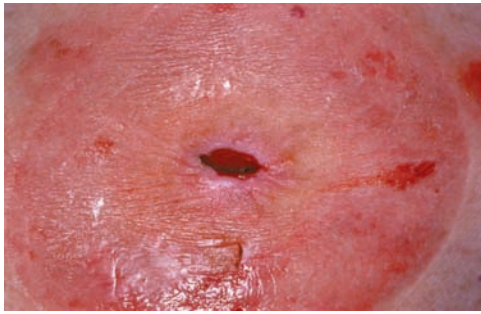
(**A**)

(**C**)

(**B**)

Figure 5.27 (**A**) Infected atopic eczema has compli-
cated an irritant reaction associated with a short, leaking
ileostomy. This rapidly became generalized, typical
eczema (**B** and **C**) which responded to potent topical
steroids and specific, oral antibiotic therapy. This is the
same patient as illustrated in Figure 5.24B.

Figure 5.28 Atopic eczema affecting a urostomy in a patient with multiple sclerosis. This is the same patient as
illustrated in Figure 5.24C.

Figure 5.29 Infected peristomal eczema (**A**) in a patient with chronic, dry, generalized eczema (**B**). The peristomal skin was infected with *S. aureus*. The patient was treated with specific oral antibiotic therapy, frequent emollient applications generally, and moderate-strength topical steroid ointment twice daily. (**C**) Peristomal eczema in a patient with generalized discoid eczema (**D**).

Etiology

It is very common affecting 2% to 3% of the population. The cause is unknown, although a number of exacerbating factors and associations suggest an immune pathogenesis. An overgrowth of the commensal yeast *Malassezia furfur* is possibly important in active disease, as topical antifungal treatments that kill the yeast are associated with clearing of the rash. It is therefore postulated that the disease is caused by an exaggerated immune response to the presence of the yeast. Emotional stress, concurrent ill health, "burning the candle at both ends," and immune deficiency are associated with exacerbations of the rash perhaps by permitting overgrowth of the yeast. This is the most common skin disease in patients with HIV/AIDS. There is an association with psoriasis and some regard the two conditions as parts of a spectrum in which often the term sebopsoriasis is used. In support of this is the similar exacerbation seen after emotional stresses and a strong association with IBD. In our stoma patients, those with IBD are four times as likely to have seborrhoeic dermatitis as those without.

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(C)
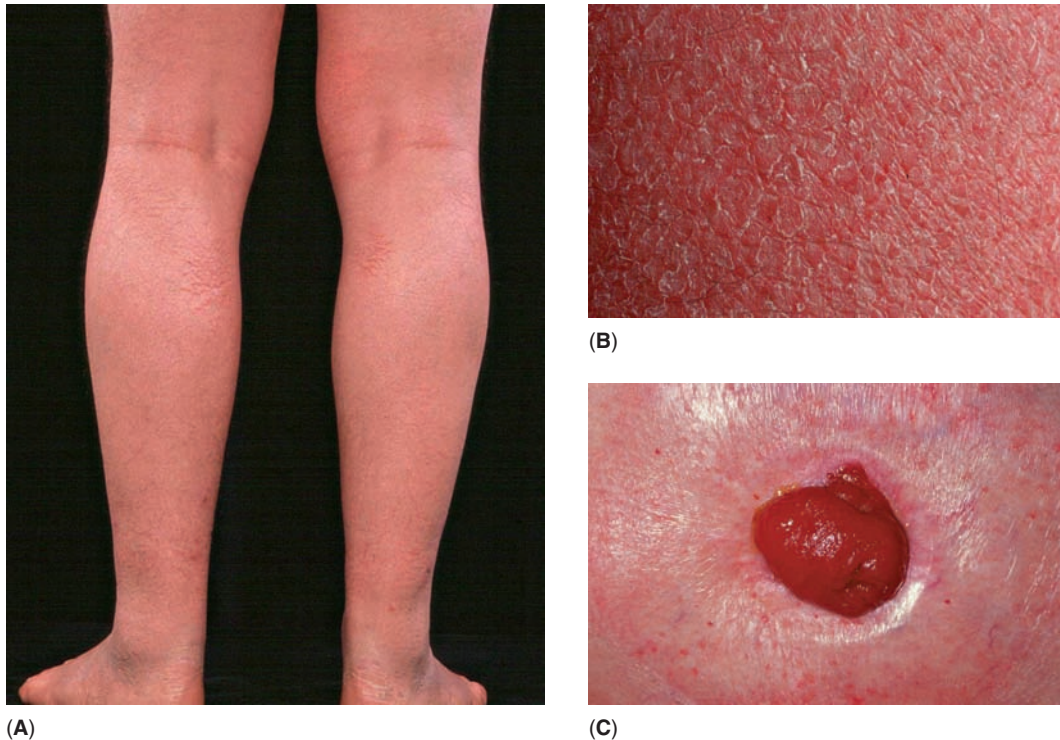
Figure 5.30 Asteatotic eczema. (**A**) Note the dryness superficial cracking of the skin around the ankles and behind the knees. (**B**) In close-up, the dryness and scaling is seen. This type of eczema may extend onto the trunk and involve an ostomy (**C**).

Figure 5.31 This is the same patient illustrated in Figure 5.24A. There is eczema around an ileostomy for Crohn's disease. The weeping areas around the stoma represent vesicles that have been deroofed.

Clinical Features

Peristomal seborrhoeic dermatitis is diagnosed in the context of typical lesions elsewhere. We will therefore describe the general features of the condition. It is characterized by a scaly, red rash that affects the scalp, eyebrows, glabella, sides of the nose, chin, presternal area, and upper

Figure 5.32 (**A**) There is chronic eczema affecting the ankle of a patient with long-standing varicose veins. (**B**) This has become generalized and involves abdominal skin including the area around the patient's ileostomy pouch.
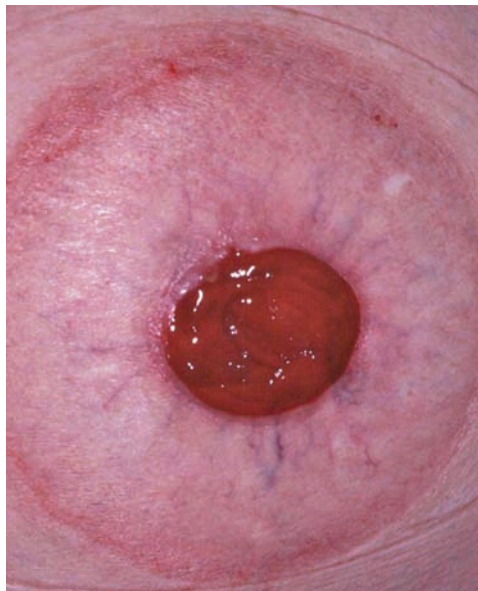
Figure 5.33 Irritant eczema surrounds the area of skin normally covered by the adhesive barrier of a stoma bag. The patient has a history of atopic eczema and has demonstrable dermographism. Dermographism means that pressure or rubbing of the skin produces an exaggerated inflammatory response characterized by a wheal of urticaria. It probably results from an enhanced release of histamine from mast cells in the skin. It may respond to oral antihistamine therapy.

back (Figs. 5.34 and 5.35). It occasionally involves the flexures, particularly in an acute flare (Fig. 5.36). Unlike other eczematous conditions, it is not usually itchy, although it may be sore. The term seborrhoeic derives from the greasy yellow appearance of the scales. The condition does not primarily involve seborrhoeic glands.

(**A**)

(**B**)
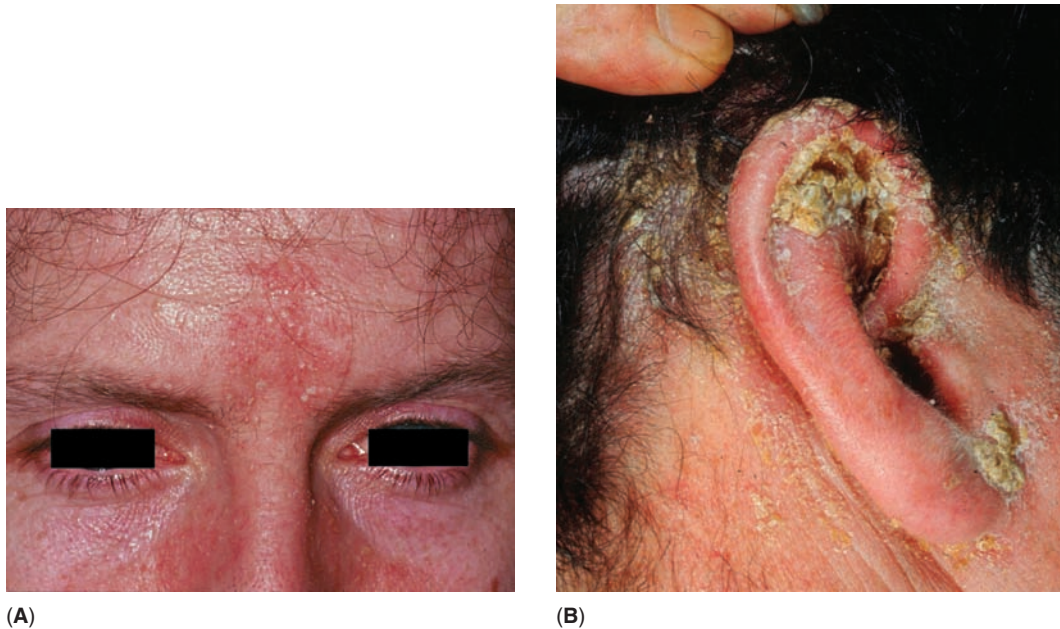
Figure 5.34 (**A**) Seborrhoeic dermatitis of the glabella (between the eyebrows), eyebrows, and nasomaxillary folds (sides of nose). Note the erythema and yellowish scales. (**B**) Marked seborrhoeic dermatitis affecting the ear and surrounding skin. The similarity to psoriasis is obvious and there is a debate as to whether the two conditions are part of the same spectrum of disease. Some dermatologists use the term sebopsoriasis to refer to a disease with features of both conditions.

(**A**)

(**B**)

(**C**)

Figure 5.35 (**A**) Typical seborrhoeic dermatitis affecting the anterior chest in a patient. The rash consists of discrete orange–red scaly plaques. (**B**) On this patient's presternal skin the typically greasy yellow appearance to the scaling is more obvious. (**C**) Seborrhoeic dermatitis of the presternal skin in a young man. At this site, the erythema sometimes presents as annular plaques termed a petaloid appearance. This patient also has involvement of the chin and moustache area.

Peristomal involvement may be an extension of flexural or presternal seborrhoeic dermatitis (Fig. 5.37). Because of the occlusion, scaling may not be apparent in lesions under an adhesive barrier (Fig. 5.38). As was seen for psoriasis, in some patients with seborrhoeic dermatitis, the rash does not occur under hydrocolloid barriers (Fig. 5.39). It is particularly important to

(A)

(C)

(B)

Figure 5.36 (**A** and **B**) The condition can involve the axillary and groin flexures, particularly in an acute, generalized flare as illustrated. At these sites, it may be more inflamed and sore. (**C**) Seborrhoeic dermatitis affecting the groin. The differential diagnosis includes: candida infection (but here there are no pustules or satellite lesions); or staphylococcal infection (but here there is brown scale not crust adhering to denuded skin). The presence of seborrhoeic dermatitis elsewhere in this patient confirmed the diagnosis.
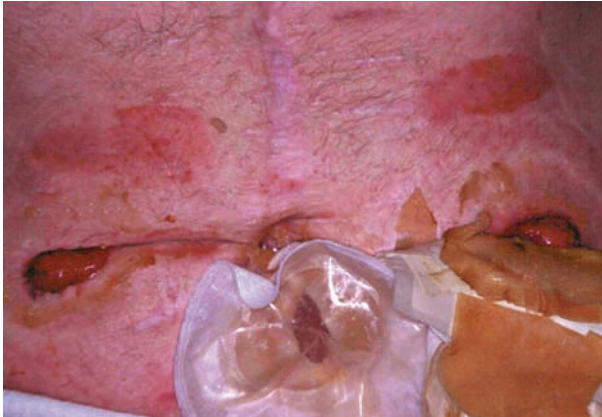
Figure 5.37 Patches of seborrhoeic dermatitis surround an ileostomy and mucous fistula in a Crohn's patient with extensive facial and flexural seborrhoeic dermatitis. The patient responded to ketoconazole shampoo, ketoconazole cream for facial and flexural disease, and topical corticosteroid lotion applied to the peristomal lesions.

Figure 5.38 Diffuse erythema associated with seborrhoeic dermatitis in an ulcerative colitis patient with chronic flexural seborrhoeic dermatitis. This rash cleared with the treatments described in Figure 5.37.

(**A**)

(**B**)

Figure 5.39 (**A**) This shows the urostomy of a patient with florid facial and presternal seborrhoeic dermatitis. The rash surrounds the area normally covered by the hydrocolloid barrier but is largely absent within it. In close-up (**B**), the yellow scaling can be seen.

take swabs from suspected seborrhoeic dermatitis because secondary infection is common. In some cases, peristomal seborrhoeic dermatitis appears to be largely driven by secondary infection (Fig. 5.40). Furthermore, peristomal rashes clinically indistinguishable from seborrhoeic dermatitis can be caused by bacterial infection. This is discussed in chapter 4.

Management
In our experience, control of the peristomal disease is best achieved when seborrhoeic dermatitis elsewhere is treated. Scalp involvement responds to selenium sulfide or ketoconazole shampoos once weekly. At other sites, creams containing ketoconazole or miconazole alone may suffice (Fig. 5.41), although mild or moderate strength topical steroids may be required, particularly on the trunk. On the face, only mild topical steroid (hydrocortisone) should be used. Peristomal seborrhoeic dermatitis can be treated with topical corticosteroid lotion (appendix 4). This is applied at stoma bag changes as often as once a day. All our patients have responded within two weeks and treatment discontinued. Occasional treatments, up to a maximum of once every two weeks, may be needed in some cases.

LICHEN SCLEROSUS

Definition
Lichen sclerosus (LS) is an uncommon condition characterized by atrophic and sclerotic changes in genital, perianal, and sometimes other areas of skin.

    Peristomal LS (2,3) has been described in two published case reports, both of which had vulval involvement typical of the disease and this provided a clue to the diagnosis of peristomal LS. It appears to be increasing in prevalence as we have now seen eight cases (Figs. 5.42–5.45), whereas until eight years ago we had not seen any in the stoma clinic.

Etiology
The etiology is unknown. There is no genetic predisposition, and an infectious cause has not been found. Local trauma may be involved as it exhibits the Koebner phenomenon. The female to male ratio is at least 5:1, and while predominantly a disease of adults it is not uncommon in children.

Clinical Features
The disease primarily affects genital skin with ivory white atrophic plaques, hyperkeratotic areas, hemorrhage, and even ulceration. It is often very itchy. In women, the vulval and perianal

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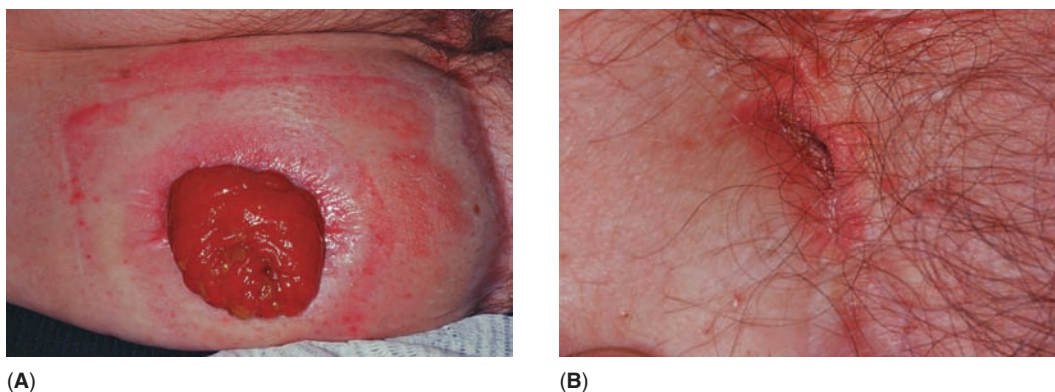
Figure 5.40 (**A**) Orange–red scaly rash adjacent to an ileostomy in a patient with Crohn's disease. The patient had typical facial, presternal, and scalp seborrhoeic dermatitis and a scaling erythema extending from the ileostomy to the umbilicus (**B**) consistent with seborrhoeic dermatitis or psoriasis. There were no other features to suggest psoriasis. Swabs taken from peristomal skin revealed a heavy growth of *S. aureus*. The peristomal and umbilical rashes cleared after a one-week course of oral flucloxacillin. Seborrhoeic dermatitis elsewhere was controlled with topical ketoconazole cream.

(A)

(B)

(C)
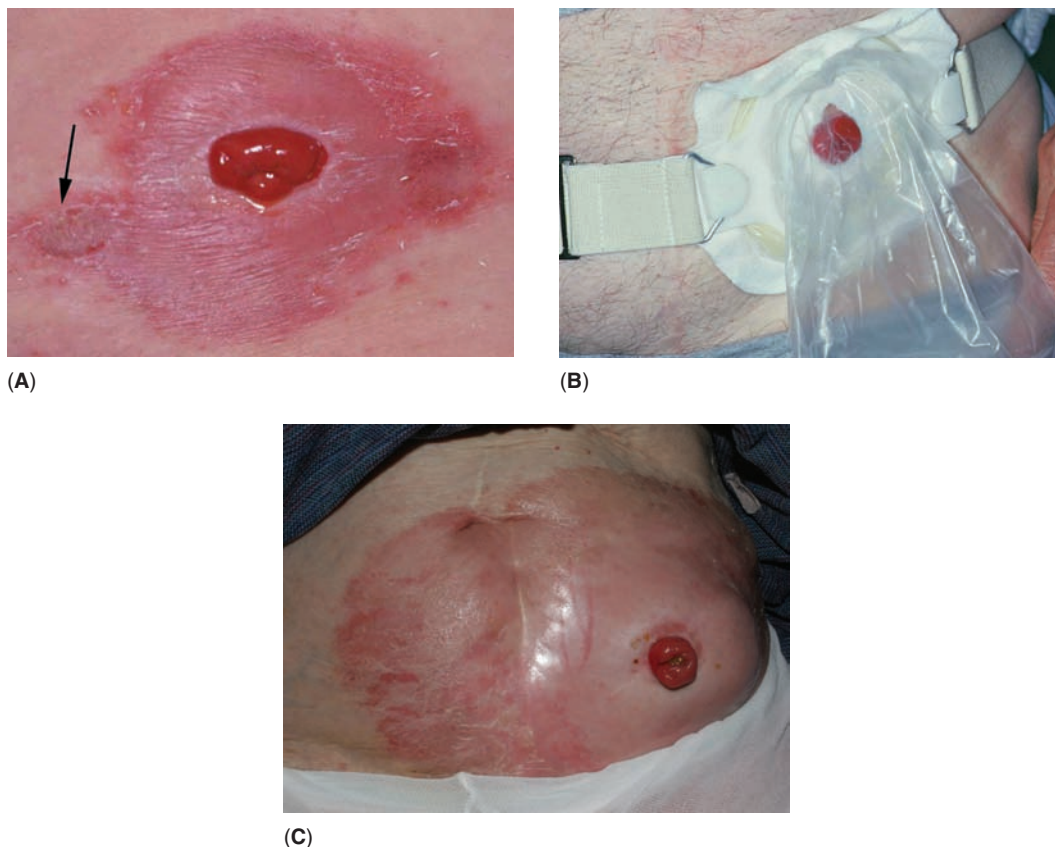
Figure 5.41 (**A**) Sebopsoriasis (seborrhoeic dermatitis/psoriasis) affecting an ileostomy. The lesion indicated by the arrow is an incidental seborrhoeic wart. (**B**) This problem initially responded to topical ketoconazole cream. Because the cream would prevent normal bag adhesion, the patient used a nonadhesive Shachts bag during treatment (see chap. 2). (**C**) This patient used a combination antifungal/hydrocortisone cream around the stoma. Rather than using a Shachts bag, the patient applied it in the evenings while the patient sat still for one to two hours with a bag held in place with a waist belt and without removing the release film (see appendix 4 for the method).

distribution is said to be a "figure-of-eight" pattern. Over time, permanent architectural damage of the vulva can occur (Fig. 5.44). There is a long-term risk of squamous cell carcinoma in untreated LS. LS may also affect the skin outside the genital and perianal area, and peristomal LS can appear without genital involvement. LS can affect any type of abdominal stoma.

Management
Topical corticosteroids (appendix 4) are the mainstay of treatment. In our experience, LS around stomas is more likely to be painful and to ulcerate than genital disease and topical therapy alone is not so effective in some patients. For these cases, intralesional injections of triamcinolone (corticosteroid) is required. The disease may appear to clear but will readily recur. Patients should be given open access to clinics if problems recur and be reviewed at least annually to exclude any malignant transformation.

PEMPHIGOID

Definition
Pemphigoid is a relatively common condition most frequently seen in people over 60 years old. It usually begins with an itchy urticated, erythematous rash that develops tense, fluid-filled blisters after a period of time, varying from weeks to months (Fig. 5.46).

Etiology

The cause is unknown but it has an autoimmune pathogenesis, whereby the blisters result from antibody-mediated damage to the protein bonds between the epidermis and dermis. This occurs at the level of the basement membrane where the basal keratinocytes abut the lamina lucida,
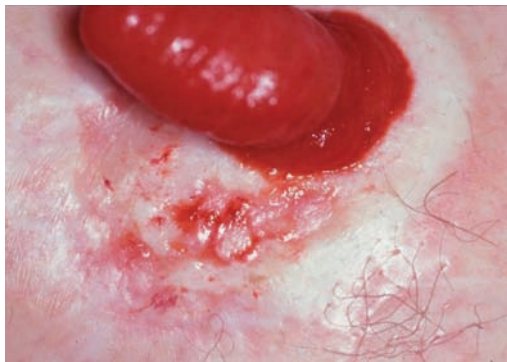
(A)

(C)

(B)

(D)

Figure 5.42 (**A**) Lichen sclerosus affecting a urostomy. In this case, there was no genital involvement. The rash presents as a typically porcelain white appearance with hemorrhage and, in this case, painful ulceration. This condition of unknown cause can affect any area of skin, although genital and (**B**) perianal skin are by far the most common sites. (**C**) In women, it causes an itching vulval rash that scars with sclerosis that damages the normal architecture of the vulva. In men, the process can result in tight restrictions of the foreskin. (**D**) It can involve other areas of skin, such as the trunk as illustrated, where it heals to leave the same papery, atrophic scars. If this diagnosis is suspected, the patient should be referred to a dermatologist for treatment, as occasionally patients have undergone unnecessary surgery for this medically treatable condition. The condition responds to potent topical corticosteroids. (*Continued*)

(E)

(F)

Figure 5.42   (*Continued*) (**E** and **F**) In males, it can cause phimosis (stricture of the foreskin) and/or disruption of the urethral meatus associated with a sclerotic white plaque.

(A)

(B)

Figure 5.43   (**A**) Quiescent lichen sclerosus (LS) in an elderly man with a urostomy for bladder carcinoma. He had a circumcision previously for LS-related phimosis. (**B**) Ulcerating LS in this case was very painful and did not respond to topical steroids. Over a period of 18 months, she required three intralesional steroid injections to control it.

resulting in a cleavage that is clinically apparent as a blister. The disease affects adults mainly in later life with an equal sex ratio.

Clinical Features

Pemphigoid often begins with a prodromal itchy, eczematous, and/or urticarial rash, sometimes for months before the first blister appears. Blisters can occur anywhere but favor thighs,

(B)

(A)

Figure 5.44 (**A**) Vulval lichen sclerosus in a middle-aged woman. Note the hooding of the clitoris and the fusion of the labia such that labia minora are now unapparent. This damage and the shrinkage of the introitus may be permanent. (**B**) Her urostomy developed itchy, porcelain white and hemorrhagic changes circumferentially. There is also painful ulceration. This required intralesional steroid injection to gain control of the symptoms and effect healing.

arms, chest, and abdomen. New blisters and consequent erosions may occur at sites of skin trauma, so the peristomal skin is very likely to be affected (Fig. 5.47) and some cases have been reported in the literature (4,5). We have seen 5 in the last 10 years in our clinics.

Management

A dermatologist should manage the disorder. The diagnosis is largely clinical but usually confirmed by a skin biopsy and serum specimen for immunofluorescence (see "Further Reading"). Systemic therapy is usually required, initially with corticosteroids. Some patients require only topical therapy, but this is not practical in ostomates because the denuded skin (Fig. 5.48) and the problems associated with applying anything topical to wet, sore skin make it impractical. Systemic steroid-sparing agents such as dapsone or azathioprine are used if large doses of steroids are required longer term. More recently, oral antibiotics from the tetracycline group have been used successfully as a steroid sparing agent in pemphigoid. Management of peristomal involvement is complicated by the problems of bag adhesion to the painfully eroded skin (Fig. 5.48). Nemoto (5) described the use of nonadhesive bags supported by a waist belt (Fig. 5.41 and chap. 2) in the management of pemphigoid affecting a colostomy. This approach was highly effective and is acceptable to the patient. If the foam-backed nonadhesive bags are not available, ordinary hydrocolloid bags can be employed without removing the carrier (appendix 4). Pemphigoid may be complicated by infection and Nemoto (5) used antibiotic cream under the barrier to help prevent this.

(A)

(C)

(D)

(B)

Figure 5.45 (**A**) Initial presentation of lichen sclerosus (LS) thought to be possibly merely trauma. (**B**) At one month, the involvement was more severe and biopsy confirmed LS. The patient was treated with topical steroid lotion and (**C**) the skin normalized. (**D**) The LS recurred nearly one year later. This patient had a urostomy for bladder carcinoma.

DRUG ERUPTIONS

Cutaneous eruptions due to systemic medication account for 15% to 20% of adverse drug reactions and may present with various different morphologies. These are also discussed in chapter 6 and appendix 6, but one or two specific reactions coincidental to the primary reason for surgery deserve mention here. As a rule, one should suspect a drug eruption in any sudden onset of a new rash or deterioration of an existing dermatosis. In practice, commonly used drugs such as penicillins or diuretics and some less frequently used but notorious culprits (e.g., antiepileptics, amiodarone, and allopurinol) cause most rashes. In stoma care, nicorandil has

(A)

(B)

Figure 5.46 (**A**) Pemphigoid affecting the thighs in an elderly woman. Note the urticated erythema and blistering. (**B**) Close-up view of the tense fluid-filled blisters and the erosions that result when they are deroofed.

(A)
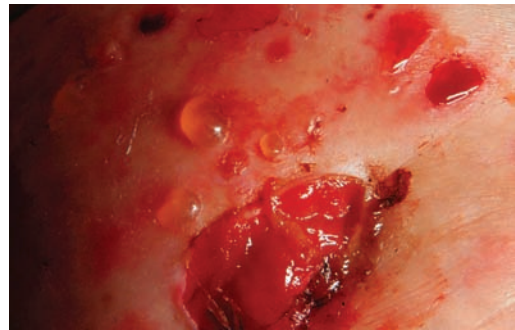
(B)

(C)

(D)

Figure 5.47 (**A**) Pemphigoid in a patient with an ileostomy for inflammatory bowel disease. Note the bullae near the stoma and the healing erosions on the thighs (compare with Fig. 5.46). (**B**) Close-up of the stoma site. Topical treatments alone are impractical and having a stoma should be an indication for immediate systemic therapy for pemphigoid without a prior trial of topical steroid. (**C**) This patient has biopsy pemphigoid that is almost exclusively restricted to the peristomal skin. Localized pemphigoid is not uncommon. Note the small intact blister near the stoma. (**D**) The patient responded to oral corticosteroids in relatively low dose (prednisolone 25 mg daily, reducing to 7.5 mg daily over four weeks). Note the healing erosions corresponding to sites of previous bullae.

(A)

(B)
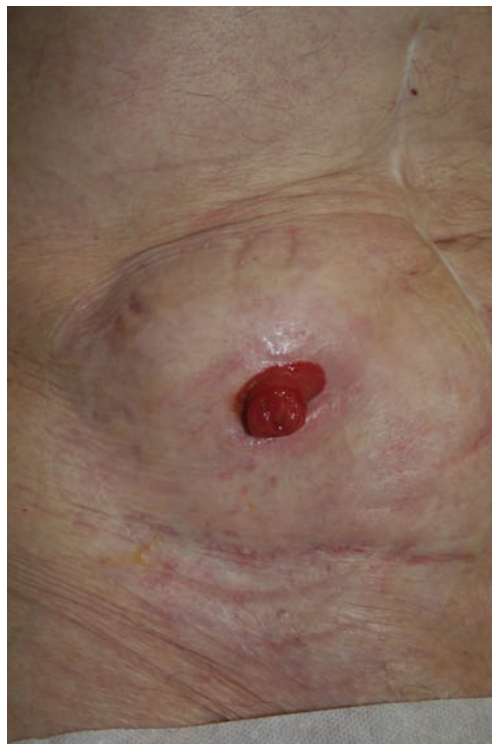
(C)

Figure 5.48   (**A**) Peristomal pemphigoid in an elderly man showing complete denudation of the peristomal skin. (**B**) He was already receiving oral steroids and because he could not wear a stoma bag, he was admitted for four days and treated with topical aqueous steroid lotion soaked into a gauze square. He used hand-held suction to keep the stoma effluent away from his skin. By the third day, he was able to successfully apply a stoma bag and (**C**) the skin was healed within a further month. (This case was presented at the WCET congress in Oporto, Portugal in June 2009 by Jacqueline Clemit, stoma nurse).

emerged as a significant cause of skin problems and may even be implicated in bowel perforation and fistula formation. Nicorandil is a drug used for angina and has recently been reported to be a cause of peristomal ulceration (6,7). Nicorandil-induced ulceration may involve the oral mucosa—more typically; however, perianal and cutaneous ulceration have also been reported (Fig. 5.49). This effect is possibly due to a vascular "steal effect" leading to local ulceration of the skin. Cessation of the drug usually leads to healing of the ulceration.

Biological therapies such as anti-TNF have been widely used in various inflammatory conditions such as psoriasis, Crohn's disease, and rheumatoid arthritis. There are reports of the occurrence of pustular psoriasis and a paradoxical worsening of the pre-existing psoriasis with these drugs. This may be of importance in stoma patients with IBD who are treated with anti-TNF drugs in the case of a sudden deterioration of a stable chronic plaque psoriasis or the occurrence of pustular psoriasis.

Warfarin and other anticoagulants can be associated with sometimes severe hemorrhagic eruptions. In our clinics, we have occasionally seen unusual and thankfully milder reactions to anticoagulant therapy (Fig. 5.50).

SKIN DISEASE CAUSED BY THE PATIENT, INCLUDING DERMATITIS ARTEFACTA

Definition
Skin damage or disease caused by the actions of the patient, either as a result of subconscious habit, behavior related to anxieties about their stoma, or deliberate self-harm. Dermatitis artefacta is self-inflicted skin trauma that is denied by the patient.

(A)

(B)

(C)

(D)

Figure 5.49 (**A** and **B**) Two examples of perianal nicorandil ulcers showing the typically bland, non-inflamed punched out appearance. Case (**A**) did not have a stoma and case (**B**) had a stoma for unrelated reasons. (**C**) Similar nicorandil ulceration around a long-standing ileostomy in a patient recently started on high-dose treatment for angina. (**D**) The ulcers can appear anywhere. This is the same patient with an ulcer in the groin fold. These resolved on cessation of nicorandil treatment.

Etiology, Clinical Features, and Management

This problem has also been discussed in chapter 1 and is discussed in a little more detail here. The reasons why patients mutilate their skin are complex. For a discussion on peristomal skin, they can be divided into five categories.

- *Psychosis*: The patient is driven by psychotic delusions to harm themselves. Patients with severe psychotic illness may produce gross self-mutilations.
- *Dementia:* The demented patient may indulge in repetitive behaviors such as picking or scratching that causes skin damage.
- *Obsessional neurosis and personality disorders:* These have been combined because, although there is no clear consensus, they probably account for the bulk of dermatitis artefacta in patients seen in dermatology clinics, although not in the stoma clinics. The diagnosis of dermatitis artefacta should be suspected if the patient presents with bizarrely shaped or situated lesions that do not fit into a recognized pattern. Patients often focus on a particular body site for self-harm (Fig. 5.51) in an obsessional manner. In a similar way, patients with

personality disorder may harm their skin (Fig. 5.52 and Fig. 1.17A). Obsessional behavior may focus on the stoma itself (Figs. 5.53 and 5.54). Unless patients accept their behavior and ask for help, these situations can be difficult to manage. If a patient is frankly psychotic or demented, this is easily recognized and they can be referred to the appropriate psychiatric agency. Challenging other patients with the fact of their self-harm is usually unproductive as they refuse to accept it and default on further follow-up. In rare cases, patients have attempted suicide after being challenged in this way. Delicate handling is therefore needed with repeated clinic visits at which an attempt to uncover the reasons for self-harm and to modify subsequent behavior is made.

- *Anxiety neurosis:* Some patients with a stoma may enter a reactive anxiety-depression state as a manifestation of difficulties in adapting to their new situation with a stoma. This undoubtedly contributes the bulk of self-inflicted skin disease that we see in the stoma clinic and is predictable and understandable. Occasionally, this can result in dermatitis artefacta (Figs. 5.53 and 5.54). Again, careful and considerate handling of the situation by the stoma specialist is important in modifying behavior.
- *Secondary gain:* Some patients harm their skin for secondary gain. This may be to seek the comfort of continued medical attention or to perpetuate and support a legal claim for damages (Fig. 1.17B).

(A)
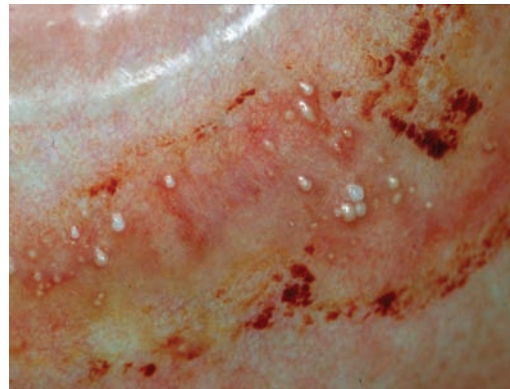
(B)

(C)

(D)

Figure 5.50   (**A**) Hemorrhagic and eroded rash in a patient recently started on warfarin for deep venous thrombosis. The patient had irritant dermatitis and the warfarin appears to have exacerbated this causing unusually deep and hemorrhagic inflammation and denudation of the skin (**B**) as manifested by the formation of milia (see appendix 1 "Glossary") as it healed. (**C** and **D**) These images show another patient receiving Warfarin therapy with irritant dermatitis as a result of leaks caused by the stoma situation in a prominent skinfold. The resulting inflammation is more severe and hemorrhagic in appearance than usual.
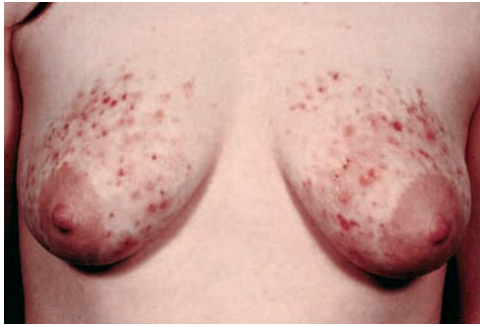
(**A**)

(**B**)

(**C**)

Figure 5.51 (**A**) Excoriations of the breast in an obsessive woman who had been sexually abused as a child. (**B**) Self-inflicted excoriations around the eyes in a girl. The bizarre shape and distribution suggests dermatitis artefacta. (**C**) This woman with Alzheimer's disease habitually picked at her stoma bag resulting in leaks of feces onto the skin (arrow). The problem was compounded by the presence of abdominal scarring that impaired bag adhesion.

Figure 5.52 This patient with a stoma for Crohn's disease had a borderline personality disorder and injected an unknown substance into the skin on the nonstoma side of the abdomen. The patient refused any psychological or psychiatric help for the condition.
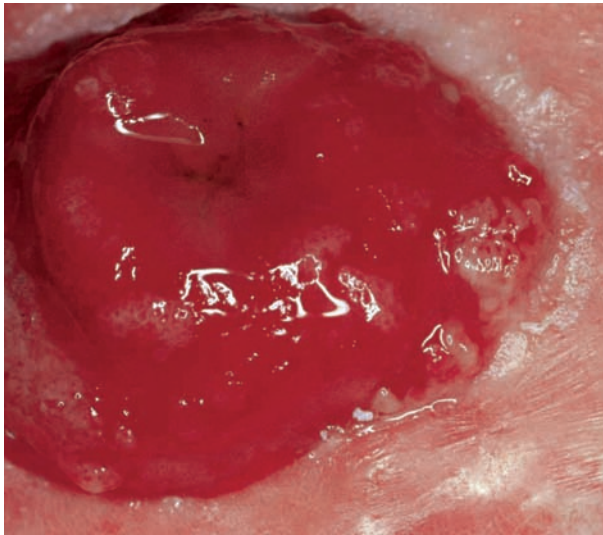
Figure 5.53 This patient with an ileostomy for ulcerative colitis was fully aware of the obsessional tendency to pick at the stoma through the appliance. This had resulted in hyperkeratotic papules of reactive squamous metaplasia on the stoma. These are clinically indistinguishable from viral warts. The patient sought help from a clinical psychologist.

(A)

(B)

(C)

Figure 5.54 (A–C) This patient was referred with suspected pyoderma gangrenosum near the stoma (A); this was subsequently diagnosed as a pressure ulcer. General examination revealed further pressure ulcers over each posterior, superior iliac crest and marked fat necrosis in a band all around the abdomen. This caused a permanent new abdominal fold to appear as a result of fat atrophy from pressure damage (B and C). The patient was very anxious about leaks and had caused the damage by wearing a stoma appliance with a belt excessively tightly. Over many weeks and with careful goal setting the patient was able to gradually reduce the belt tension to a level that caused no further tissue damage and still allowed the patient the confidence to leave the house. The ulcers healed rapidly thereafter.

OTHERS

There are case reports of a variety of primary skin diseases affecting peristomal skin, such as peristomal squamous carcinoma (8), basal cell carcinoma (9), hidradenitis suppurativa (10), and pemphigus (11). While any skin disease might appear at the peristomal site, primary dermatoses, other than those described above and in chapter 6, are rare causes of peristomal skin problems. The average practitioner will, therefore, only occasionally encounter one of these less common dermatoses affecting a patient's peristomal skin. The correct diagnosis will usually only be made when the significance of cutaneous abnormalities elsewhere is appreciated. In practice, any patient who presents with a persistent peristomal skin disorder, which the clinician cannot diagnose and treat, warrants a dermatological opinion.

Although rare, some of the dermatoses have been reported in more than one patient; in addition, some common skin disorders are intuitively more likely around stomas. These are described below. This is not an exhaustive treatise on dermatology, for which readers are directed to "Further Reading."

Rashes

Pemphigus is a rare, blistering skin disease that has been described involving peristomal skin (11). Like pemphigoid, it is an autoimmune condition but in pemphigus the antibodies are directed against the bonds between keratinocytes so that the blisters are more superficial and delicate. Intact blisters, therefore, may not be seen. Many cases are associated with a strong genetic tendency, the disease particularly affecting Ashkenazi Jews. Drug-induced and paraneoplastic (malignancy-associated) pemphigus are also recognized. Unlike pemphigoid, mucosal lesions are common and may predate the skin involvement. The erosions present the same problems as pemphigoid for the peristomal skin (Fig. 5.55) and management strategies are similar.

(A)

(B)

Figure 5.55   (**A**) Pemphigus involving the trunk of a Jewish woman. (**B**) In close-up, the erosions and small blisters can be seen.

Hidradenitis suppurativa is a chronic suppurative condition of the apocrine follicles. It therefore affects the sites where these glands are present, particularly the axillae, groins, perianal area, and breasts. It occurs after puberty and is more common in females. The clinical features (Fig. 5.56) result from pyogenic bacterial infection of apocrine glands that have become blocked by comedone occlusion of the pilosebaceous follicle into which they empty. It is not known why this occlusion occurs, but there may be a genetic predisposition. We have seen several patients with this condition and a background of Crohn's disease and we postulate that there is a link between the two conditions (Fig. 5.56). Treatment involves wound hygiene and long-term antibiotic therapy. If the scarring and sinus formation is severe, surgical excision and grafting may be necessary. In severe cases, biological therapy with anti-TNF drugs has been used. The one case described in the literature affecting peristomal skin (10) had typical hidradenitis of long-standing before ileostomy formation for Crohn's disease. The patient developed new hidradenitis lesions adjacent to the ileostomy that interfered with normal appliance use. This responded to dressing with a nonadherent, absorbable dressing and changing to a bag with a karaya ring and microporous adhesive.

Pityriasis lichenoides chronica is a rare skin condition of unknown cause. It is the only uncommon dermatosis we have encountered affecting peristomal skin (Fig. 5.57) and highlights the fact that any skin disorder might occur at this site. The cause is unknown and the disease may last months to years. It often responds to ultraviolet phototherapy or oral erythromycin for three to four weeks.

Other generalized conditions might affect the peristomal skin. These include the hereditary dry skin conditions (ichthyoses; Fig. 2.8) and hereditary blistering diseases (epidermolysis bullosa). These may become apparent only after stoma surgery, as a response to the irritation of wearing an appliance. Where time permits, a preoperative assessment, prior to stoma surgery, should include a skin examination to look for evidence of any of these conditions so that problems can be pre-empted and possibly prevented. Management of patients with a hereditary blistering disorder would be similar to that for pemphigus or pemphigoid.

Tumors

Seborrhoeic warts are one of the more common benign tumors seen in the adults. The cause is unknown but they are increasingly common with advancing age. They are warty papules with a stuck-on appearance, usually brown but occasionally pink, and there may be obvious dilated pores plugged with keratin. Lesions are often multiple. In peristomal skin, they may be pink (Fig. 5.41A) or brown with hyperpigmentation, particularly in individuals with a dark complexion (Fig. 5.58). Treatment is unnecessary except for cosmetic reasons, if the lesions are inflamed or, in the case of peristomal skin, if they interfere with bag adhesion. They respond to ablative treatment with liquid nitrogen or with curettage and cautery or shave excision in the case of larger lesions.

Campbell de Morgan spots (cherry angiomas) are very common capillary angiomas seen in adults. They are usually multiple and range in size from tiny pinpricks to discrete papules a few millimeters in diameter (Fig. 5.59). No treatment is necessary apart from reassurance.

Pigmented lesions that are new, changing in shape, size, or color, particularly if these features are irregular, should be referred for a dermatological opinion. Most will be seborrhoeic warts or benign nevi (moles) (Fig. 5.60). The latter may be flat and brown with persistent skin markings (intraepidermal or junctional nevi), papular and brown (compound nevi), or papular and flesh colored (intradermal nevi), each representing a further stage in the development of the lesion. Hair growth is a common feature, particularly of intradermal nevi. Malignant melanoma is a serious malignant neoplasm of melanocytes. Several morphological types are described but the outcome depends on the tumor thickness and presence of metastases at presentation. If found early, when the lesions are thin, survival rates are very high but these drop off with larger, thicker tumors, where systemic metastasis is more likely. Although it is typically related to sun exposure, it may occur anywhere and we have seen one patient with a melanoma on the flank adjacent to an ileostomy (Fig. 5.61). In some families, a genetic tendency for melanoma is present, which may be disproportionate to the degree of sun exposure. Treatment involves surgical excision, and the patient should be referred to a plastic surgeon for wide excision and assessment of possible metastases.

Basal cell carcinoma is probably the most common malignancy of white-skinned individuals. Unlike most malignant neoplasms, it almost never metastasizes but can cause extensive

(A)

(B)

(C)

(D)

Figure 5.56 (**A** and **B**) Hidradenitis affecting the breast in a 40-year-old woman with Crohn's disease and an ileostomy (note the axillary scar from previous hidradenitis surgery). (**C**) The axilla is heavily scarred both from the disease and previous surgery. She was given a course of infliximab infusions (see chap. 7) as other therapies were ineffective. Clinically, both the active disease and the resulting scarring (**D**) are reminiscent of both pyoderma gangrenosum and cutaneous Crohn's disease.

(A)   (B)

Figure 5.57   (**A**) Pityriasis lichenoides chronica. This disorder usually affects the limbs, but in this case began in peristomal skin. (**B**) Pink scaly papules of established lesions can be seen on the anterior border of the forearms. These began as raised purplish papules. The diagnosis was confirmed histologically.
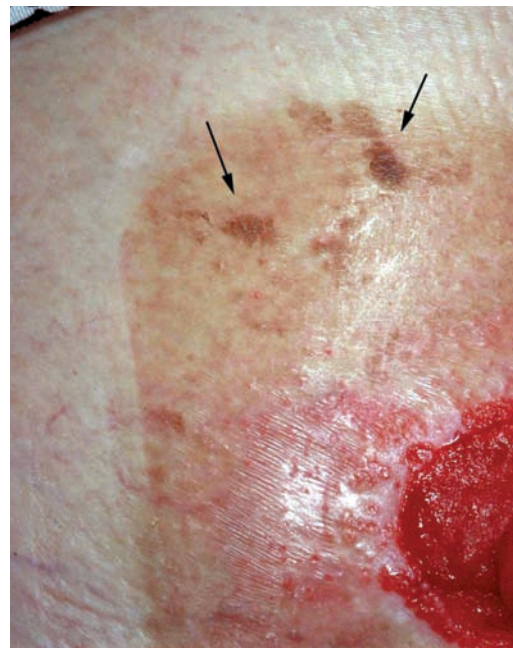
(A)   (B)

Figure 5.58   (**A**) Multiple seborrhoeic warts on the chest. The more common sites affected are the trunk, head, and neck. (**B**) Seborrhoeic warts in the peristomal skin (arrows). This patient has a dark complexion. The warts are brown and there is a background of post-inflammatory hyperpigmentation due to irritant dermatitis that has contributed to the pigmentation.
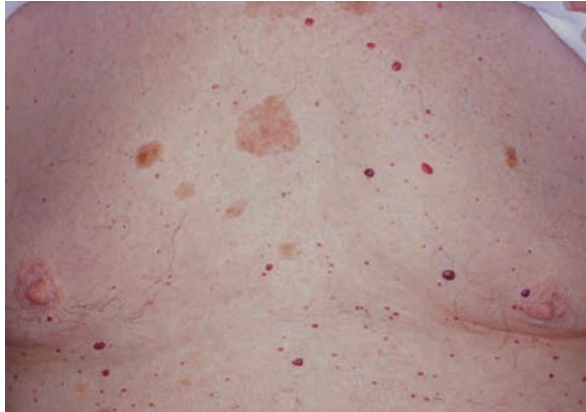
Figure 5.59 Multiple Campbell de Morgan spots and seborrhoeic warts on the chest of an elderly man.

Figure 5.60 Benign compound melanocytic nevus (mole). The pigmentation and outline are regular. The surface has typical, slight projections and there is normal hair growth appearing from it.
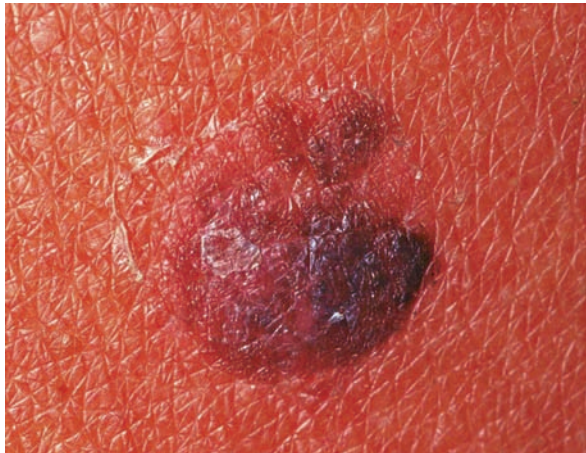
Figure 5.61 Malignant melanoma from the flank of a patient with an ileostomy. This superficial spreading melanoma was <0.75 mm in thickness and, therefore, associated with a five-year survival of >90%.

local damage as it slowly enlarges. It is a tumor of the basal keratinocytes and is usually associated with sun exposure. Nonetheless, it can occur on the trunk, particularly in some individuals with multiple lesions. Some patients developed multiple basal cell carcinomas many years after taking blood tonics containing arsenic, although such patients are increasingly uncommon. One of our patients (Fig. 5.57) had multiple basal cell carcinomas of the head and neck and one a few centimeters from the stoma (Fig. 5.62). The lesions are usually papular with a raised gelatinous-looking pearly edge and prominent capillaries. The central area may ulcerate, particularly in larger lesions. Some basal cell carcinomas are flatter and more superficial in appearance; however, a raised pearly edge is usually seen (Fig. 5.62). They may be pigmented. The patient should be referred to a dermatologist. Treatment involves surgical excision or, in the case of superficial basal cell carcinoma, cryotherapy, curettage, or topical imiquimod (Aldara™).

Squamous cell carcinoma is a malignant neoplasm of keratinocytes. Like basal cell carcinoma, it is often sun related and occurs on exposed sites. It may also be initiated by carcinogenic chemicals and sometimes complicates chronic wounds and infections (Marjolin's ulcer) such as in the peristomal case that has been described (8). Squamous cell carcinoma presents as a fungating lesion or nonhealing ulcer with obvious tissue destruction (Fig. 5.63). It should,

(A)   (B)
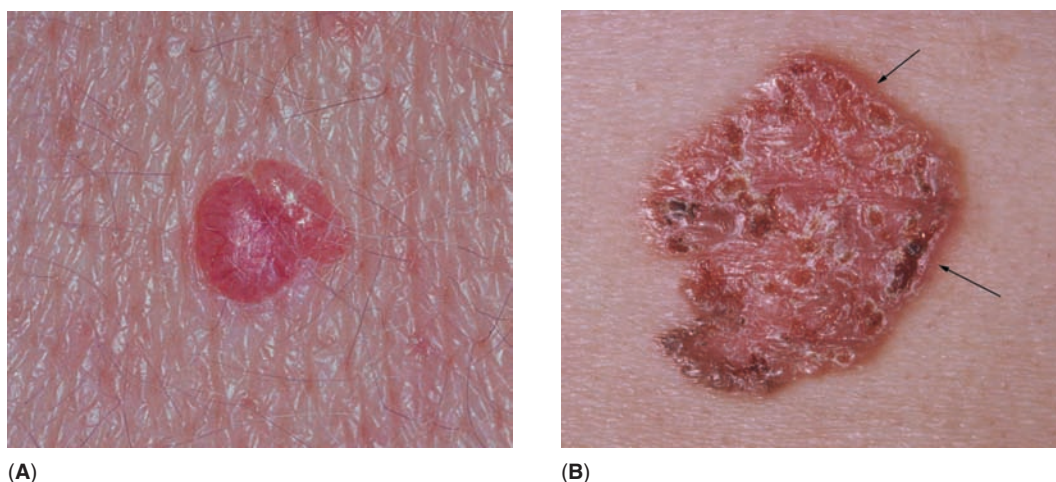
Figure 5.62   (**A**) Nodular basal cell carcinoma on the abdominal skin near an ileostomy. Note the typical pearly appearance and the dilated capillaries over the edge. (**B**) Superficial basal cell carcinoma on the chest. A pearly, whipcord edge can be seen (arrows).

Figure 5.63   Fungating and ulcerating squamous cell carcinoma on the face of an elderly man.

therefore, always be considered in a nonhealing ulcer. Treatment involves surgical excision, and the patient is usually referred to a surgeon if the lesion is large and there is any possibility of metastasis. Radiotherapy is an alternative treatment in patients in whom surgery may be difficult or contraindicated.

The last section represents an overview of the more common and more serious dermatological conditions. Readers are referred to "Further Reading" for more detailed texts.

KEY MESSAGES

General

- Common skin problems, such as eczema and psoriasis, are common causes of peristomal rashes.
- Look for evidence of these disorders by careful history taking and general physical examination of the patient.

Psoriasis

- Psoriasis is particularly common in patients with Crohn's disease or ulcerative colitis.
- It appears or worsens at sites of skin injury/trauma.
- There is often a family history.
- The plaques may not be present beneath the hydrocolloid barrier of a stoma bag. If a patient with peristomal psoriasis is not using an appliance with a hydrocolloid barrier, changing to such an appliance may result in improvement of their psoriasis.
- Peristomal psoriasis may become secondarily infected. Candidal and staphylococcal infection, in particular, must be excluded.
- Short courses of topical steroid lotions are usually all that is necessary to treat the peristomal skin.

Eczema

- Most forms of constitutional eczema may become generalized and affect the peristomal skin.
- In patients with atopic eczema, infection or irritation around a stoma may trigger an exacerbation of eczema.
- Peristomal skin should be swabbed in all patients with suspected peristomal eczema to rule out secondary infection or primary infection mimicking eczema.
- Short courses of topical steroid lotions are usually all that is necessary to treat the peristomal skin.

Seborrhoeic Dermatitis

- Seborrhoeic dermatitis is particularly common in patients with a stoma for IBD.
- Secondary bacterial infection perpetuates peristomal seborrhoeic dermatitis.
- Primary bacterial infection can mimic peristomal seborrhoeic dermatitis.
- Rapid and long-term control of peristomal seborrhoeic dermatitis is achieved by treating the disease at all the other body sites as well.

Other Skin Disorders

- Lichen sclerosus (LS) is a significant cause of peristomal skin disease.
- Pemphigoid is relatively common in older people and can cause peristomal skin problems.
- Preoperative assessment, prior to stoma surgery, should include a skin examination to look for evidence of pre-existing skin disease.
- Persistent skin problems, which cannot be confidently diagnosed and treated, require a dermatological opinion.

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6 | Skin Problems Related to the Primary Abdominal Disease

Calum C. Lyon

Skin disorders in this group fall into the following categories:

- *Directly related to the primary disease*
  - Malignancy
    - Direct extension to skin
    - Metastasis to skin
  - Crohn's disease of the skin or stoma
    - Erythema nodosum
  - Connective tissue diseases and vasculitis (see also chap. 5)
    - Systemic sclerosis (scleroderma)
    - Polyarteritis
- *Indirectly related to the primary disease*
  - Malnutrition secondary to malabsorption or active disease causing:
    - Rashes (especially zinc, riboflavin, and vitamin C)
    - Poor wound healing
  - Pyoderma gangrenosum associated with:
    - Inflammatory bowel disease
    - Malignancy
- *Iatrogenic*
  - Drug related
    - Hypersensitivity rashes
    - Complications of antineoplastic chemotherapy
    - Skin infection secondary to immunosuppression
    - Steroid atrophy
  - Radiotherapy related
    - Radiation dermatitis
    - Impaired wound healing
    - Diarrhea
  - Surgical complications are considered in chapter 1

DIRECTLY RELATED TO THE PRIMARY DISEASE

Malignancy

Patients who have had stoma surgery for bowel or urinary tract malignancy may develop secondary deposits within or around the stoma. This is probably more common with adenocarcinoma of the bowel (Fig. 6.1). Such peristomal tumors may represent secondary (metastatic) deposits of tumor in the skin or, rarely, growth of residual tumor within the bowel. In a proportion of cases, such as that illustrated in Figure 6.1, this may represent seeding of tumor to the skin at the time of stoma formation. Treatment is surgical.

Crohn's Disease

Very occasionally, Crohn's disease presents in skin distant from the mouth or anus. More commonly, it involves perioral, perianal, genital, or peristomal skin. Three patterns of peristomal involvement are seen, ulceration of the stoma itself (Figs. 6.2 and 6.3), Crohn's fistulae (Fig. 6.4), and granulomatous inflammation of the skin (Figs. 6.4B and 6.5). Over the last ten years, we have an increasing number of patients with other skin manifestations of bowel disease in our stoma clinic. These are either coincidental to their stoma problem or indeed in many it is the

Figure 6.1 Metastatic adenocarcinoma of the colon appearing at the highly vascular junction between skin and bowel, nine months after first surgery for carcinoma of the sigmoid colon.

(**A**)

(**C**)
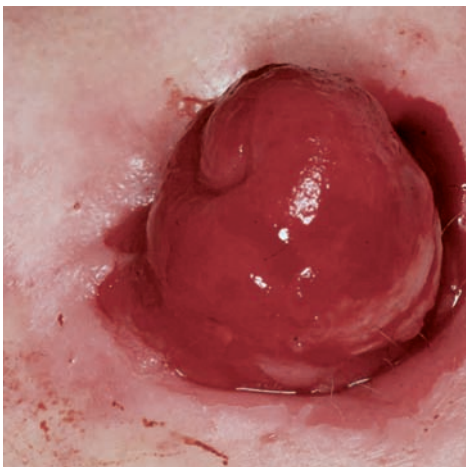
(**B**)

Figure 6.2 (**A**) Sloughing and hemorrhagic aphthoid ulceration of Crohn's disease affecting an ileostomy.(**B**) The same patient after one week of treatment with topical steroid paste [corticosteroid in carmellose sodium paste (see p. xii), see appendix 4]. The ulceration is less severe but can still be seen on the under surface of the stoma. The yellow sloughing is typical. (**C**) Teenage girl with Crohn's disease affecting the stoma manifesting as edema and ulceration; ulceration and inflammation of the surrounding skin is also seen.

(A)
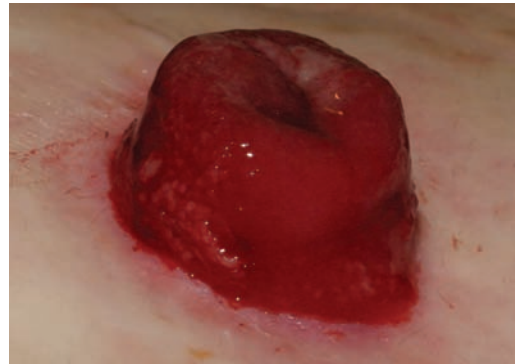
(B)

Figure 6.3 (**A**) Typical Crohn's ulceration. There are several sloughing ulcers on this ileostomy. (**B**) More extensive but smaller areas of aphthoid ulceration in an adolescent with Crohn's disease.

(A)

(B)

(C)

Figure 6.4 (**A**) The signs of peristomal, Crohn's fistulae may be very subtle. The patient illustrated has persistent irritant dermatitis changes and complained of leaks. However, no problems were apparent with the stoma architecture or the appliance type. When the stoma was observed for several minutes, fecal fluid was seen welling up (arrow) from a small fistula at the mucocutaneous junction. (**B**) Extensive peristomal Crohn's disease of the skin. The multiple papules give a cobblestone appearance to the skin. The ileostomy has been destroyed by the long-standing inflammatory process and feces can be seen emerging from several fistulae. (**C**) A similar presentation in a teenage girl with active Crohn's disease. She was severely anemic and malnourished secondary to malabsorption and was admitted for parenteral feeding and to commence adalimumab therapy. There was a remarkable improvement in both her skin and general condition such that surgical refashioning of her stoma may not be necessary.

(A)

(B)

(C)
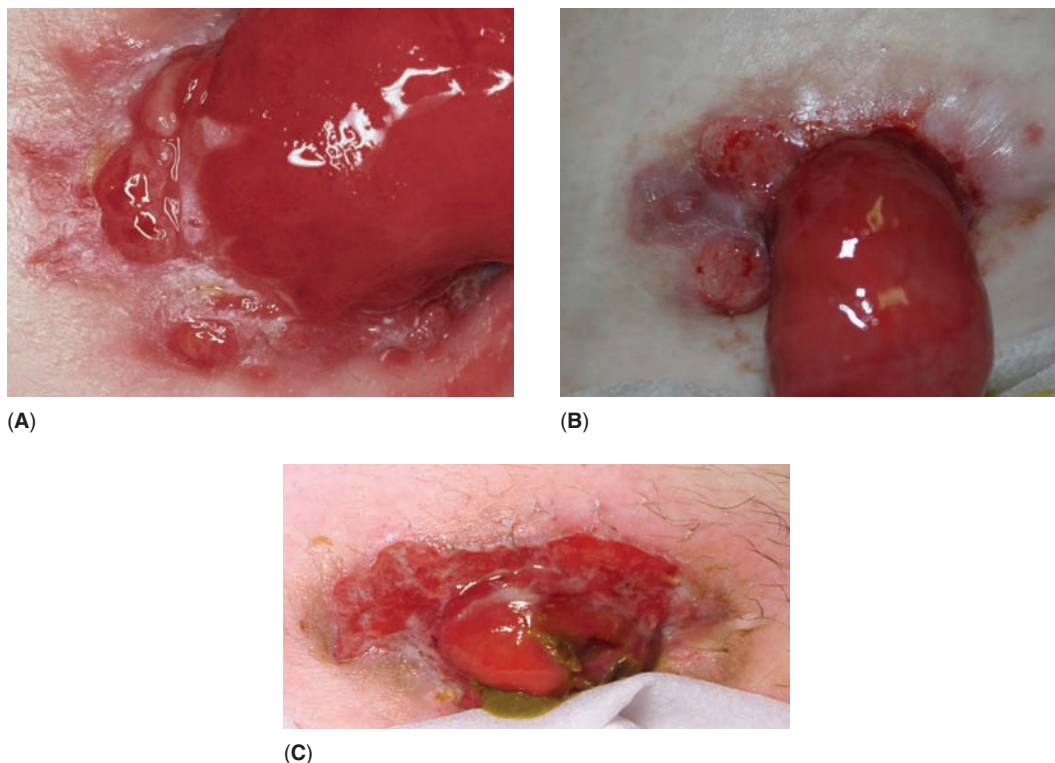
Figure 6.5   (**A**) This young boy with Crohn's disease has several ulcerated sloughing papules surrounding his ileostomy. Clinically, these are similar to papules of overgranulation (see chap. 3) but, histologically, they show inflammation and giant-cell granuloma formation typical of Crohn's disease. (**B**) A similar appearance in a 14-year-old girl who has more ulceration including the mucocutaneous junction at the two-o'clock position. (**C**) More extensive Crohn's ulceration. Both cases (**B** and **C**) received systemic treatment with adalimumab for their Crohn's disease and a combination of topical tacrolimus and corticosteroid resulting in healing.

main reason for referral, particularly perineal disease (Fig. 7.1), genital Crohn's disease (Figs. 6.6 and 6.7), and other nonstoma-related extra intestinal manifestations of the disease (Fig. 6.8), which one should be alert to as they suggest active intestinal disease (see also chap. 7). Management of Crohn's disease involves investigation for wider bowel involvement and is discussed in chapter 7 along with treatment modalities. Genital and perineal disease is only occasionally responsive to such approaches, and while antibiotics such as metronidazole have been used with some success, it is the biological therapies, infliximab and adalimumab, that have been most successful but by no means universally (Fig. 6.6). The presence of extraintestinal manifestations may indicate active Crohn's disease (see section "Pyoderma Gangrenosum"). Mild peristomal or stomal Crohn's disease may respond to potent topical steroid pastes or creams (appendix 4). In our experience, severe disease, resulting in necrosis of the stoma spout or extensive scarring of the peristomal skin, often requires surgical revision even with the newer biological therapies because the stoma spout has been damaged (Fig. 6.4).

Other Inflammatory Diseases
A number of primary inflammatory disorders, of unknown cause, may occasionally necessitate stoma surgery because of arterial damage or sclerosis of the bowel. This group of rare disorders includes systemic sclerosis and primary vasculitides such as polyarteritis nodosum. In such cases, the diagnosis of peristomal skin disease is evident from the generalized skin signs and the systemic features of these multisystem diseases. In the author's experience over 10 years, in only one case has such a disease resulted in stoma surgery, although these disorders can occur coincidentally on peristomal skin (see chapter 5 "pre-existing and Coincidental Skin Disease").

(A)

(B)

(C)
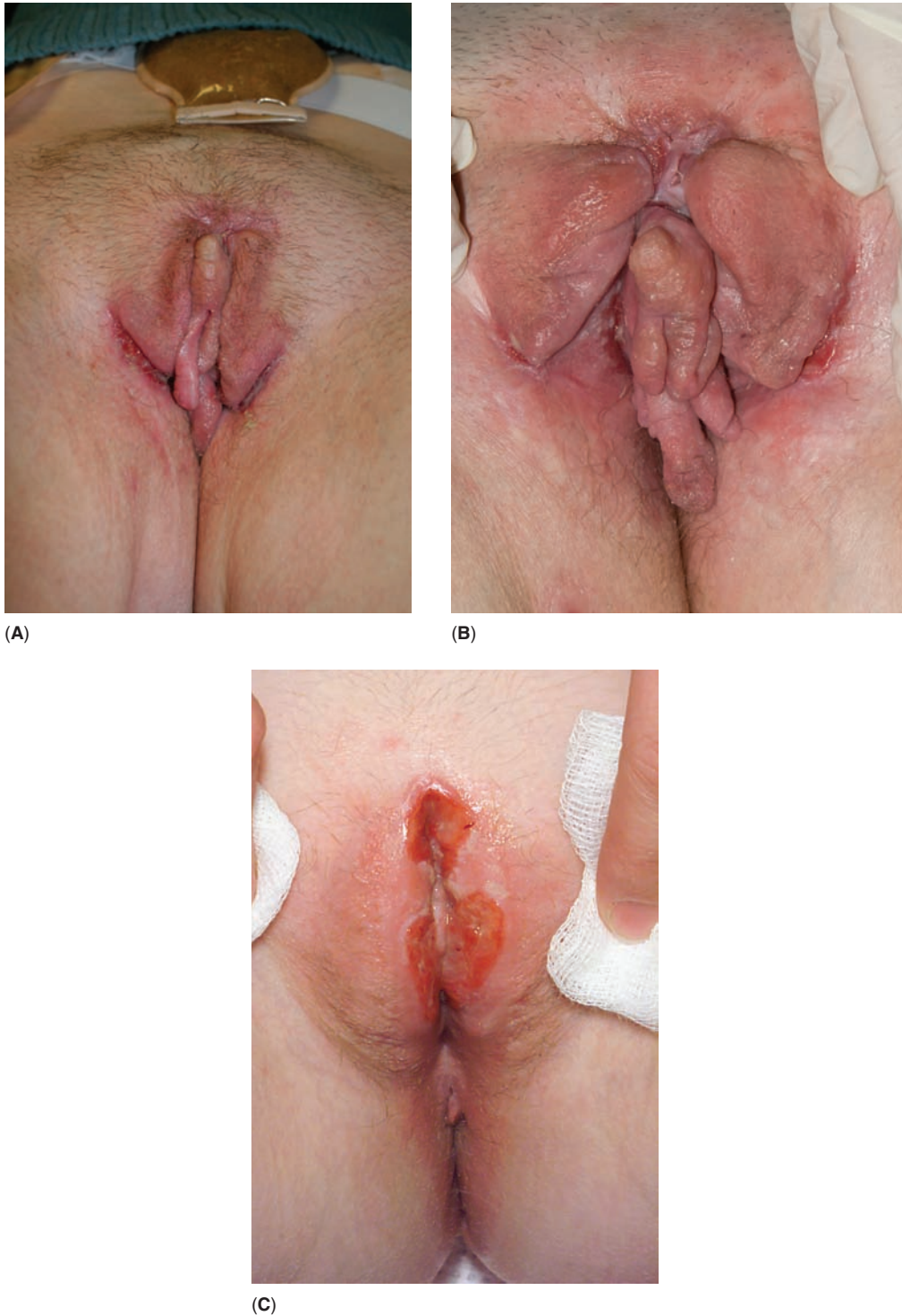
Figure 6.6 (**A**) A 35-year-old woman with vulval Crohn's disease. The lateral fissuring and edema are typical. This did not respond satisfactorily to topical therapies or biologic agents (infliximab and adalimumab). (**B**) One year later, the disease was worse and the patient was referred for consideration of a labioplasty to address the excessive redundant skin tags. (**C**) Vulval Crohn's disease in a 13-year old. This is at an early stage with superficial ulceration. Fortunately, this responded well to systemic treatment.

(A)

(B)

(C)

(D)

Figure 6.7 (**A**) The groin and perineal fissuring occurs in males too and (**B**) has a "snail-track" appearance sometimes. (**C**) Penile Crohn's disease causes edema, resulting in a "saxophone penis". This together with the groin ulceration (**B**) settled with adalimumab therapy, but the edema recurs with any cause of inflammation, for example, mild infection because the penile lymphatics were permanently damaged. (**D**) The picture shows the perineal ulcer in the same patient, which also responded to therapy.

DISEASES INDIRECTLY RELATED TO THE PRIMARY DISEASE

Nutritional

Impaired nutrition may result from low intake (poor appetite, excess alcohol consumption or, sometimes, inadequate parenteral nutrition), malabsorption (short, damaged, or diseased bowel), or metabolic consumption of nutrients (chronic inflammation or malignancy using up stores). Inflammatory bowel disease (IBD) or malignancy can result in significant weight loss via any or all of these three mechanisms. In these undernourished patients, wound healing is impaired

(A)   (B)
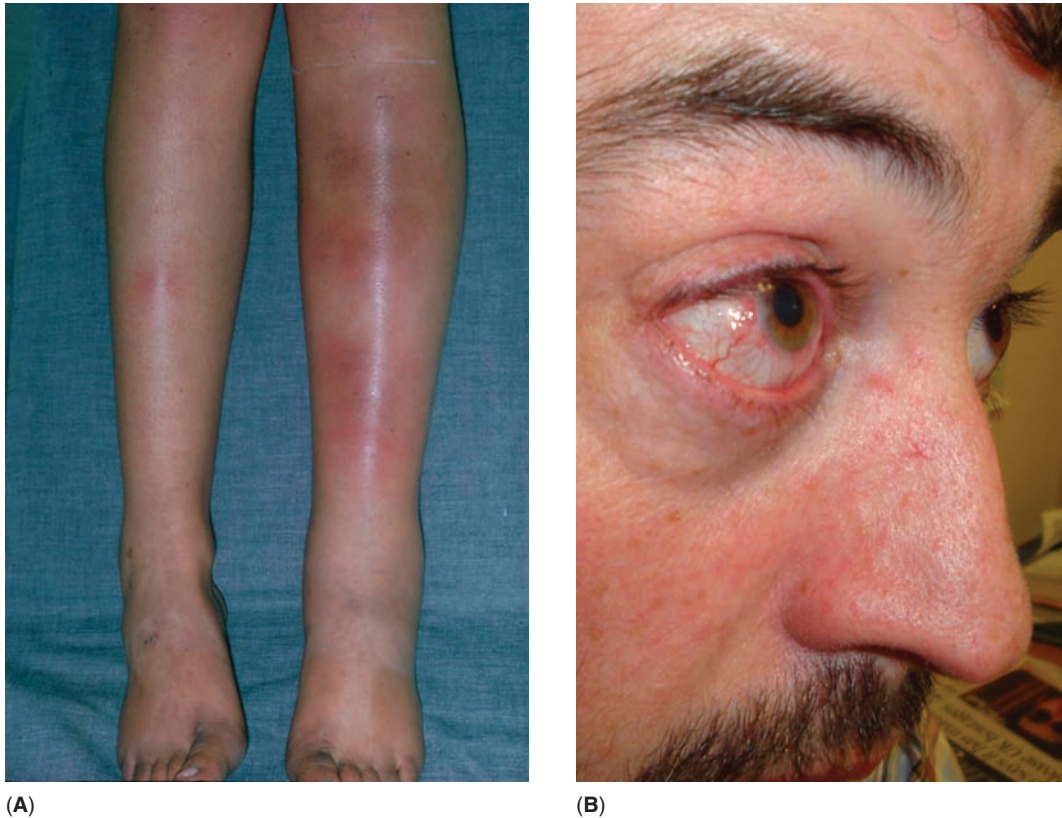
Figure 6.8 (**A**) Erythema nodosum is a localized inflammation in subcutaneous fat (panniculitis). It is a reaction pattern mostly to chronic inflammatory conditions such as inflammatory bowel disease, although the most common cause is a bacterial sore throat. It is a very painful condition presenting with self-limiting tender nodules. (**B**) Crohn's disease can be associated with inflammatory eye conditions, particularly uveitis and episcleritis. Uveitis, or inflammation of all or part of the uvea (the iris, ciliary body, and choroid), can result in blurred vision, pain, and headaches. Episcleritis, as in the case illustrated, results from inflammation of the outermost layers of the eye, often presents as red, burning eyes. In this case, it responded to increased doses of adalimumab given for worsening intestinal and perineal Crohn's disease.

and there is an increased chance of surgical wound dehiscence, especially in the presence of anemia (see Fig. 6.26). Because such efforts are made to mitigate the nutritional sequelae of bowel disease (see chaps. 2 and 7), the author has only seen a handful of patients with skin diseases consequent on nutrient deficiencies. Crohn's disease and its associated surgeries are most likely to result in such deficiencies (see chap. 7). From a dermatological point of view, deficiencies of zinc, essential fatty acids (EFAs), and vitamins A, B2, and K would be most problematic.

Acquired zinc deficiency causes a crusted, erythematous, sometimes blistering rash affecting the skin around orifices, particularly mouth, anus, and genitalia (the term acrodermatitis enteropathica usually refers to the similar zinc deficiency syndrome seen in babies who have hereditary impairment of zinc absorption). Zinc deficiency should be excluded in stoma patients with a peristomal rash where poor nutrition is suspected.

Riboflavin (vitamin B2) deficiency can also result in periorificial dermatitis (Fig. 6.9), with a similar distribution to that of zinc deficiency.

Serum zinc estimations are available in some centers. However, if vitamin or zinc deficiency is suspected, it may be simpler to undertake a therapeutic trial of B vitamins and zinc replacement to see if this can ameliorate the rash.

A rash consisting of dry, scaly follicular papules (phrynoderma or "toad skin") can occur in association with vitamin A deficiency, but is nonspecific and can be seen in patients lacking

Figure 6.9 Riboflavin deficiency. The patient illustrated was receiving total parenteral nutrition following bowel resections for Crohn's disease. There was a sore, weeping erythematous rash around the stoma and around the mouth. Zinc levels were normal and there was no evidence of Candida infection. The rashes resolved after six weeks' treatment with vitamin B compound, two tablets daily.

EFAs, B-complex vitamins, vitamin C, and general malnutrition. EFA deficiency is associated with generally dry skin, diffuse erythema, and flexural or periorificial inflammation similar to that seen with zinc depletion. Lack of the fat-soluble vitamin K will result in clotting disorders, manifesting as easy bruising and purpura.

Pyoderma Gangrenosum

Definition

Pyoderma gangrenosum (PG) is a rare, ulcerative, inflammatory skin disorder which is associated with an inflammatory or proliferative systemic disease in up to 50% of cases (Fig. 6.10). In most patients with peristomal PG, the stoma was formed because of IBD. However, it is important to remember that it can occur in patients who have had a stoma formed because of malignancy, perforated diverticular disease, or chronic fecal or urinary dysfunction. It affects males and females equally.

Etiology

A search of a medical research database such as PubMed (http://www.ncbi.nlm.nih.gov/pubmed/) reveals many case reports of disease associations, novel treatments, etc., but the cause remains unknown. It may be multifactorial and several theories have been put forward, including an exaggerated response to infection and altered immune responses, particularly neutrophil function (1). As with some other skin diseases, new lesions can occur at sites of skin trauma (pathergy). It affects peristomal skin far more commonly than expected from the incidence in the general population. This may be due partly to the association with IBD and partly as a result of the repeated trauma to peristomal skin from everyday appliance use. The predisposing factors or disease associations in our patients are obviously skewed towards IBD, which is seen in 71% of cases; rheumatoid arthritis 4% and hematological proliferative or malignant disease 4%. The remaining 21% had stomas for other reasons, mostly with concurrent intraabdominal inflammation (e.g., perforated diverticular disease). The triggering factors for the development of peristomal PG are essentially traumatic: erosions, traumatic ulcers, infection, and especially pressure from appliances including convexity. PG accounts for 17% of new referrals to our clinics (more than 140 cases to date), but the incidence is diminishing probably because of the use of less and more gentle convexity (see p. 185).

Figure 6.10 Severe ulcerative pyoderma gangrenosum at a typical site in a middle-aged man recently diagnosed with early myeloma, a common association.
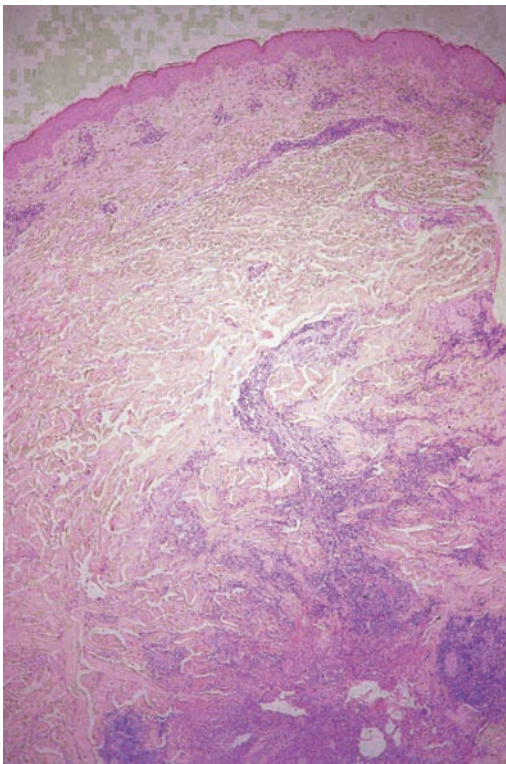
(**A**)
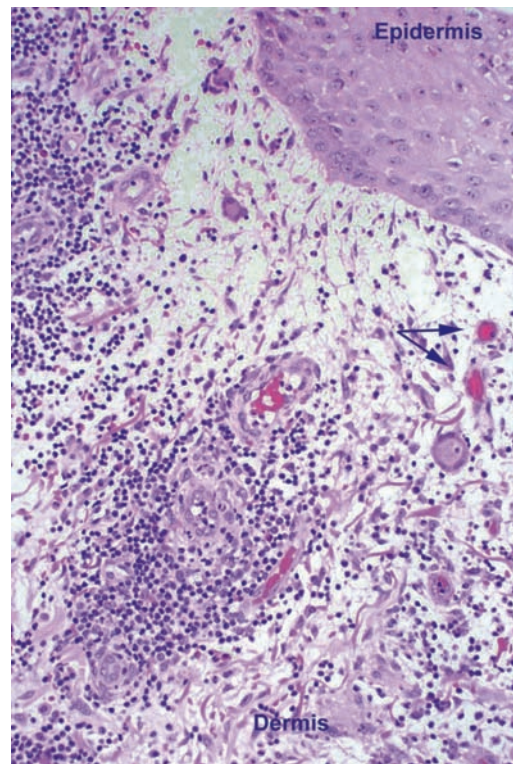
(**B**)

Figure 6.11 (**A**) Pyoderma gangrenosum (PG) showing a mid-dermal neutrophil abscess and scattered perivascular infiltrate in the upper dermis. (**B**) Typical peristomal PG. There is a mixed inflammatory infiltrate which is largely perivascular, granulation tissue formation (arrows), and neutrophils can be seen leaving the blood vessels (center of the field).

Histology

The histological features are nonspecific, although a skin biopsy may be undertaken to exclude other causes of nonhealing peristomal ulceration, particularly malignancy or infection. Features consistent with a diagnosis of PG are a dense, dermal inflammatory infiltrate with neutrophil abscess formation, necrosis and vasculitis secondary to the inflammation (Fig. 6.11A). Only 2 of our 34 patients with peristomal PG had these findings on biopsy. All the others have

shown a largely perivascular, mixed inflammatory infiltrate with granulation tissue formation (Fig. 6.11B).

Clinical Features

PG most commonly affects the legs, buttocks, and abdominal skin. Peristomal skin appears to be uniquely predisposed and the majority of stoma patients affected do not have PG elsewhere. This includes those patients in whom PG is idiopathic or associated with diseases other than IBD, such as rheumatoid arthritis. A careful history and examination should, therefore, be undertaken to look for underlying associated diseases.

The typical lesion begins as a painful papule, pustule, or nodule, which rapidly ulcerates (Fig. 6.12). Early peristomal lesions may appear less prominent, perhaps because of the occlusion under a stoma bag (Fig. 6.13). The established lesion is an ulcer that is usually very painful

(A)

(B)
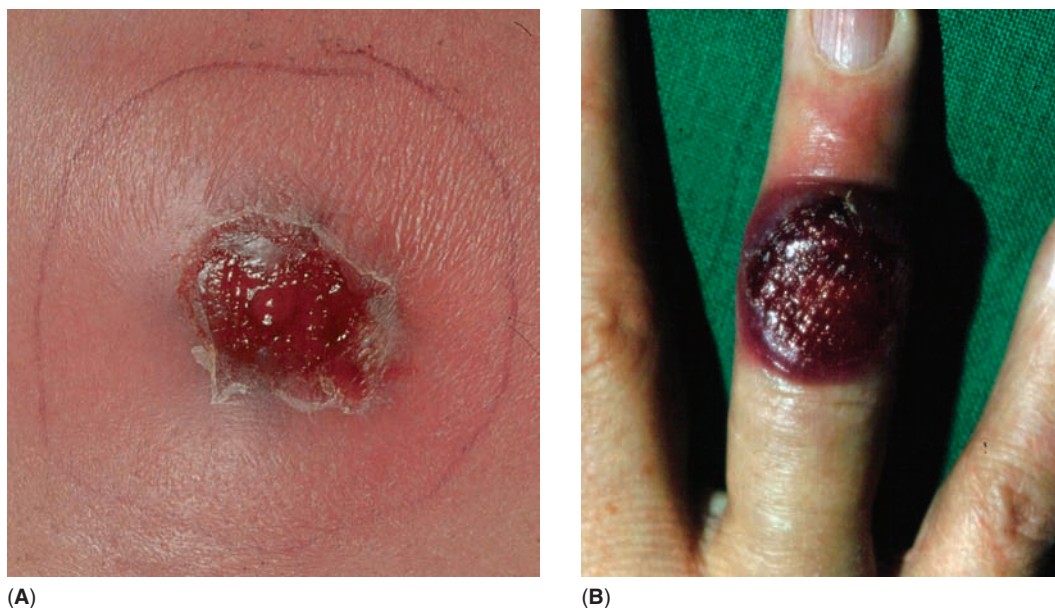
Figure 6.12 (**A**) An early lesion of pyoderma gangrenosum. This pustule has begun to ulcerate centrally. The bluish tinge to the surrounding skin is typical. (**B**) More inflamed ulcerating papule on a finger; an unusual site.

Figure 6.13 Pyoderma gangrenosum in a young man with colitis. There is one intact bluish pustule, the other has already ulcerated. Intact pustules are rare near stomas because stoma bag changes deroof them.
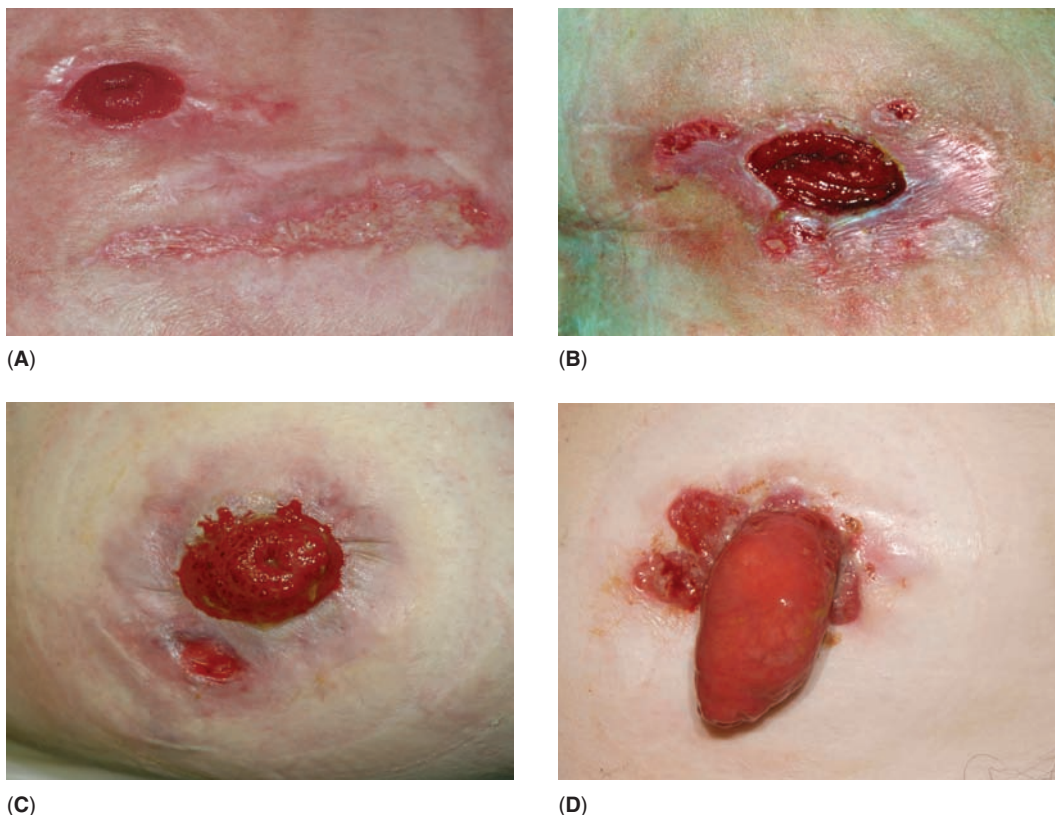
Figure 6.14 (**A**) Superficial pyoderma gangrenosum (PG) near an ileostomy in a patient with ulcerative colitis and CREST (calcinosis, Raynaud's phenomenon, esophageal dysfunction, sclerodactyly, and telangiectasia) syndrome. The irregular bluish edge and sloughing base are common features. (**B**) Recurrent PG in a patient with ulcerative colitis. Note that these ulcers are developing in the scar from previous PG. (**C**) Small PG ulcer in a Crohn's patient. A biopsy showed giant cell granulomas, but this was a foreign body reaction not cutaneous Crohn's disease, compare with Fig. 6.18. (**D**) Superficial PG. This patient developed PG in an area of healed Crohn's disease near the ileostomy. PG is triggered by skin injury including other inflammatory or infective skin disorders.

and almost always interferes with the normal use of a stoma bag. In common with PG elsewhere, there are superficial (Fig. 6.14) and deeper forms (Fig. 6.15). The ulcer edges are bluish and undermined, often with a ragged appearance (Figs. 6.14–6.20). More extensive circumferential ulceration is sometimes seen (Fig. 6.21). There is usually a rim of erythema around the ulcer and the skin is firm to the touch because of the associated inflammatory edema. Patients who use a convex appliance or who have a parastomal hernia are particularly predisposed to PG because of the resulting skin trauma (Figs. 6.22 and 6.23). The skin pressure and tension resulting from a hernia can result in simple traumatic ulceration rather than PG. The history, appearance, and response to treatment help to distinguish it from PG (Figs. 6.24–6.26).

PG may appear in old surgical scars (Figs. 6.27–6.29). The radial suture scars produced when the stoma is formed or refashioned appear to be common sites (Fig. 6.30). It is important to remember that while peristomal PG is more common than expected from the incidence of PG in the whole population, ulceration around stomas is still more likely due to something else, usually trauma or infection (2). Obviously, in predisposed individuals, these traumatic ulcerations can develop into PG (Fig. 6.29) and occasionally do because of the pathergy phenomenon. It is also important to be vigilant for infection complicating PG, which is after all an open wound at a dirty site (Fig. 6.31). It is surprising how few significant bacterial infections we see around stomas given the occlusion, presence of fecal material as well as the fact that many patients will have received immunosuppressive medications that can predispose to infection.

(A)

(B)

(C)

(D)

(E)

Figure 6.15 (**A**) Peristomal pyoderma gangrenosum (PG) in a patient with Crohn's disease. The bluish edge is irregular and deeply undermined to leave a strand of persistent epidermis over the ulcer. The ulcer is deep and purulent. (**B**) Deep PG surrounding a urostomy in a patient with polyarteritis. The necrotic ulceration extends beyond the stoma and has caused necrosis of the penis. (**C**) Deep and extensive PG. This required systemic therapy with ciclosporin. Note the large stria on the right side that has resulted from previous steroid therapy for colitis. (**D**) Extensive PG in a Crohn's. This did not respond to topicals or systemic ciclosporin and this was our first patient to receive infliximab, which cleared it rapidly. (**E**) PG in a 10-year-old boy with severe Crohn's disease. The edge shows typical features.
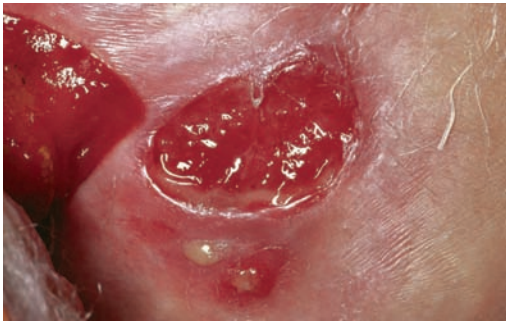
(A)   (B)

Figure 6.16 (**A**) In this patient, with an ileostomy for Crohn's disease, new ulceration is beginning below an existing ulcer and purulent material can be seen oozing from it. (**B**) Four weeks later, the upper ulcer is healing but below it ulceration is still active with a ragged edge and strands of epidermis persisting over the base.

(A)   (B)

Figure 6.17 (**A**) This is the patient illustrated in Figure 6.15B four months later. The bluish edge is well demonstrated and (**B**) on close-up, the undermined, ragged edge can be seen. Re-epithelialization of the ulcer base is evident between the strands of persisting epidermis.

Figure 6.18 Overhanging, bluish edge surrounds a pyoderma gangrenosum ulcer in a patient with Crohn's disease.
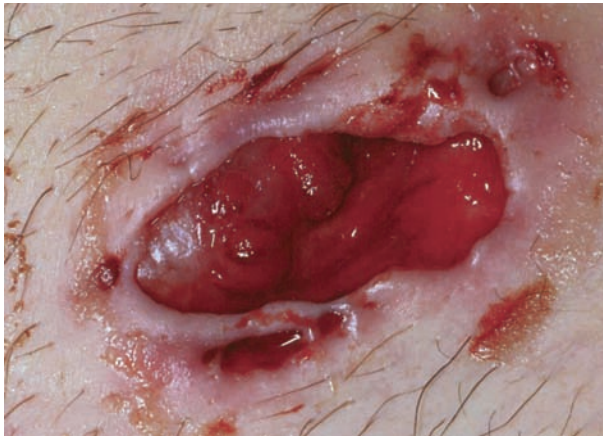
Figure 6.19   The entire circumference of this mucous fistula is affected by pyoderma gangrenosum inflammation. The ragged, bluish, ulcerating edge is well seen. The patient has ulcerative colitis.
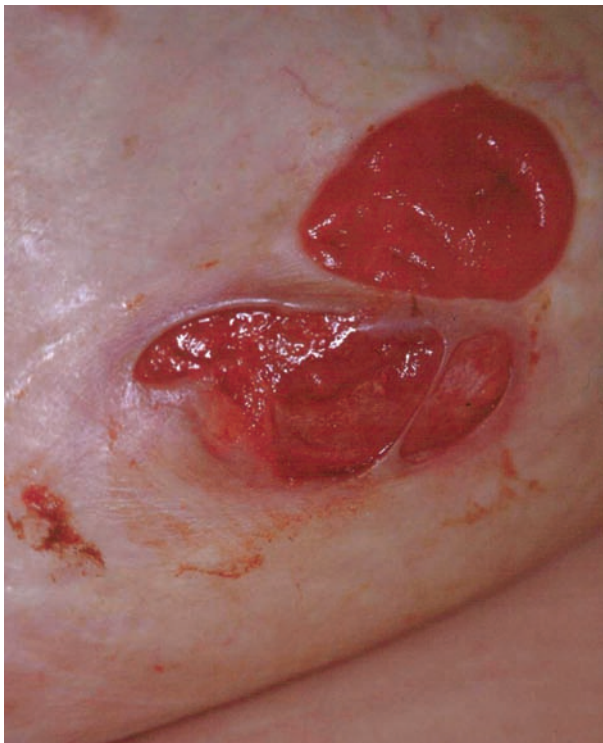
Figure 6.20   Typical pyoderma gangrenosum adjacent to a colostomy in a patient with diverticular disease and rheumatoid arthritis.

One also has to be cautious with potentially immunosuppressive medications for PG that might predispose to infections. We have seen two cases who developed synergic gangrene in treated PG ulcers; both required surgical debridement (chap. 4). PG can present with systemic symptoms, usually fever and malaise, which makes ruling out infection all the more difficult, particularly if there is erythema around the ulcer, and infection should be ruled out by appropriate investigation. Other systemic manifestations are beyond the scope of this book and are very rare (we have seen 2 in 10 years); briefly, it can cause bone inflammation that mimics infective osteomyelitis and pulmonary lesions that mimic tuberculous disease (3).

  PG usually heals with irregular scarring, sometimes described as cribriform (Figs. 6.30–6.34). This produces an uneven surface that may interfere with bag adhesion.

(A)

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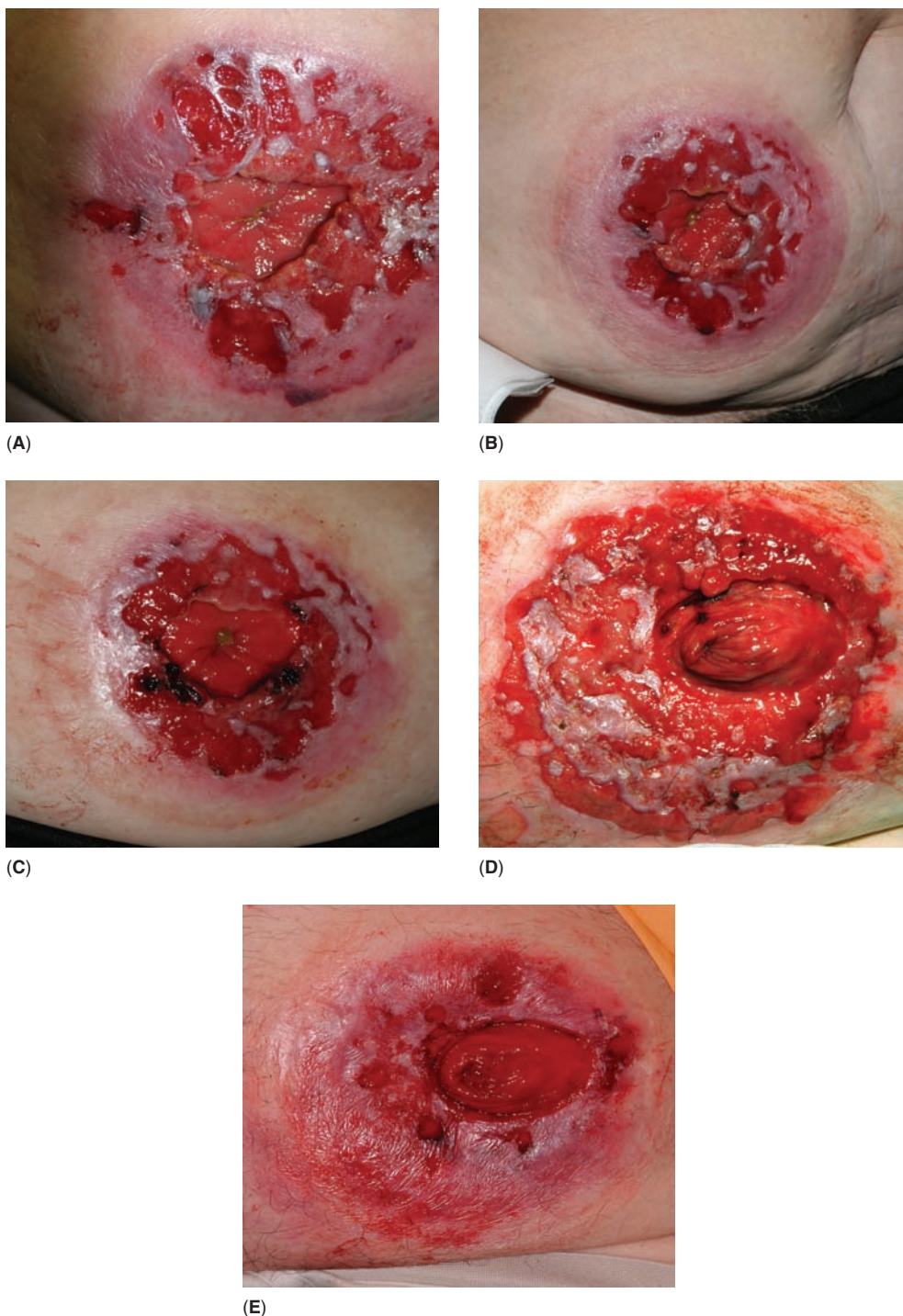
Figure 6.21 (**A**) Extensive ulcerating pyoderma gangrenosum (PG). (**B**) This patient developed inflammatory polyps (see section "Granulomas," chap. 3) around the stoma that (**C**) required excision and cautery to allow proper bag fitting. The trauma of surgery delayed healing of the PG. This was achieved with topical therapy but both the "granulomas" and the PG have been recurrent. (**D**) Similar ulceration around a colostomy; histology of the affected area showed granuloma formation (see appendix 1 "Glossary") with foreign body giant cells, which appeared to be in response to particles of carboxymethylcellulose powder (Orahesive). (**E**) It responded to sucralfate powder and corticosteroid lotion.

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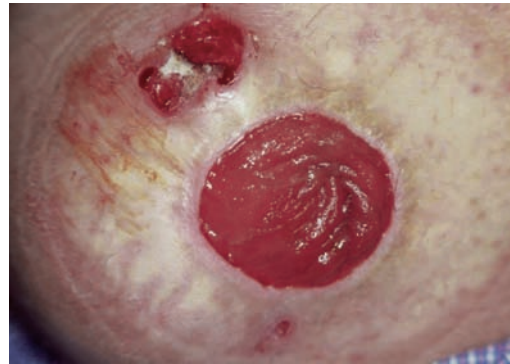
(B)

(C)

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(E)

Figure 6.22 (**A**) This patient with ulcerative colitis has pyoderma gangrenosum (PG) adjacent to the ileostomy. This has occurred at the site of greatest pressure from a convex appliance that the patient uses because of a short stoma and a prominent parastomal hernia. (**B**) Two areas of PG around a colostomy in a patient with colonic carcinoma in remission. (**C**) These probably result from skin trauma occurring because of a very large parastomal hernia for which the patient wears a support. (**D**) This patient with ulcerative colitis was pregnant and had a hernia when PG developed. Fortunately, this responded to topical corticosteroid. Note the irregular scarring that often results as PG heals. (**E**) This Crohn's disease patient has a large parastomal hernia for which she wears a support belt. Typical PG ulcers have appeared at the sites where the belt attaches to the bags and results in pressure on the skin.

(A)

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(C)
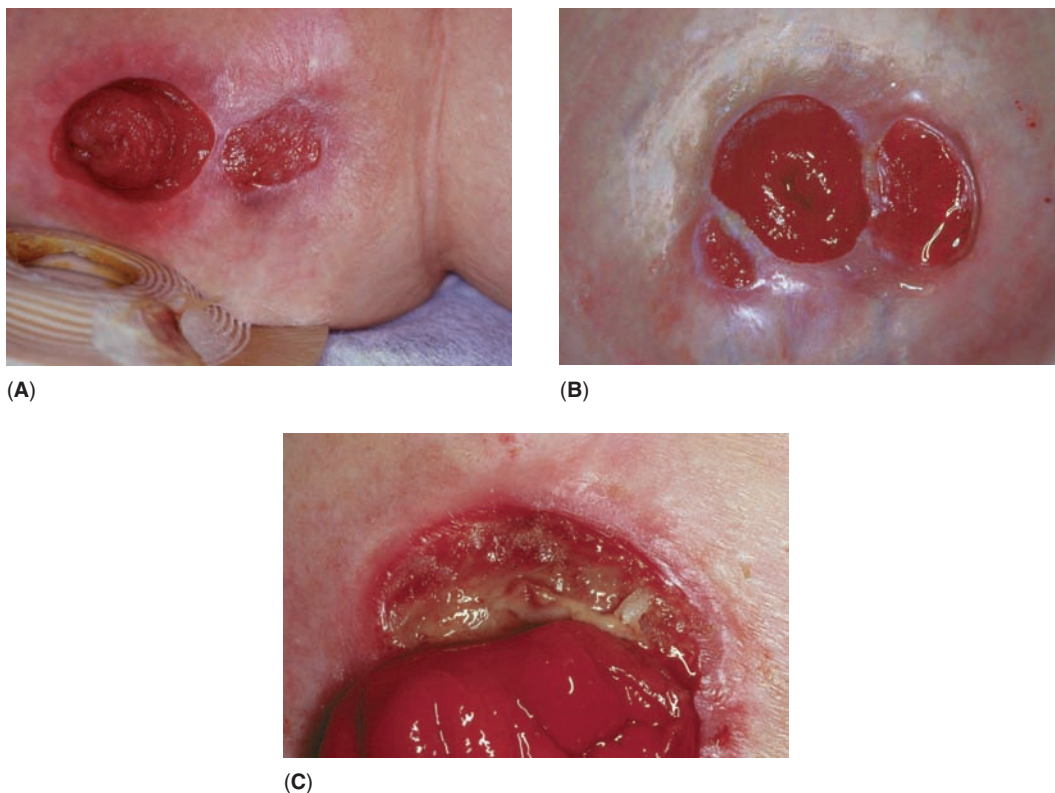
Figure 6.23 (**A–C**) Peristomal pyoderma gangrenosum in three patients with inflammatory bowel disease. In each case, the patient used a convex appliance (**A**) and the ulcers occurred in the region where the appliance exerts the greatest pressure on the skin.

(A)

(B)
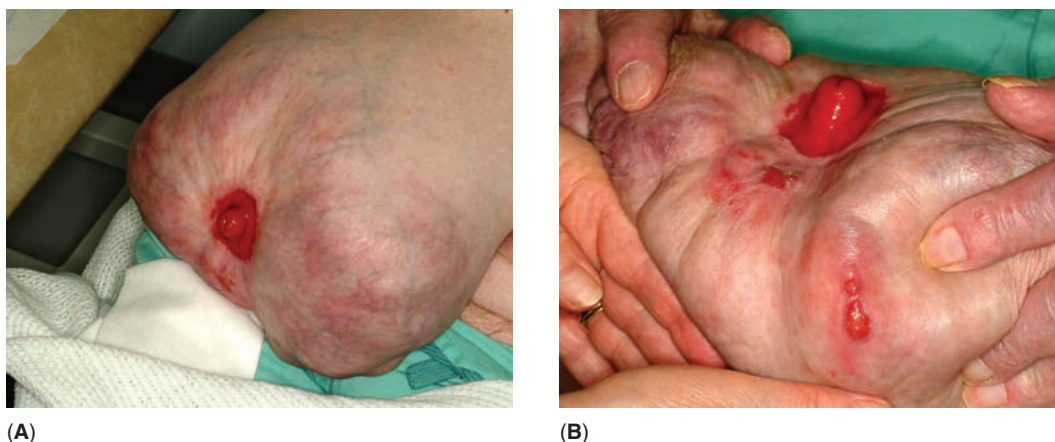
Figure 6.24 (**A** and **B**) This patient has a massive hernia associated with the ileostomy. The resulting stretching and relaxation of the patient's peristomal skin frequently cause skin tears especially around the edge of the appliance's adhesive barrier. These can progress to shallow ulcers as shown, which heal rapidly without treatment, unlike pyoderma gangrenosum.
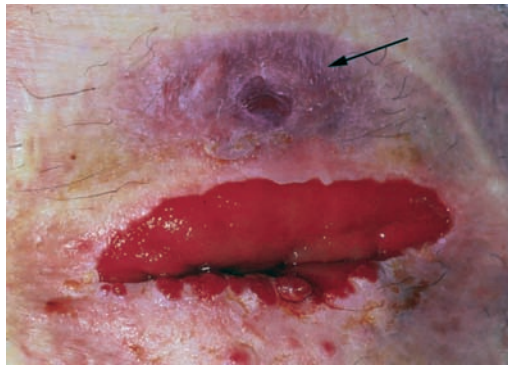
(A)   **(B)**

Figure 6.25   (**A**) This patient with colitis developed an ulcer above his stoma. The ulcer healed rapidly and spontaneously (arrow) after he began to wear braces and was able to wear his trouser belt more loosely. (**B**) The belt, when worn tight, had caused the problem. The stoma itself is short and buried and this has resulted in inflammation. These types of skin reaction are discussed in chapter 3.

Figure 6.26   It may be very difficult to differentiate pyoderma gangrenosum (PG) from other causes of ulceration. The patient illustrated has a colostomy for diverticular disease. The patient developed wound dehiscence soon after surgery and the illustration shows the slowly healing wound at three months. The appearance of the ulceration to one side of the stoma is suggestive of PG because of the raised bluish edge and separate small area of ulceration. However, a biopsy showed only scar formation with minimal inflammation, consistent with healing dehiscence. The slow healing in this case may have been the result of severe perioperative weight loss.

Figure 6.27 The patient illustrated had severe peristomal pyoderma gangrenosum (PG) affecting an ileostomy on the right abdomen, for which the stoma was closed and re-sited on the left. The patient developed PG around the new ileostomy on the left abdomen one year later. The picture shows PG appearing in the surgical scar on the right abdomen concurrently with peristomal PG on the left.

Figure 6.28 Pyoderma gangrenosum appearing in one of the recently healed radial suture scars around a mucous fistula in a patient with colitis.

Figure 6.29 This young man with colitis developed pyoderma gangrenosum (PG) in his recent surgical scar and mucocutaneous separation at his ileostomy, which then progressed into PG as well.

(A)   (B)

Figure 6.30   (**A**) This young woman with Crohn's disease has pyoderma gangrenosum in each of three suture scars around her ileostomy. She also has a long-standing parastomal hernia. (**B**) The lesions were treated with systemic steroids (prednisolone 60 mg, reducing to 0 mg daily over 5 weeks) plus topical steroid betamethasone valerate lotion once daily (appendix 4). They healed with significant contracted scarring.

(A)   (B)

Figure 6.31   (**A**) Extensive pyoderma gangrenosum (PG) in a patient with diverticular disease. This is complicated by bacterial cellulitis that required systemic antibiotic therapy. For that reason, the patient was treated for PG only with topical corticosteroid in carmellose sodium paste (see p. xii) rather than potentially immunosuppressive systemic therapy. (**B**) The PG has healed with irregular cribriform scarring that resulted in some dangling strands of skin that were removed under local anesthetic by simply snipping them off.

While most patients with peristomal PG have localized disease, occasionally lesions are multiple and other areas of skin are involved (Fig. 6.35).

Between one-third and one-half of patients will experience recurrent peristomal PG, particularly if there is recurrent skin trauma as illustrated in Fig. 6.22. There is a greater likelihood of PG if there is active sepsis elsewhere, such as pelvic abscess or fistulae (Fig. 6.33). In such situations, recurrent lesions appear to be more likely. Unfortunately, while many cases of PG improve when diseased or infected bowel elsewhere is removed, many others do not.

Management

Occasionally, PG can be misdiagnosed clinically as malignancy or infection. We have seen several such patients in whom inappropriate surgical resection of the ulceration has resulted in PG in the surgical scar (Fig. 6.27) and at the newly re-sited ileostomy (4). If PG is suspected, a dermatological opinion is recommended. On the other hand, surgery is indicated in some

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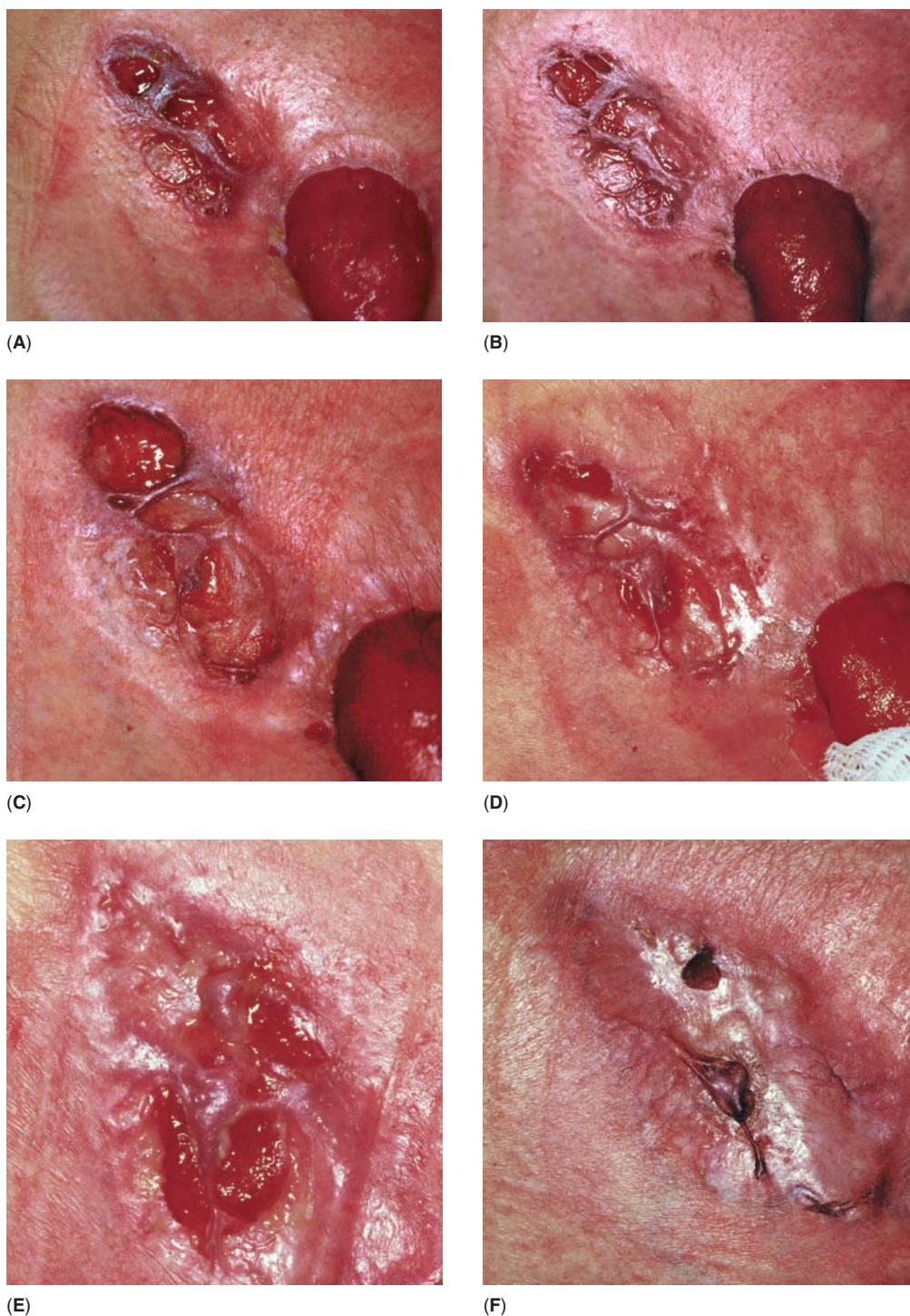
Figure 6.32 (**A**) Typical pyoderma gangrenosum near an ileostomy in a patient with Crohn's disease. (**B**) The lesion did not improve after three weeks of systemic and topical steroid treatment (prednisolone 60–100 mg/day). (**C**) Ciclosporin (5 mg/kg/day) for three months produced a moderate improvement only. (**D**) The lesion was treated with topical tacrolimus [0.3% in corticosteroid in carmellose sodium paste (see p. xii)] and substantial improvement was evident after one week and (**E**) after three weeks of treatment. (**F**) After four weeks of treatment, the ulceration had healed. A depressed scar remains with some thicker cords overlying it. These represent some of the persisting epidermal strands seen in (**A**).

(A)

(B)

(C)

(D)

(E)

(F)

Figure 6.33 (**A**) Pyoderma gangrenosum (PG) near an ileostomy in a young man with Crohn's disease. (**B**) The lesion did not respond to steroids and the patient could not tolerate ciclosporin. The lesion healed completely after six weeks treatment with dapsone (50 mg twice daily). (**C**) PG recurred six months later within the scar. The patient had ongoing sepsis with a long-standing ischiorectal abscess and sinus tract formation. (**D**) The lesion was treated with topical tacrolimus [0.3% in corticosteroid in carmellose sodium paste (see p. xii)] and substantial improvement was evident after one week. (**E**) He developed a tiny PG ulcer at the root of the penis, which was treated in the same way and healed rapidly. (**F**) Peristomal PG has healed after four weeks of treatment to leave an area of depressed scarring.

patients with recurrent lesions at sites of repeated trauma, for example, to correct a parastomal hernia or to refashion a short stoma so that non-convex appliances can be used. In these situations, surgery may be highly effective in preventing recurrences of PG. There is no diagnostic test that will confirm or rule out a diagnosis of PG. While the clinical features are striking and typical, they are not exclusive to PG and other diagnoses need to be considered, for example,

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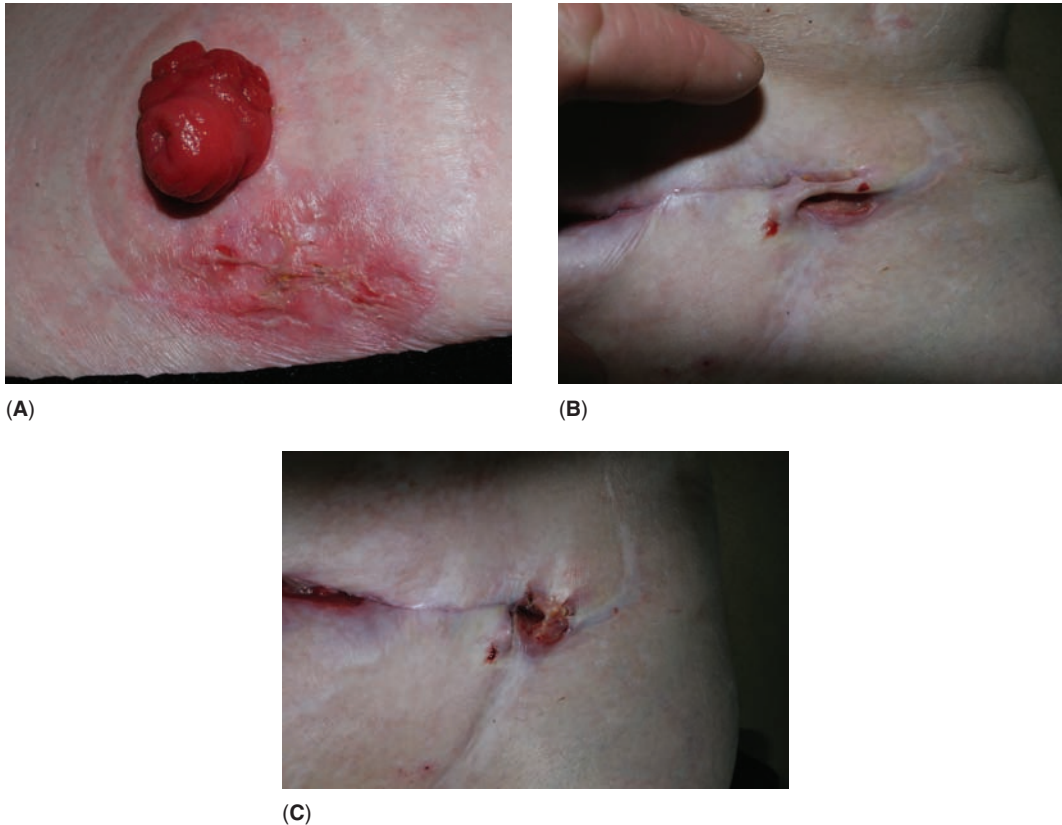
Figure 6.34 (**A**) Cribriform scarring after pyoderma gangrenosum (PG) in a young woman with ulcerative colitis. (**B**) The strands of skin that make up the criss-cross or cribriform pattern sometimes epithelialize all round and remain attached at each end. (**C**) In such cases, it is best to remove them, even with the risk of triggering further PG, because they rub the skin beneath, resulting in maceration and a greater potential for PG. This is easily done under local anesthetic.
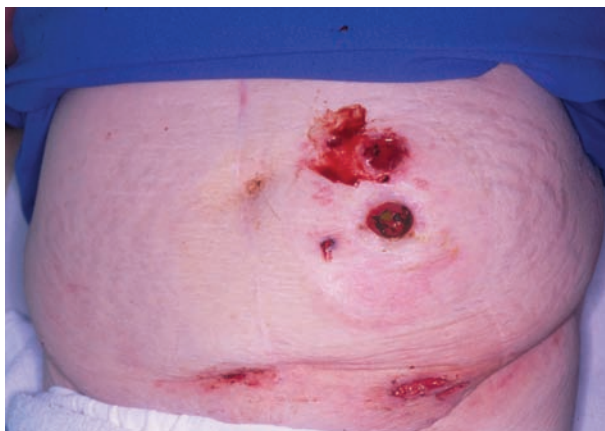
Figure 6.35 Pyoderma gangrenosum in an elderly woman with a colostomy for perforated diverticular disease. She has several areas both near and distant to the stoma. This required a brief course of ciclosporin combined with topical therapy to clear the lesions. Note the new hemorrhagic papule medial to the stoma.

Crohn's disease and hidradenitis suppurativa (see chap. 5). It is particularly important to rule out infective (Fig. 6.36), malignant, or inflammatory causes (Table 6.1). An ulcer edge biopsy is usually recommended. However, surgical incisions may make the ulcer enlarge due to the pathergy phenomenon, and some clinicians would omit the biopsy unless the lesions failed to respond to treatment. All PG ulcers should be swabbed to look for secondary infection and in

Figure 6.36   An ulcer associated with Pseudomonas infection that responded to specific antibacterials. The patient had been referred as suspected pyoderma gangrenosum, which it was not.

Table 6.1   Routine Screening Investigations of Patients with Peristomal Ulceration

Investigation	Indication
Inflammatory markers: C-reactive protein, erythrocyte sedimentation rate and orosomucoids	To check for active bowel/systemic inflammation
Chest radiograph	To exclude latent tubercular infection prior to any immunosuppresive therapy
	To look for pulmonary PG and lesions suggestive of Wegener's granulomatosis which can mimic PG
Fluorescent treponemal antibody Treponema pallidum hemagglutination test	To exclude syphilitic ulceration
Anti-neutrophil cytoplasmic antibody	To look for Wegener's granulomatosis and other causes of vasculitis which can result in ulceration similar to PG
Anti-phospholipid antibody and coagulation screen	To exclude hypercoagulability as a cause of ulceration
Rheumatoid factor	Connective tissue disease may be associated with PG
Antinuclear factor and complement screen	
Ulcer edge biopsy	To exclude primary or metastatic malignancy as a cause of ulceration
Full blood count, serum and urine electrophoresis	Myeloproliferative disease, leukemias and benign monoclonal gammopathy associated with PG
Microbiological examination of ulcer swab and biopsy	Microbial causes of ulceration, in particular synergistic gangrene and deep fungal infection

Abbreviation: PG, pyoderma gangrenosum.

order to rule out primary infection as a cause of ulceration. In resistant or atypical cases, a biopsy specimen should also be sent for microbiological examination.

Each patient should be examined and investigated for the presence of any focus of sepsis or active IBD. Screening investigations that are undertaken to exclude treatable underlying diseases, which may be associated with PG as well as other causes of nonhealing ulceration, are listed in Table 6.1. The presence of PG in an IBD patient does not necessarily mean that they have active bowel disease at the time, although a recent study has suggested that it may be so in up to 69% of cases (5).

The first step in management should be to identify and minimize or avoid exposure to any triggering factors for PG, particularly trauma from clothing or appliances and excessive bag changes or rough cleaning of the stoma as is sometime observed (Fig. 6.18A). As mentioned above, convex appliances are an important cause; therefore, the softest, shallowest convexity that is appropriate should be used and convexity is avoided if possible. In our population of all stoma patients in 2002, 14% were using convexed appliances compared with 36% of those with

peristomal PG and 74% of recurrent cases of PG. Many patients with small or superficial PG will respond to topical steroid therapy (appendix 4) alone or combined with systemic steroid therapy (typically prednisolone as a reducing dose from 1 mg/kg/day). Haelan™ tape (appendix 4) is particularly useful either alone or to cover an ulcer to which tacrolimus has been applied (see below).

Of those who do not respond to steroids, 60% heal rapidly using topical tacrolimus [0.3% in corticosteroid in carmellose sodium paste (see p. xii)]. A further 30% will have a moderate improvement (6). While it remains unlicensed, it is available ready compounded from manufacturing pharmacies in the United Kingdom. Corticosteroid in carmellose sodium paste (see p. xii) is used because it does not interfere with stoma bag adhesion. Treatment is applied once daily for four weeks or longer. Improvement is usually evident within the first two weeks (Figs. 6.32 and 6.33). Tacrolimus is effective even for very large lesions, and it is our treatment of choice for a patient with severe involvement but who is unable to take systemic corticosteroids or ciclosporin (see chap. 2). Systemic absorption should be considered, particularly with large areas of ulceration. However, none of the 15 patients we initially treated had any detectable absorption of tacrolimus. Patients occasionally report stinging and burning with topical tacrolimus, but the main problem is that it causes overgranulation as it heals (Fig. 6.37). This is presumably because it heals up very quickly. The overgranulation responds to topical steroids, and Haelan tape is very useful as it can be used in conjunction with tacrolimus to hopefully prevent the problem occurring (appendix 4). If the affected area is small and can be covered with Haelan tape without

(A)

(B)

(C)

Figure 6.37   (**A**) Pyoderma gangrenosum (PG) affecting an ileostomy in an elderly man with colitis. (**B**) After one month of using topical tacrolimus, the PG has healed but the sites are overgranulated. (**C**) After a further month of using Haelan tape, this has largely resolved with some remaining areas that have epithelialized.

affecting bag adhesion, it is worth trying the proprietary Tacrolimus ointment 0.1% (Protopic™) instead as it is a little more effective than the paste.

Some patients require systemic therapies other than prednisolone to achieve healing. Several treatments have been described as effective, including ciclosporin, dapsone, clofazimine, mycophenolate mofetil (7), minocycline, and tacrolimus. In our experience, ciclosporin is the most effective. It is used in the dose range of 3.5 to 5 mg/kg/day for up to three months. Ciclosporin has significant side effects, including hypertension and derangement of renal function, which require regular monitoring. A dermatologist, experienced in its use, should supervise treatment. Dapsone (100–150 mg daily) is an alternative systemic treatment for patients who cannot tolerate ciclosporin (Fig. 6.32). Dapsone has significant hematological side effects, which require regular monitoring, and a dermatologist experienced in its use should supervise treatment. We have not found minocycline to be of additional benefit in the treatment of peristomal PG.

Intralesional steroid injections (triamcinolone 20–40 mg) can occasionally cause significant deterioration of PG ulceration in some cases, probably as a result of the pathergy phenomenon secondary to the trauma of injection and we tend to avoid this modality.

The greatest advance in the last 10 years has been the introduction of the biological therapies, particularly infliximab (5,8) and adalimumab (9). Both are licensed for the management of IBD and are very effective in the management of severe PG resistant to other therapies. Both act by inhibiting the activity of the proinflammatory cytokine tumor necrosis factor alpha. They are monoclonal antibodies that are given by injection. Infliximab is partly mouse protein (chimeric monoclonal antibody) and as such is associated with a risk of anaphylactic reactions. It, therefore, must be administered in hospital under close supervision. Adalimumab is fully "humanized" and can be administered by the patient as a subcutaneous injection every two weeks.

Patients with very large PG ulcers, particularly those that completely surround the stoma, can present severe problems for stoma bag adhesion and the application of topical treatment. Management strategies designed to circumvent these problems are discussed in chapter 2.

IATROGENIC DISEASE OF THE SKIN

Surgical complications and their sequelae are discussed in chapter 1.

Drug-Related Skin Problems

Patients with drug reactions represent one of the most common referrals to dermatologists from other hospital specialists. Almost all drugs can cause a skin reaction, including drugs used to treat bowel disorders that are relevant to stoma patients, everything from steroids to chemotherapeutic agents. The reasons why one agent will produce a rash in one individual out of many thousands treated are usually not known. Although some reactions are predictable from knowledge of the pharmacological actions of the drug, the majority are idiopathic hypersensitivity rashes. Several patterns of drug rash are recognized (Table 6.2). Most types cause generalized skin problems so that this is not primarily a peristomal diagnosis. Dermatological expertise is frequently required for diagnosis and management as occasionally very severe, even life threatening, reactions can occur. Table 6.2 lists the reactions of particular relevance to stoma patients. This table is not intended to be comprehensive. Many other drugs, some widely used, cause reactions. If a drug rash is suspected, a dermatological opinion is recommended. One drug that has emerged as a cause of significant morbidity is nicorandil. This may cause problems coincidentally if an ostomate starts using it (also discussed in chap. 5), but its adverse effects can be the reason for stoma surgery. Nicorandil is a drug used in angina that causes vasodilation via a nitrate action and by potassium channel activation. It is known to cause mouth ulcers but an astute clinical observation linked the drug to anal pain and ulceration (10). Many patients have undergone defunctioning colostomies for anal ulceration prior to this drug side effect being highlighted (Fig. 6.38). It also causes peristomal ulcers and ulcers have been seen at many other body sites, often associated with trauma, for example, one of my patients had an ulcer on an amputation stump. It is even associated with bowel ulceration and perforation (Fig. 6.38) and we suspect that it may even be responsible for internal fistulae (e.g., rectovaginal) (11). Stopping the drug usually results in prompt resolution, although the perianal ulcers can

Table 6.2 Some Drug Reaction Patterns that May Affect Stoma Patients

Skin reaction pattern	Description	Drugs implicated
Toxic erythema	Generalized erythematous macular and papular rash.	Antibiotics, particularly penicillin Omeprazole Antineoplastic chemotherapy (Fig. 6.41)
Purpura	Purple discoloration in the skin, which does not blanche on pressure.	Steroids via capillary fragility (Fig. 6.42) Antineoplastic chemotherapy via depression of platelet count Some drugs cause a purpuric vasculitis but this usually affects the extremities
Erythema multiforme (Fig. 6.43)	Target-like lesions on the extremities. May become generalized, periorificial, and blistering. The eponym Stevens–Johnson syndrome refers to this generalized, severe form.	Omeprazole Antineoplastic chemotherapy Penicillin
Toxic epidermal necrolysis	Generalized erythema where the necrotic epidermis peels away in sheets. Often periorificial.	Omeprazole Antineoplastic chemotherapy (Fig. 6.44) Sulfasalazine Aminopenicillins (e.g., amoxilicillin)
Fixed drug eruption	Erythema, purpura, or blistering occurring at the same localized site each time the drug is taken.	Paracetamol Benzodiazepines

(A)

(B)

(C)

(D)

Figure 6.38 (**A**) This patient with angina was receiving nicorandil 20 mg twice daily when she suffered severe perianal ulceration in 2003. It was to be almost a further two years before nicorandil induced anal ulcers were highlighted and so this was not suspected. The ulceration failed to respond to topical therapies and the patient underwent a defunctioning colostomy (**B**) which also developed bland looking but painful ulceration. At referral to dermatology, mouth ulcers were also noted. (**C**) The patient failed to respond to topical treatments and oral steroids were given. Although the patient felt better in herself, the ulcers did not respond. The patient suffered small bowel perforation, which has also been described with nicorandil, and the patient died six weeks later. (**D**) Similar ulcers in a woman with a long-standing stoma who had started the higher dose nicorandil some six months earlier.

(A)   (B)

Figure 6.39 (**A**) This patient with colitis received high-dose corticosteroids prior to stoma surgery. This has resulted in weight gain and striae (stretch marks) because it makes the elastic structure of the skin more fragile. Similar less severe changes can be seen on the back of normal adolescents during a large growth spurt. (**B**) The patient also has the typical steroid "moon face."

be difficult to heal. The drug can usually be replaced with another nitrate, but it is important to discuss with the patient's cardiologist before altering any medication.

Corticosteroids, either topically or systemically, can result in skin problems (Figs. 6.39 and 6.40). It is important that patients are aware of the limits of their use, particularly for topical steroids (appendix 4). Antineoplastic chemotherapy agents can impair open or incised wound healing, particularly methotrexate, cyclophosphamide, and doxorubicin (12). Systemic steroids will also delay wound healing. For these reasons, surgery is usually avoided immediately after chemotherapy and subsequent chemotherapy is delayed until at least two weeks after surgery (see Fig. 6.45). The impairment of wound healing is enhanced if the patient has also suffered significant weight loss. Ideally, the nutritional status of the patient is addressed prior to surgery, although in practice this may not be possible. Perhaps because of such preventive measures, we have seen very few peristomal skin problems directly relating to chemotherapy in our clinic. Chemotherapeutic agents used in bowel carcinoma can cause acne like folliculitis and a neutrophilic hidradenitis as well as the toxic erythemas (Table 6.2). Mucocutaneous separation (see chap. 2) can also occur even with the precautions above. The other side effects of chemotherapy may, indirectly, result in peristomal skin disease (13,14). These include vomiting leading to stoma prolapse, diarrhea resulting in irritant dermatitis, and bone marrow suppression leading to bleeding and purpura (Table 6.2). Bone marrow suppression resulting in leucopenia increases an individual's susceptibility to infection. Topical or systemic steroids also tend to increase the likelihood of cutaneous or other infections. These are discussed in chapter 4 "Infections."

Figure 6.40 This woman was given topical steroid lotion for psoriasis. Against written and verbal advice, she applied it daily for three years getting repeat prescriptions form her doctor. When she eventually came back to us, she had permanent skin atrophy manifesting as a stretch mark.

(A)

(B)

Figure 6.41 (**A**) Toxic, macular and papular erythema secondary to benzylpenicillin. (**B**) Erythematous reaction to amoxicillin in a baby. There are urticarial features in some areas with raised plaques. This is a common feature.
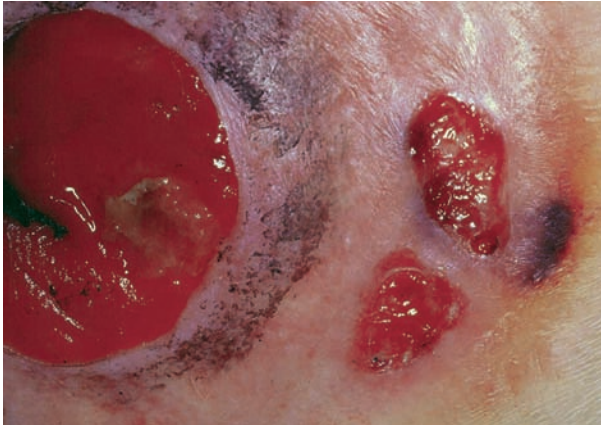
Figure 6.42 Steroid-related purpura in an elderly colostomy patient with traumatic erosions.

(A)

(C)

(D)

(B)

Figure 6.43 (**A**) Stevens–Johnson syndrome secondary to paracetamol. This picture shows early mouth ulceration and desquamation of the lips. (**B** and **C**) These two pictures show bullous erythema multiforme related to antibiotic therapy in two different patients. As (**C**) indicates, the reaction may be hemorrhagic with marked necrosis. (**D**) This shows the typical target-like lesions of erythema multiforme.

(A) (B)

Figure 6.44 (**A**) Toxic epidermal necrolysis in a patient receiving antineoplastic chemotherapy for lymphoma. The epidermis has peeled away, after only mild rubbing of the skin, to leave an erosion (Nikolsky's sign). (**B**) There is generalized desquamation of the skin, erosions on the neck, and ulceration around the eyes, typical of this condition.

Figure 6.45 Wound dehiscence following radiotherapy and chemotherapy.

Radiotherapy-Related Skin Problems

Radiotherapy may be employed as a palliative measure to reduce tumor bulk or as an adjuvant to stoma surgery, with the aim of long-term remission. Radiotherapy is targeted to the tumor site and frequently to any draining lymph nodes, which, for most tumors requiring stoma formation, will be pelvic and para-aortic. The radiotherapy regimen is designed to deliver the maximum energy to these deep structures, thereby sparing the skin. This may be achieved by implants of radioactive elements or by targeted external beam therapy delivered in several fractions over a period of weeks. Despite these measures, it can be associated with skin problems, although for the majority of stoma patients the treatment area can be sited away from the peristomal skin so that any skin problems will not interfere with appliance use. The reactions seen include an

Figure 6.46 Chronic skin damage on the chest secondary to radiotherapy for bronchial carcinoma. The skin is atrophic (thinned) and telangiectasias are prominent.

acute dermatitis with subsequent desquamation, analogous to sunburn. With higher levels of exposure, the skin may blister to leave eroded areas. This responds to short-term treatment with a moderate-strength topical steroid (appendix 4). The chronic skin changes following radiation damage of the skin include atrophy and telangiectasia (Fig. 6.46). Patients receiving radiotherapy are told to avoid all topical applications containing metallic elements such as zinc or bismuth, because these absorb radiation in the skin and lead to secondary radiation, which effectively increases the skin dose. Radiation damage to the stoma itself is prevented by protection with a lead shield during treatment. As with chemotherapy, the nausea, vomiting, or diarrhea can indirectly cause peristomal skin problems.

KEY MESSAGES

Skin Disorders Directly Related to the Primary Disease

- Metastatic malignancy should be considered in any patient who presents with atypical papular lesions around a stoma, particularly emerging from the mucocutaneous junction.
- Crohn's disease can cause ulceration on the outer surface of a stoma and skin, peristomal fistulae or papular Crohn's disease of peristomal skin.
- Biologic therapies are new and effective treatments.

Skin Disorders Indirectly Related to the Primary Disease.

- Poor nutrition can result in:
  - Rashes around the stoma and other body orifices.
  - Poor wound healing.
- PG is far more common than expected around stomas.
  - It can occur in diseases other than Crohn's or colitis.
  - It is painful and interferes with appliance use.

- It responds to topical steroids or topical tacrolimus in most cases, although systemic treatment is needed in some cases.
- Surgical treatment is contraindicated except to correct triggering factors such as a parastomal hernia or buried stoma.
- Biologic therapies are very useful in resistant cases.

Iatrogenic Skin Disorders

- Nicorandil has emerged as a significant cause of skin morbidity as well as bowel and perianal disease.
- Immunosuppressive and cytotoxic therapies may predispose to skin infections.
- Radiotherapy and cytotoxic agents can result in delayed wound healing.

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7 | Inflammatory Bowel Disease—Stomas and Nutrition

Andrew Robinson

WHAT IS INFLAMMATORY BOWEL DISEASE?

The term inflammatory bowel disease (IBD) encompasses a group of illnesses characterized by inflammation, functional disturbance, and damage to the small bowel, large bowel, or both. Nearly a quarter of a million people in the United Kingdom live with IBD, of whom two-thirds have a diagnosis of ulcerative colitis (UC) and one-third have Crohn's disease (CD). The incidence of UC is fairly stable, but there has been a steady increase in the number of CD cases over the last couple of decades. IBD is much more common in developed counties and in the Northern Hemisphere, and Ashkenazi Jews have the highest prevalence of CD in the world. Smokers are three times more likely to develop CD than nonsmokers but half as likely to develop UC; the reasons for the differential effects of smoking remain poorly understood (1). IBD also runs in families, and there is a 10-fold increased risk if there is any family history and a 30-fold increased risk if a sibling has IBD. Fifty percent of identical twins are concordant for CD, indicating a high, but not exclusively, genetic etiology.

UC affects only the large intestine, whereas CD can affect any part of the gut from the mouth to the anus and may also involve areas outside the intestine, such as the vagina and peristomal skin. The symptoms of IBD are dependent on the site of inflammation and can, therefore, present with an array of gastrointestinal problems. In some patients, the diagnosis can be delayed for years, as there is a significant symptomatic overlap with irritable bowel syndrome, which is much more common. Early diagnosis is a particular problem for patients with small bowel CD and those with colitis but without rectal bleeding, and IBD should always be considered in patients with ongoing unremitting gastrointestinal symptoms.

UC usually presents with diarrhea, rectal bleeding, urgency, and tenesmus (a feeling of incomplete emptying and a constant need to open the bowel). Many of the symptoms arise from inflammation in the rectum, and patients with localized rectal disease (proctitis) may be just as symptomatic as those with more extensive disease.

Crohn's colitis may mimic UC but, if there is no rectal involvement, there will be less urgency and tenesmus, and pain and weight loss may be the presenting symptoms. Seventy percent of patients with CD will have disease in the terminal ileum (the end of the small intestine). This may be picked up asymptomatically (e.g., in a patient with iron deficiency anemia) or present with pain after eating, weight loss, or a painful mass in the right iliac fossa. Stricturing disease can lead to vomiting and obstruction, and fistulizing disease can produce a variety of symptoms, including recurrent urinary tract infections, feculent urine, pneumaturia (air in the urine), or vaginal discharge. Thirty percent of Crohn's patients will have perianal disease, including fissures, fistulae, abscesses, or skin tags.

The key to best management is prompt diagnosis, aggressive treatment of active disease, and long-term prophylaxis to reduce or prevent relapses. Acute mild to moderate colitis is usually treated with a combination of oral and topical mesalazine, resulting in remission for about 60% of patients (2). Those with more severe disease require urgent specialist management, often with tapering oral prednisolone (40 mg to 0 mg over 8 weeks) or intravenous hydrocortisone. All patients receiving steroids should be given concomitant calcium and vitamin D_3. Those with over six bloody motions a day, fever, or systemic involvement require an urgent abdominal X-ray to exclude toxic colonic dilatation, a potentially life-threatening complication of acute colitis. Hospitalized patients failing to respond to intravenous steroids will be considered for colectomy after three days. Trials are underway comparing the anti-tumor necrosis factor infliximab with ciclosporin as salvage therapy for unresponsive patients. Patients with frequently relapsing disease or those who relapse when steroids are reduced and those with steroid intolerance are given immunosuppressant therapy. Azathiaprine or its metabolite 6-mercaptopurine is most

frequently used, although methotrexate has a role in unresponsive or intolerant patients. CD is also treated with steroids but there is less evidence that 5-aminosalicyclic acid is effective compared with UC. Antibiotics are also helpful in some patients with colonic and perianal disease but relapses are common, and this is an area of ongoing research. Children with CD are often treated with elemental diets to avoid excessive steroid dosing and as a bridge to azathiaprine therapy. Immunological therapies such as infliximab and adalimumab have had a huge impact on disease control for many patients with previously unresponsive severe disease.

Mesalazine can reduce the risk of relapse in UC by over 50%. Furthermore, there is increasing evidence that regular mesalazine therapy reduces the increased risk of bowel cancer associated with colitis (3).

Symptoms can be well controlled with medical therapy in the majority of patients with UC and many of those with CD, but some patients have severe, unresponsive, or complex disease necessitating surgical intervention. Indications for emergency surgery in patients with UC include toxic megacolon (where the bowel dilates and may perforate), excessive bleeding, failure to respond to intravenous steroids, and progressive abdominal pain. Elective surgery is recommended for patients who are unable to stop prednisolone without relapsing, those with chronic symptoms incompletely responsive to medical therapy, and those experiencing unacceptable side effects from medical treatment.

Patients with CD may also require surgery for colonic disease as for UC. Other indications for surgery include strictures causing bowel obstruction and pain, fistulizing disease where the bowel has developed abnormal connections between other loops of bowel, the bladder or the vagina, and Crohn's masses where many loops of bowel may be stuck in a large, inflammatory mass.

IBD AND STOMAS

The surgical treatment of UC involves removing most of the colon. Early surgical procedures, where partial colonic resections were undertaken, resulted in a very high (almost universal) relapse in the residual colon, and partial colectomy for UC is no longer advocated. Removal of the colon traditionally resulted in a permanent ileostomy as the only option for emptying bowel contents.

Over the last 30 years, UC patients have had the option of a permanent ileostomy or the construction of an ileoanal pouch from the distal small bowel (4). This pouch is sutured to the inside of the anal canal and offers patients the possibility of stoma-free bowel control.

Over half of all patients undergoing colectomy for UC are suitable for, and choose to have, an ileoanal pouch, which should be undertaken in specialist centers where surgeons are performing four or more procedures a year. Some patients whose colon was removed in an emergency situation will have the pouch procedure a few months later but will continue with a stoma until the pouch has healed, and tests show that there is no evidence of leakage or stricturing. Patients whose colectomy is planned electively and those with straightforward surgical procedures may have the pouch constructed at the time of colectomy but will also require a few months with a temporary ileostomy until the pouch is ready for use. During their time with a temporary stoma, some patients decide not to proceed with pouch surgery if they are coping well with their ileostomy.

Patients with CD frequently require temporary and, sometimes, permanent stomas. A common indication for a temporary stoma is following surgical resection in patients with marked malnutrition or intra-abdominal sepsis. These patients are at high risk of anastomotic breakdown (leakage from the area where two sections of bowel have been sutured together) which would result in peritonitis, severe infection, and possibly death. The temporary stoma allows feces to collect in a bag and reduces the risk of leakage until the bowel has had a chance to heal and the patient has recovered their physical and nutritional health. Temporary stomas are often required for Crohn's masses, complex fistulizing disease, multiple resections, and patients with marked hypoalbuminemia. These are usually loop stomas, which can be fairly simply reversed after a few months when the patient has recovered.

Temporary stomas may also be used to encourage healing of CD, although the development of alternative biological drugs and elemental diet has reduced the popularity of this procedure. Patients with extensive colonic disease or those with complex perianal disease (Fig. 7.1) may be

(A)

(C)

(B)

(D)

Figure 7.1   (**A**) Perianal Crohn's disease (CD) in a man with a defunctioning stoma performed to rest the distal bowel and perianal area. He responded to adalimumab treatment (see text). (**B**) Perianal fistulous CD, note the associated perianal tag. (**C**) Complex perianal CD in a child. (**D**) Milder recurrent cutaneous CD in a man following perineal reconstruction with a gracilis muscle flap.

given a temporary stoma prior to definitive surgery to reduce the amount of inflammation and subsequent complexity of the operation.

Some patients with CD require permanent stomas. Those with intractable, complex perianal disease may require a permanent colostomy to provide adequate symptom relief and some may require a perineal resection, which clearly necessitates a permanent stoma. Crohn's patients requiring colectomy for extensive colitis do not have the option of an ileoanal pouch. Those with rectal sparing may undergo an ileorectal anastomosis to provide continuity, but if the rectum is also involved, they will have a permanent ileostomy. Unfortunately, CD can recur in pouches sometimes resulting in severe pelvic sepsis, and few surgeons undertake this procedure in patients with known CD.

(A)   (B)
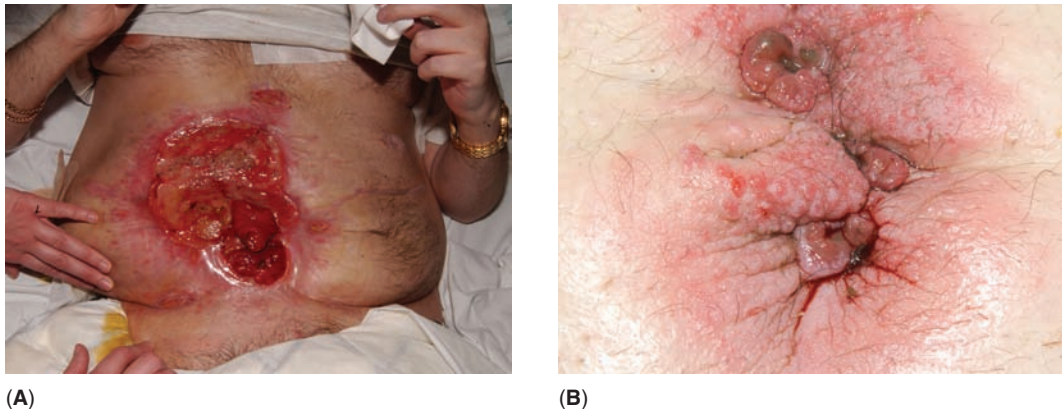
Figure 7.2 (**A**) Spontaneous cutaneous fistulae in a recently dehisced wound. (**B**) These similar Crohn's fistulae are more longstanding and are managed as ostomies; note the irritant changes in the surrounding skin, resulting from suboptimal fistula care.

Some patients with CD develop spontaneous fistulas to the skin (Fig. 7.2), and these have the appearance of stomas. In extreme cases, patient with aggressive fistulizing disease may have multiple cutaneous fistulas often involving abdominal wounds or areas of wound dehiscence.

NUTRITIONAL SEQUELAE OF IBD

Patients with IBD are often undernourished and in some cases suffer from multiple nutritional deficiencies and malnutrition. The causes of this are multifactorial including:

- Malabsorption of nutrients as a result of gut inflammation
- Nutrient loss from inflamed mucosa
- Bacterial overgrowth in damaged, strictured, dilated bowel
- Short bowel resulting from repeated resections
- Fat malabsorption due to bile salt depletion
- Specific deficiencies resulting from terminal ileal resection

In children, malnutrition combined with chronic inflammation and steroids results in growth retardation, and it is vital that all correctable deficiencies are addressed and nutritional therapy should be used in preference to steroids where possible (5). Malnutrition, chronic inflammation, and steroids also result in poor wound healing, hence the importance of identifying and correcting these in all ages.

Anemia is common in patients with IBD and the most common cause is iron deficiency. Other less common causes include vitamin B_{12} or folate deficiency, anemia of chronic disease, or drug-induced bone marrow suppression. Iron deficiency results from blood loss from bleeding mucosa, poor absorption in diseased duodenum or jejunum, poor iron intake secondary to appetite suppression, or lack of iron-containing food.

Vitamin B_{12} deficiency is common in patients who have had the terminal ileum removed (the most common place for CD to occur) as this is the sole site of absorption in the gut. Vitamin B_{12} is essential for red blood cell production and nerve function and is usually given by injection when malabsorption follows surgery.

Patients with severe diarrhea or high-output stomas are at risk of dehydration, salt depletion, and kidney failure. Magnesium deficiency is particularly common as the kidney often excretes magnesium in an attempt to conserve sodium. Low magnesium results in tetany (spasms of face, hands, and feet) and can result in convulsions if levels fall below 0.2 mmol/L. Treatment of hypomagnesemia is with 1-α cholecalciferol and oral magnesium oxide.

Calcium deficiency results in similar symptoms to magnesium deficiency and often occurs as a result of vitamin D malabsorption and poor calcium intake. Many patients with CD have

lactose intolerance, and as a result their intake of milk and dairy products is reduced. Furthermore, steroid therapy (such as prednisolone) inhibits calcium absorption, increases bone metabolism, enhances calcium excretion, and promotes the development of osteopenia and osteoporosis. All patients taking steroids should receive calcium and vitamin D supplements, and a full dietetic assessment is recommended.

Zinc deficiency is also common in patients with IBD as a result of malabsorption and losses in diarrhea. Zinc plays an important role in tissue healing and is an essential cofactor for many enzyme functions, including vitamin A transport.

Dietary fat requires conjugated bile acids in the duodenum in order to be fully digested and absorbed. Bile acids are produced and conjugated in the liver before being excreted in the bile. When bile acids reach the terminal ileum they are reabsorbed into the circulation and are carried back to the liver to be used again. Patients with terminal ileal CD and those who have had the terminal ileum removed are unable to reabsorb bile acids, which pass into the colon where they can cause diarrhea. This results in depletion of bile acids and ultimately fat malabsorption. Bile acids can also be deconjugated in the context of bacterial overgrowth resulting in ineffective fat absorption. Fat malabsorption results in steatorrhea (bulky offensive stools that are difficult to flush away) and can lead to deficiency of the fat-soluble vitamins A, D, E, and K.

DRUG ABSORPTION AND STOMAS

Patients with intestinal resection and stomas may not absorb drugs in a reliable or predictable fashion due to a number of factors affecting gut function. The three most important factors are: (*i*) How much bowel remains? (*ii*) Is there residual disease in the remaining bowel? and (*iii*) What is the bowel transit time? Patients with shorter lengths of bowel, active CD, and rapid bowel transit will have problems absorbing most medications, particularly those designed for slow release or protected with enteric coating. Many patients will be using loperamide to slow gut motility and improve absorption of other drugs, and some may be using concomitant octreotide injections, particularly if there is very short bowel remaining. High doses of loperamide (up to 32 mg or more a day) are sometimes required as this drug is circulated around the entero-hepatic circulation, which is often disrupted in patients with short bowel.

Important drugs to monitor are warfarin, thyroxine, and digoxin, and levels of these drugs can be very sensitive to minor changes in gut transit. Levels should be closely monitored and, if patients are receiving lipid infusions, drug levels should be checked at the same time relative to the infusions each day (6).

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8A | Pediatric Aspects—An Overview

Ian Sugarman

Many points that relate to stomas in children are similar to that in adults and have already been discussed in the chapter 1. This chapter is intended to give the reader an overview of stomas in children, highlighting the etiology for stoma formation and the differences between children and adults in both their creation and complications.

One would like to think that formation of stomas in children would be a rare occurrence. Although no formal incidence is available, this is not the case, and while I have a special interest in children who may require stomas, it is surprising to see that almost 5% of the operations I perform involve stoma surgery.

Equally, one would surmise that stoma formation in children is for children with adult disease (e.g., Crohn's disease) but again this would be incorrect. Although we deal with children up to the age of 18, we also deal with newborns, including premature neonates. Thus we may be required to create a stoma in any child ranging from 16 weeks premature (and weighing <1 kg) to adolescents.

There are, however, two reassuring facts about stomas in children.

First, as experience in surgical technique and ability improves, children who previously would always undergo a stoma formation as part of their initial treatment now may have corrective surgery as their primary (and hopefully only) procedure. One example of this is the condition of Hirschsprung's disease (see section "Etiology"). It used to be that all children with this condition had an immediate stoma (to relieve bowel obstruction), then undergo the corrective surgery, and finally have closure of their stoma as a third procedure. Today, these children are tried on daily rectal washouts and a primary (corrective) operation at a few weeks of age without the need of a stoma. In my experience, approximately two-thirds of children with Hirschsprung's disease now are treated without a stoma.

Second, the majority (almost two-thirds) of children who require a stoma do so on a temporary basis following which it is reversed.

Saying that, this does not relinquish the need for stoma formation to be performed expertly to minimize the complications summarized in this chapter (but dealt with in more detail in other chapters). Like the adult surgeon, we are always looking at ways to improve our techniques and minimize the trauma (such as the use of the laparoscope).

Like our adult colleagues, one of the most important members of our team is the clinical nurse specialist. Their role is multifactorial, not only with marking sites for stomas and with improving care post-stoma formation, but also, when children are involved, a very important psychological aspect to their role is required. Not only do we have to explain to the child how, where, and why there is a need to have a stoma formed but we also need to inform the parents. Often this can be a daunting task as, sometimes, the parents find it extremely difficult to come to terms with this part of the operative procedure. In Leeds, we have been fortunate in that a child psychologist has recently joined our team, and the combination of clinical nurse specialist and child psychologist will definitely help prepare the child for the surgery required.

ETIOLOGY

Figure 8A.1 shows the distribution of stoma formation with age. It can be seen that there are two peaks, with the highest percentage groups in the neonatal period and the teenage years. This reflects the facts that there are two major reasons for stoma formation in children.

First, children born with congenital anomalies who require a stoma to allow bowel evacuation. The two most common causes are children born with anorectal malformations (ARMs) or Hirschsprung's disease. Both of these conditions present with babies failing to pass meconium

through the anus, in ARMs because of a physical abnormality and in Hirschsprung's disease because of a physiological abnormality.

The incidence of children born with ARM is approximately 1:5000 live births. Children can be placed into two broad categories: (*i*) those in whom the misplacement of the anus is minimal and bowel evacuation is possible and (*ii*) those in whom there is major anatomical abnormality and meconium and stool evacuation is compromised. While the first group usually responds to a local procedure, the second group requires delicate reconstructive surgery, and to prepare them for this an initial stoma (usually colostomy) is performed. Figure 8A.2 gives an example.

The incidence of Hirschsprung's disease is also approximately 1:5000 live births. In this condition, there is an absence of ganglion cells in the bowel. The absence is always at the distal
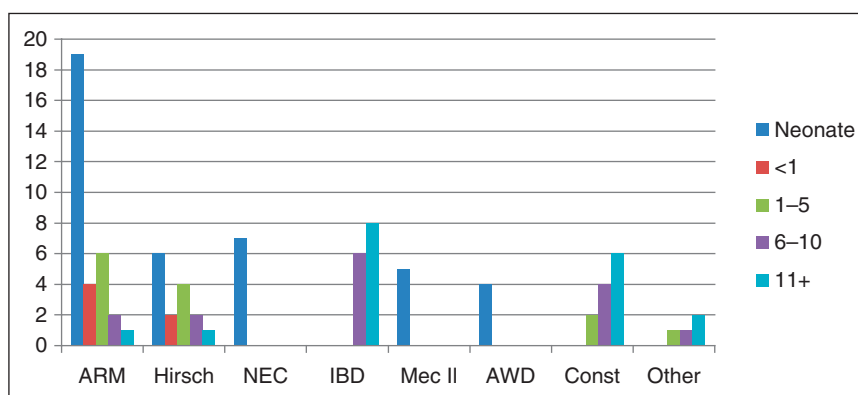
Figure 8A.1   Percentage of stoma formation against age in the author's practice. *Abbreviations*: ARM, anorectal malformation; AWD, abdominal wall defects; Const, constipation; Hirsch, Hirschsprung's disease; IBD, inflammatory bowel disease; Mec II, meconium ileus; NEC, necrotizing enterocolitis.

Figure 8A.2   Picture of a male child with an absent anus suggestive of a high anorectal malformation.
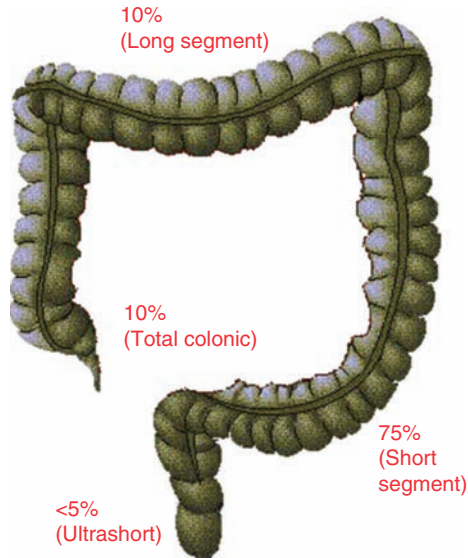
Figure 8A.3 Distribution of aganglionosis seen in children with Hirschsprung's disease (<1% have total intestinal aganglionosis, not shown in diagram).
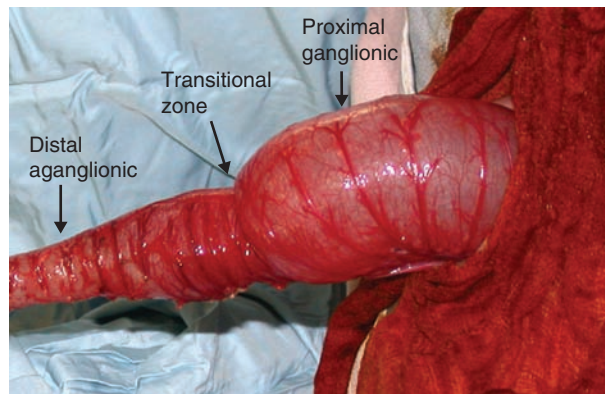
Figure 8A.4 Example of the transitional zone of the bowel, changing from dilated ganglionic bowel proximally to contracted aganglionic bowel distally.

extremity of the bowel (rectum) but will extend proximally for a variable amount (Fig. 8A.3). The absence of ganglion cells leads to the bowel affected being in a contracted state, which leads to a functional obstruction. The bowel which is ganglionic and above the abnormal bowel, undergoes peristalsis normally and thus becomes markedly dilated (Fig. 8A.4). Obviously, the site of the stoma will depend on length of aganglionosis.

The third most common neonatal group are neonates who have had complication of necrotizing enterocolitis (NEC). This is a condition which almost exclusively affects premature babies and is still of unknown etiology. The risk and incidence of this condition increase with increasing prematurity and can vary from very mild symptoms to acute collapse with necrosis and perforation (Figs. 8A.5 and 8A.6). Although the name is "colitis," NEC can affect any part of the bowel and has the highest surgical morbidity of any condition pediatric surgeons treat. It was for this reason that the standard treatment was for formation of a stoma, and this is still indicated in the majority of neonates operated on. However, like Hirschsprung's disease, with increasing experience more neonates are having resection and primary anastomosis.

Other neonatal conditions that require a stoma formation are rare. For example, meconium ileus (a condition where the meconium is tenacious and leads to obstruction) can present with complications including volvulus or perforation of the bowel, requiring bowel resection and possible stoma formation. Gastroschisis is a form of anterior abdominal wall defect in
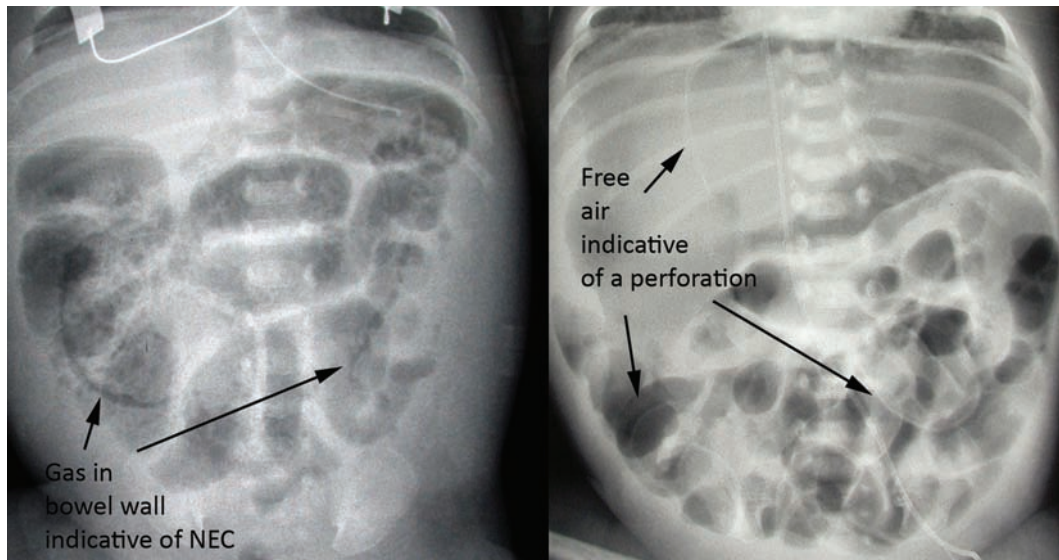
Figure 8A.5   X-ray of a premature baby with necrotizing enterocolitis and free air indicating a perforation.
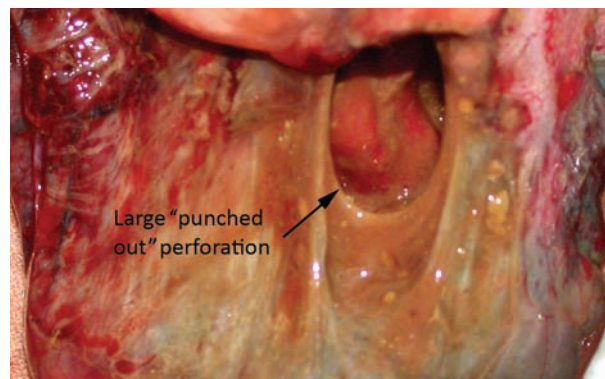
Figure 8A.6   Findings of a large fecal perforation secondary to necrotizing enterocolitis. This baby underwent resection of the perforation, ileostomy, and mucous fistula formation. The ileostomy was closed six weeks later.

which the bowel "herniates" through the defect and is free floating. Rarely, it can be complicated by perforation, and one option is a stoma formation at the primary operation.

Finally, a very rare but fascinating group is conjoined twins, in whom there is a shared distal bowel, meaning that, on separation, one of the twins must have a permanent stoma formed.

The second peak of incidence is in the teenage years. This starts to reflect adult conditions, of which inflammatory bowel disease is by far the most common. It is well recognized that one of the peaks of onset of inflammatory bowel disease is in teenage years, and for those in whom medical treatment has failed, presentation is acute requiring surgical intervention or in children with the severest form of perianal disease (Fig. 8A.7), this may come under the auspices of the pediatric surgeon and, like adult surgeons, a stoma with or without bowel resection may be the treatment of choice.

Other conditions leading to the requirement of a stoma are rarer. These include the failure of medical or surgical treatment for a range of disorders, from the common (e.g., chronic constipation) to the less common (treatment of rectal prolapse or solitary rectal ulcer syndrome). It also

includes children who were born with congenital conditions described earlier, who have undergone corrective surgery, but who are either constipated with soiling or incontinent and a stoma makes their and their carers life easier.

Table 8A.1 summarizes the distribution of stoma surgery by etiology.

Figure 8A.7 Child with severe destructive perianal Crohn's disease.

Table 8A.1 Distribution of Stoma Surgery by Etiology

Emergency	Elective

Neonatal period
• NEC
• High ARM
• Failed conservative treatment of a baby with Hirschsprung's disease
• Complicated meconium ileus
• Complicated gastroschisis
Older child
• Acute colitis in IBD
• Trauma
	Planned either before or during major gastrointestinal surgery
	• IBD surgery
	• FAP surgery
	• Late-presenting Hirschsprung's disease, other enteric nervous disorders (e.g., hypoganglionosis), or severe constipation
	As a permanent stoma
	• In children where all other corrective surgery has been unsuccessful
	  • ARM
	  • Hirschsprung's child with Down's syndrome
	• Because of underlying disease
	  • Colonic and perianal Crohn's disease
	  • Severest forms of cloacal anomalies
	  • Conjoined twins (omphalopagus)

Abbrevations: ARM, anorectal malformation; FAP, familial adenonatous polyposis; IBD, initable bowel disease, NEC, necrotizing enterocolitis.

TYPE OF STOMA FORMED

Temporary Stomas

As stated above, stomas in children are either performed as a temporary or permanent procedure, but the majority are temporary. Temporary stomas may be jejunostomies, ileostomies, or colostomies. The reasons they are formed are summarized below:

1. To protect the bowel distal to the stoma. *NEC* has been described above. One variant of this condition is NEC totalis, where almost all the bowel has been affected, and it is impossible to tell if, and how much, bowel may survive. One option at this point is to perform a high jejunostomy. This allows total rest of the distal bowel to try to promote survival of the bowel. In one paper, this led to a 50% survival rate (1).
   Post surgery: A pelvic anastomosis is sometimes best allowed to heal fully before using. Thus, following total colectomy and pelvic anastomosis (whether it be an end-to-side or pouch formation) in familial adenomatous polyposis, ulcerative colitis, or long-segment Hirschsprung's disease.
   Rectal trauma: To rest damaged rectum in order to allow healing.
2. Before definitive surgery to allow bowel evacuation. As described above, certain congenital abnormalities require immediate bowel decompression by stoma formation.
3. Where the bowel is too unhealthy to anastomose. This is seen in NEC, midgut volvulus, or perforation post chemotherapy.

Permanent Stomas

Permanent stomas are either ileostomies or colostomies. The reasons they are formed are summarized below:

1. Congenital abnormalities which can only be treated with a permanent stoma. Examples include conjoined twins or severest forms of ARM, some cloacae (i.e., where the genitourinary tract and rectum are fused into a single channel).
2. Fecal incontinence secondary to failed treatment of congenital abnormalities. These patients usually have some other general developmental disorder [e.g., Down's syndrome or Mowat–Wilson syndrome (autosomal dominant condition of mental retardation associated with Hirschsprung's disease)] and usually have no colon [thus precluding other treatments of fecal incontinence such as an antegrade continence enema procedure (2)].
3. Disease precludes other treatment. Crohn's disease where the anus and rectum are involved preclude pouch surgery because of the high risk of complications of the pouch.

DIFFERENCES IN STOMAS IN NEONATES AND CHILDREN COMPARED WITH ADULTS

General

Hydration

All stomas lose effluent. It is known that the effluent is greater when the stoma is more proximal. If stoma losses are excessive then the patient will become dehydrated which, in the severest forms, can lead to collapse. We allow up to 20 mL/kg stoma losses, after which we replace fluid mL/mL. In a 70 kg adult, this would allow losses of approximately 1 L before any replacement was required, while in a 1 kg baby, anything that is above 20 mL would need to be replaced. This has the following consequences. First, medication to slow gut transit is used in nearly all our baby and children patients (loperamide being the drug of choice). Second, when in-patients, the children require frequent weighing, blood tests, and intravenous fluid replacement. This requires venous access and, more often than not, central venous access, which have problems of their own (examples include slippage, blockage, and most seriously infection, which in itself can lead to an increased stomal output). Even at home, all children and their carers have specific instructions on what losses are allowed and when to contact us. Third, frequent blood tests can lead to anemia (blood volume is only 70–80 mL/kg), so these babies may require blood transfusions.

Growth and Development

The neonatal period and first few years of life are important for the growth and development of the child. Stoma losses contain fluid and electrolytes especially sodium and, like hydration, when sodium losses are greater the stoma is more proximal. Sodium depletion is an important cause of growth failure and thus, we regularly check our patient's urinary sodium. If it is <20mmol/L, this implies sodium retention, implying sodium depletion and we would supplement their sodium intake. There is a debate about how important this is in the adolescent child, however, at the present time, we keep an eye on growth and urinary sodium on all children with stomas and supplement them if they are failing to grow as expected.

Siting the Stoma (see also chapter 8B "Pediatric Stoma Care")

As with adults, ileostomies are usually brought out in the right iliac fossa and colostomies in the left iliac fossa. The difference seen is that, sometimes, it is easier to bring the stoma out through the laparotomy incision. In neonates and children, a laparotomy is performed through an upper transverse incision rather than a midline incision (neater, less obvious scar) and to prevent a "second scar" bringing the stoma out through the wound means closure occurs in a previously formed scar.

Again, like adults, with children who are old enough to crawl or walk, we aim to bring out a stoma in a site that does not cause problems with clothing or avoids natural skin creases. This is where the nurse specialist has an important role to play (3). This is not so important in neonates when the stoma is going to be closed before mobilization begins.

Specific

Type of Stoma

Ileostomy

As with adults, either an end stoma or loop stoma is formed. The main difference is that loop stomas in children can either be loop, as described in chapter 1, or split. This difference is that a loop has the bowel in continuity with an incision on the antimesenteric border and placed over either a rubber tube or the skin, whereas in split stoma the bowel is actually divided and two ends are delivered as a stoma and a mucous fistula. These two ends may be side by side (allows an easier closure but has a slightly higher complication rate as the trephine is larger) or separate (allows smaller trephines with less complications and also allows the flange of stoma bags to be smaller, thus causing less excoriation but requires a further laparotomy to close).

The end ileostomy formation may also be different. In very premature babies, trying to invert an ileostomy, as described previously, can be difficult and traumatic for the bowel delivered, and thus, sometimes, the spout is left standing "upright" with sutures from the skin to the serosa only (at the level of the skin) and the ileostomy everts and fixes itself over the ensuing 7 to 10 days. Another example is where, in some circumstances, there may only be an end ileostomy but the bowel continuity has been restored just below the peritoneal reflection. If the stoma is the mucous fistula and the proximal bowel has been anastomosed to this, it is called a Bishop–Koop ileostomy (Fig. 8A.8) (4). If the stoma is the ileostomy and the distal bowel has been anastomosed to this, it is called a Santulli ileostomy (Fig. 8A.9) (5). Both of these allow the stoma to be used as a "blow off," but once effluent passes through the anastomosis, the stoma can be closed simply.

Colostomy

Most of the times, a colostomy is formed as per chapter 1. There is one condition in which a split colostomy is advocated and that is in the neonate with the severe form of ARM. Pena et al. have shown that if a loop colostomy is formed effluent will continue to pass distally. In a male, this allows effluent to enter the urogenital system. If the fistula is high enough (e.g., bladder neck or bladder) then the effluent mixes with the urine in the bladder and, if the child has vesicoureteric reflux, there is a risk of refluxing infected urine to the kidney, with the resultant risk of pyelonephritis (Fig. 8A.10). Pyelonephritis in a neonate/child is dangerous as it may lead to chronic damage (and is the third most common cause of chronic renal failure). Pena et al. advocate that the stoma should be split, thus allowing no effluent to pass into the mucous fistula (Fig. 8A.11) (6).
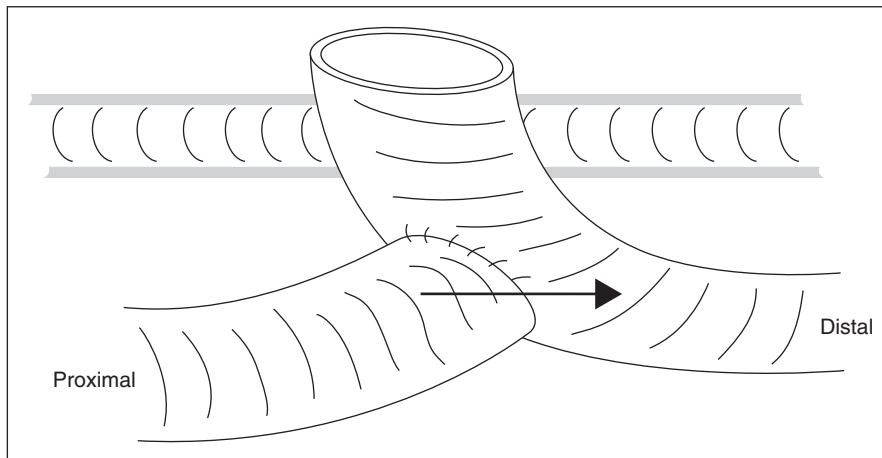
Figure 8A.8   Diagrammatic representation of the Bishop–Koop ileostomy.
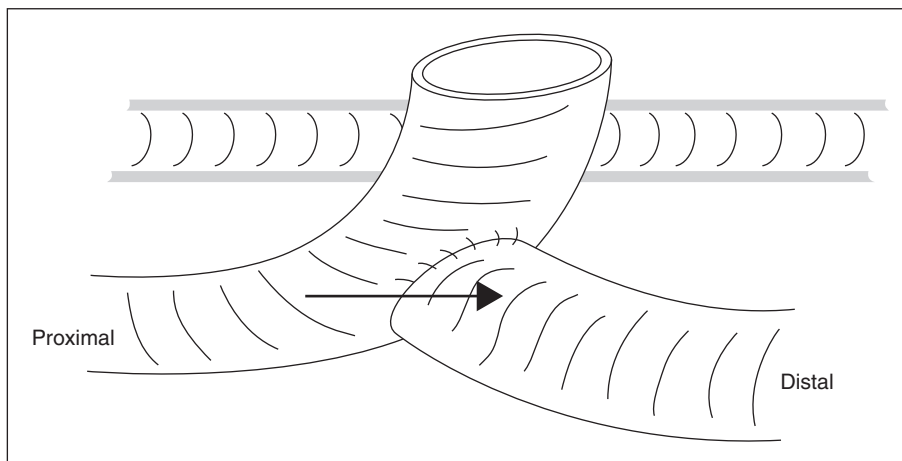
Figure 8A.9   Diagrammatic representation of the Santulli ileostomy.

Complications
This topic has been dealt with in chapter 1 in detail, and the same complications (except cancer) can be seen in children. Some points and some not previously described complications, however, are worth discussion.

Prolapse
This is extremely common in children and is dependent on type and site of the stoma. It is most common in loop stomas (7) as the trephine is large and, especially if the bowel had previously been obstructed, once the bowel decompresses and collapses, prolapse may occur. Prolapse is most common with ileostomies as the mesentery is so mobile. In colostomies, it is rarer as the stoma can usually be brought out with a degree of tension (e.g., a proximal sigmoid stoma is held by retroperitoneal attachments of the descending colon). The problem occurs when a loop transverse colostomy is formed (performed for some ARM patients and patients with Hirschsprung's disease where the transitional zone is not known). In a proximal transverse colostomy, the stoma is fixed by the retroperitoneal attachments of the ascending colon but the mucous fistula can prolapse on the long transverse mesocolon. Alternatively, in a distal transverse colostomy, it is the stoma that may prolapse on the mesocolon, while the mucous fistula is fixed by the retroperitoneal attachments of the descending colon.
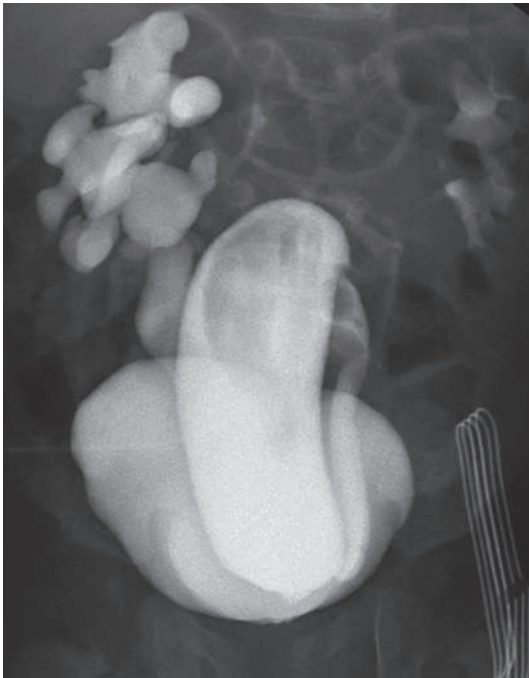
Figure 8A.10 Contrast study via a mucous fistula showing bilateral vesicoureteric reflux, much more marked on the right side with a dilated tortuous ureter and dilated renal pelvis.
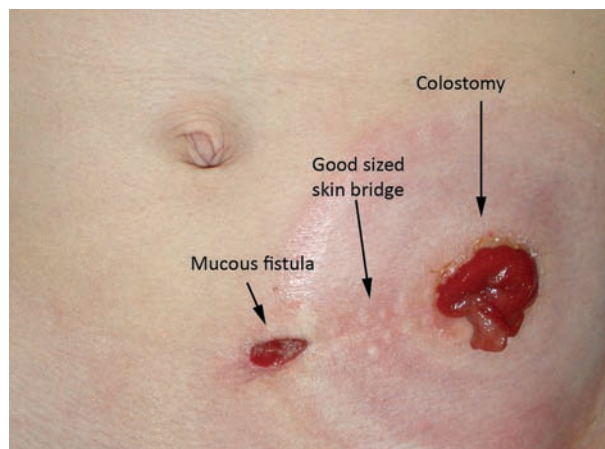
Figure 8A.11 Split stoma in a child with a high anorectal malformation.

Retraction
To try and avoid prolapse, surgeons may have too much tension on the stoma. This will result in the stoma retracting. This is seen most commonly in neonatal stomas and when the stoma is created by a less experienced operator.

Stenosis
Stenosis is rare for colostomies but more common for ileostomies. Again, this is usually operator dependent. The trephine needs to be large enough to deliver the bowel but not so large that either a proplapse can be induced or a parastomal hernia form. Stenosis occurs either at the skin, fascial, or peritoneal level, thus care must be taken at all levels (Fig. 8A.12). The other common cause in children is damage to the blood supply of the stoma. Initially, this can lead to an ischemic stoma but progress to stenosis.

Ischemia
Ischemia may be caused by inadvertent damage to the blood supply or too tight a trephine.
Rarely, it is seen as a progression of the underlying disease (Fig. 8A.13) (8).

Exteriorization of the Wrong Segment or End
Pediatric surgeons like to perform procedures through as small an incision as possible. It is
therefore possible to be mistaken about the loop of bowel that is delivered. The most common
mistake is to make a small upper abdominal incision and deliver a loop of transverse colon,

Figure 8A.12   Contrast study revealing a stomal stenosis.
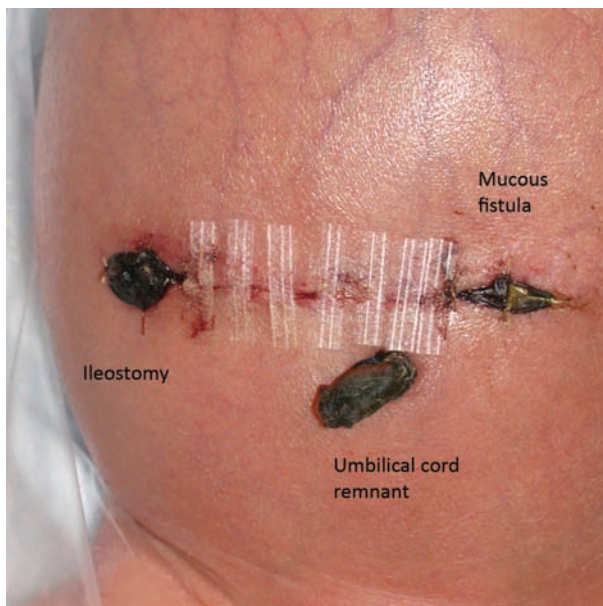
Figure 8A.13   Neonate with severe anorec-
tal malformation with ischemic ileostomy and
mucous fistula.

whereas actually a loop of dilated sigmoid is delivered. The author has seen at least two cases of this and an example is provided (Fig. 8A.14).

Fistulae

As with adults, this is usually seen as a complication of the underlying disease (e.g., Crohn's disease) but is also seen in stomas in premature babies where stitch abscess has occurred (Figs. 8A.15 and 8A.16).

Excoriation

Excoriation is much more common in loop ileostomies than any other type of stomas (Fig. 8A.17).
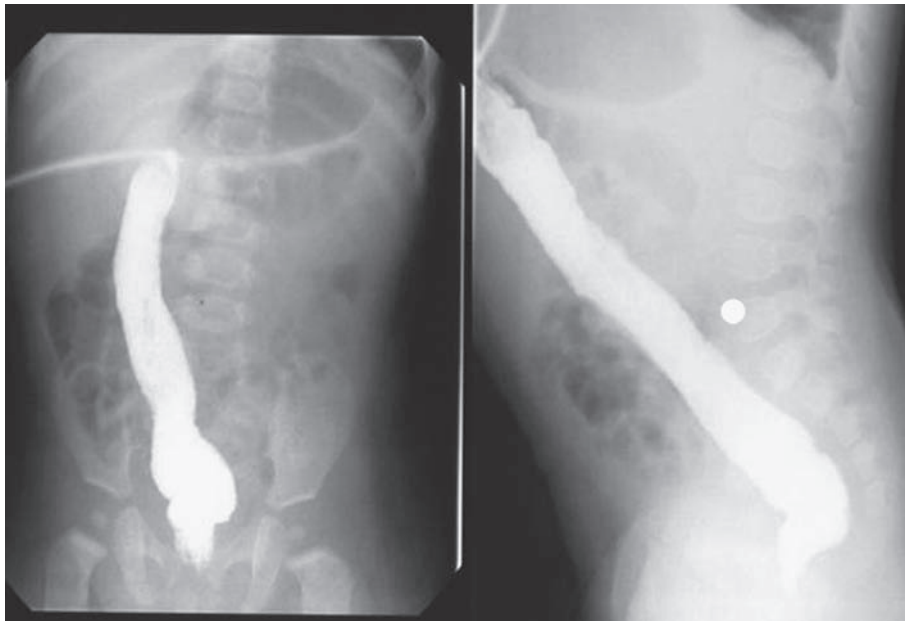
Figure 8A.14   Contrast study with contrast instilled into a proximal transverse colostomy. It can be seen that contrast is passing directly to the rectum revealing that this stoma is actually a sigmoid colon mucous fistula.

Figure 8A.15   Picture of the same child as in Figure 8A.7 showing abnormality of stoma and mucous fistula.
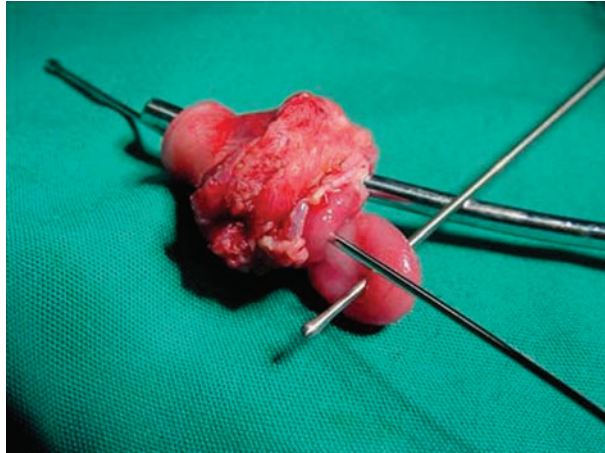
Figure 8A.16 Picture of a resected split stoma in a premature baby showing numerous fistulae.

Figure 8A.17 Comparison of skin around an end ileostomy compared to a loop ileostomy. There is marked excoriation in the latter due to the greater tendency for leakage and possibly a greater mucus production that will affect bag adhesion and irritate skin.

KEY MESSAGES

Stomas in pediatric practice are more common than one thinks and thus need to be part of the surgeon's inventory; also, all pediatric health care workers should have some knowledge of stomas and their complications. Unfortunately, complications are relatively common and thus must be recognizable so that appropriate treatment can be instituted.

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8B | Pediatric Stoma Care

Claire Bohr

The majority of pediatric stomas are formed on a temporary basis, possibly for only a few weeks up to a few years. The fact that they are not permanent does not reduce the preparation, support, and education given by the pediatric stoma nurse.

The role of the pediatric stoma nurse can vary from region to region. Nurses may cover more than one specialty, for example, urology and gastrostomy care (1). Due to centralized pediatric surgery, once discharged from hospital, many children are cared for by their local stoma care nurse who may not be pediatric trained. Effective communication between the two specialists is essential for a smooth transition from the hospital setting to the community.

Caring for children undergoing stoma formation holds many challenges. The children may range from a 500 g 24-week gestation neonate to a pubescent 16-year old, both having their individual needs (Fig. 8B.1).

The neonate with a stoma usually has other medical complications, predominantly respiratory, circulatory, and nutritional, all of which need to be considered when caring for the stoma.

The parents are put into a very stressful environment, with surgery usually being carried out as an emergency procedure. Preoperative preparation by the stoma nurse may be very minimal due to the unpredictability of timing of emergency surgery.

Siting the stoma on a neonate or very small baby is very difficult due to its size and lack of abdominal space. The surgeon should take into account the placing of the stoma to enable a bag to be fitted, avoiding the umbilicus and groin skin folds (Fig. 8B.2).

The skin of a neonate is very fragile; adhesives on stoma products are designed to adhere to skin. When choosing an appliance, the surface area of hydrocolloid covering the skin should be minimal as epidermal stripping may occur on its removal (2).

Silicone-based adhesive removers protect the skin and remove the bag painlessly (3). Wipes can be used for babies and younger children, and sprays can be used on children who can understand the explanation of it feeling cold on the skin.

Due to the fragility of neonatal skin, chemicals used in bonding agents, pastes, and adhesive removers may be absorbed percutaneously; extreme care must be taken if these products are used (4).

When using skin products on neonates and young children, the stoma nurse should be aware that many of them are alcohol based; these should be avoided as alcohol is absorbed through the skin and may sting if the skin is broken.

There is now a wider range of stoma bags for pediatrics compared to 10 years ago (Fig. 8B.3). Most toddlers are very active and having a stoma should not prevent or hinder the child's activities. As with adult stoma care, it may take a while to find the appropriate bag for the individual child, so reassurance for the parent/child is needed.

Each child should be assessed by the pediatric stoma nurse for advice on the most suitable bag; it cannot be assumed that a baby will require a neonate bag, as the stoma is often double barrelled or prolapsed, making the cutting guide much larger than a neonatal bag will allow (Fig. 8B.4).

It is important to use age-appropriate material to help the child understand the reason they need a stoma (5) (Fig. 8B.5). Play can be used on a doll or favorite toy to demonstrate stoma positioning and stoma care. Soft dolls can be purchased with stomas to help the child's acceptance. During the hospital stay, the play specialist is an important part in the child's care.

The young child should be encouraged to assist in their stoma care, eventually leading to independence.

When a stoma is closed, the perianal area can become excoriated if it is not protected from fecal matter.

Many centers have their own recommended made up barrier cream/paste; these should be used with gentle cleaning, using mild soap and water with cotton wool, as baby wipes

Figure 8B.1   Adolescent with abdomen marked with the site for stoma placement.

Figure 8B.2   Ileostomy sited correctly in a neonate.

Figure 8B.3   A range of stoma pouches and barriers suitable for pediatric patients.

contain alcohol, which will cause stinging if the skin is broken. Leaving the bottom exposed to the air for as long as possible will also help the healing process.

   One of the most challenging groups of patients for the pediatric stoma nurse is an adolescent (Fig. 8B.6).

Figure 8B.4   A toddler with a large, "double-barrelled" stoma.

It is a difficult time for any young person to find himself/herself stranded in the temporary period between childhood and adulthood; they have to overcome pressures from their peers to fit in, make decisions about their future, and cope with their changing body shape.

It is important that each young person is treated as an individual with consideration of their developmental level. A stoma nurse should be experienced in listening to patient's fears and worries; adolescents often find these emotions difficult to express, so it may take time to build up a trusting relationship with the young person before these feelings are shared.

It is important to recognize one's level of expertise in counselling adolescents; it may be necessary to involve the child and adolescent mental heath team if the stoma nurse has concerns about the young person's psychological difficulties.

Communications can be adapted to suit young people. Today, many children use text and e-mail as a way to share their feelings; these formats can be used by the stoma nurse as long as the correct documentation is used.

One of the most beneficial ways to help young people to adapt to their stoma is to put them in touch with others of similar age who have undergone the same experiences.

Many of the adolescents will outgrow pediatric services and move on to adult care. Preparation for transition should begin well before the first adult services clinic ap pointment (6).

The young person should be totally independent in stoma care, and have knowledge of their medical history and condition.

Ideally, several joint appointments with the pediatric service and adult service should take place before the young person is discharged from pediatric care.

EDUCATION

A child/young adult must be supported in returning to education following the formation of a stoma to establish studies and to spend time with their peers.

The timing of this return is individualized by both the patient's readiness and the consultant's recommendations. It may be suggested that a staged return is put in place until the child's physical stamina has improved, choosing to only attend specific sessions of mornings or afternoons, depending on individual needs.

In 2001, the Special Education Needs and Disability Act 1995 (SENDA) was amended to make unfair discrimination by education authorities against disabled children and young adults illegal.

According to SENDA, reasonable steps must be taken to ensure children/young adults who have a disability are not at a disadvantage with those who are not disabled. This includes

Figure 8B.5 A range of information leaflets aimed at children and young adults.

Figure 8B.6 Ileostomy in a 15-year old. He is of short stature with delayed pubertal development as a consequence of repeated flares of inflammatory bowel disease. These disease exacerbations and associated hospital admissions have interrupted education and social development.

school trips, sporting activities, and after-school clubs. The school has a duty to make arrangements so that these activities are accessible to all (7).

Children who only have a stoma are not in the true sense disabled, and in many cases having a stoma improves quality of life, but when dealing with inclusion to education the SENDA is relevant.

It is advisable to inform the head teacher and school nurse preoperatively of the child's condition. This must only be carried out with the parent's/child's permission; this will enable the school to make any needed adjustments and provide the child with work.

Before the child returns to school, an individual health care plan should be drawn up and all staff involved with the child's care have specific training. This should include (*i*) a background

to the child's health condition, (*ii*) stoma care and bag changing, and (*iii*) an emergency and communication plan (e.g., prolapse, bleeding) [PromoCon (8)].

It is important for the younger child to have consistency with their stoma care; the parent/carer should play an active role in the training process of all new school carers to endorse familiarity into the procedure.

As the child grows and gains independence, school staff may not be directly involved with the care of the child's stoma. But support may still be needed if a problem arises.

The child will need support on information sharing with their peers; it is an individualized decision on who to confide in, working in collaboration with the specialist nurse, school nurse, teacher, parent/carer, an agreed decision made by the child should be respected and adhered to.

SEX

A pediatric stoma nurse must be comfortable and confident in giving advice on contraception and sexual health to young people.

Research has shown that more than a quarter of young people are sexually active before they reach the legal U.K. age of 16 (9).

The biggest deterrent for seeking advice about contraception in young people is confidentiality. Young adults have the same rights regarding confidentiality as any other person.

Exceptional circumstances may necessitate health professionals to share information with an other agency, for example, (*i*) if exploitation or abuse of the child is disclosed, (*ii*) where the health, safety, or welfare of someone other than the patient would be at risk. In both these circumstances, the over-riding objective must be to safeguard the young person; locally agreed child protection protocols should be followed. Any disclosure should be justifiable according to the particular facts of the case.

Disclosure should only take place after consulting the young person whose cooperation should be sought. Offering to support a voluntary disclosure will strengthen the relationship between the stoma nurse and the young person.

Stoma nurses who provide advice on contraception, sexual, and reproductive health to young people under the age of 16 are protected by the Sexual Offences Act (2003). The act states that a person is not guilty of aiding, abetting, or counselling a sexual offence against a child where they are acting for the purpose of:

- protecting a child from pregnancy or sexually transmitted infection,
- protecting the physical safety of a child, and
- promoting a child's emotional well being by giving of advice.

If a stoma nurse has given advice to a young person regarding contraception and sexual health, it is paramount that clear documentation is recorded of the advice given.

Any stoma nurse who is involved with children should receive appropriate training to alert them to the possibility of abuse or coercion. They should be aware of local procedures for reporting such issues and be aware of the child protection policies in place.

Developments in surgical techniques and procedures combined with development in pediatric stoma products means that pediatric stoma nurses need to maintain their professional status and stay updated with new advances.

The first pediatric stoma nurse in the United Kingdom was appointed in 1978. In 2005, there were at least 20 stoma nurses in the United Kingdom and Ireland dedicated to pediatric stoma care. A specialist group the Paediatric Stoma Nurse Group has been formed to promote excellence in practice and establish standards and guidelines.

There is much more to pediatric stoma care nursing than trying to get a bag to stick, although this is one of our goals; stoma care in pediatrics is as challenging as it is rewarding.

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▌ Appendix 1: Glossary

Abscess A localized collection of pus.

Acanthoma A discrete, tumor-like area of acanthosis (q.v.).

Acanthosis Thickening of the epidermis (hyperplasia) due to expansion of the stratum spinosum (acanthocyte layer). A common feature of many skin diseases.

Acute A medical disorder arising suddenly.

Adalimumab A cytokine modulator therapy for arthritis, psoriasis, and Crohn's disease. It is a humanized monoclonal antibody therapy that inhibits TNF-α (q.v.).

Addisonian crisis If the adrenal glands produce insufficient steroids, either because of disease or because of abrupt withdrawal of steroid therapy, a stress such as injury or infection can produce life-threatening hypotension, hyponatremia, and water intoxication ("crisis"). Addison's disease is tuberculosis of the adrenal glands, although more common causes today are autoimmune destruction or vascular disease.

Adenocarcinoma A malignancy of glandular epithelium.

Allergy, -gen Immune system based hypersensitivity to a chemical (the "allergen"), subsequent exposure to which triggers a reaction such as dermatitis, urticaria, rhinitis, or asthma.

Anastomosis Connection between two tubular structures. It may be naturally occurring or surgically produced.

Aphtha, -ae, -ous, -oid Shallow ulcer in a mucous membrane. This usually refers to the mouth, but the term is used for similar ulceration on other mucosal surfaces.

Atopy, -ic The tendency to develop allergic/hypersensitivity reactions to allergens involving the production of IgE and producing an urticaria, rhinitis, or asthma reaction.

Atrophy, -ic Shrinkage or diminution of skin. Loss of epidermis appears as thin skin with fine wrinkles and translucency that allows blood vessels to become visible. Loss of dermis and subcutis with normal overlying epidermis appears as a depression covered by skin that appears normal.

Atrophy

Benign monoclonal gammopathy Proliferation of one clone of plasma cells producing a particular immunoglobulin (antibody) or component protein, which appears in the serum. This condition may not progress to any malignant state such as myeloma, hence the term "benign." It is also called monoclonal gammopathy of undetermined significance.

Biologics Term used to refer to monoclonal antibody therapies, usually for chronic inflammatory diseases such as Crohn's and psoriasis. These include infliximab, adalimumab, and etanercept.

Bulla, -ae, -ous A blister: an elevated, fluid-containing lesion >5 mm in diameter (see also "Vesicle").

Caput medusae The "Medusa head" or "Gorgon's head" from Greek mythology, which had snakes for hair and would turn anyone who looked at it to stone. The term is used for the radiating, dilated veins that occur around the umbilicus or a stoma in patients with severe liver disease. The dilated vessels occur because the diseased liver prevents normal blood flow coming from the gut and the blood is diverted to the systemic circulation via these anastomotic sites. Other sites may also be involved such as the rectal or esophageal veins, resulting in varices.

Bulla

Carbuncle	A necrotizing infection of the skin and subcutaneous tissue, consisting of a collection of furuncles (q.v.).
Cellulitis	Purulent inflammation of the skin and subcutaneous tissue, usually infective in etiology. Appears as a flat, erythematous, tender lesion.
Chimeric	Monoclonal antibodies are usually generated by cell cultures from mice. If injected into a human (see biologics), they would cause an allergic reaction as the foreign (mouse) protein would be recognized. In the context of this book, the term chimeric refers to therapeutic antibodies that are engineered to be half-mouse half-human. Some therapeutic antibodies are completely humanized as they are produced by cell lines engineered to produce human antibodies. The term derives form Greek mythology where the chimera was a fire-breathing monster with a lion's body, a goat's head, and a snake's head for a tail.

Cellulitis

Cholestyramine	This resin is used therapeutically as it sequesters bile salts and prevents their reabsorption and reuse by the liver (50% of cholesterol is excreted as bile salts, therefore, cholestyramine reduces cholesterol). Bile salts are very irritating to the skin, so cholestyramine has been used successfully as a cream in patients with perianal dermatitis, especially pouch patients with short transit times.
Chronic	A medical disorder of long duration.
Commensal	The situation where two organisms live close together without being dependent on, or destructive of, one another. For example, certain common skin microbes are neither helpful nor harmful to humans. The word literally means "sharing the same table."
Connective tissue diseases	Term used to refer to a group of multisystem inflammatory disorders of unknown cause, but characterized by autoantibody production, joint disease, and multisystem inflammation. This group of diseases include systemic lupus erythematosus, systemic sclerosis, and dermato/polymyositis, as well as some intermediate syndromes.
CREST syndrome	Calcinosis, Raynaud's phenomenon, esophageal sclerosis, scleroderma, telangiectasia. An acronym for a subtype of systemic sclerosis said to carry a better overall prognosis.
Crust	Dried collections of exudate on the skin surface, caused by infection or inflammation.
Cyst	A closed cavity in the skin which is lined with epithelium and contains fluid or semisolid material. The skin is often movable over the lesion.

Crust

Cytokine	Soluble proteins released from activated T-lymphocytes primarily that act as signals between immune cells and some others. There are four groups: interleukins, interferons, colony stimulating factors, and tumor necrosis factors. (Derives from *cyto* = cell and *kinesia* = movement).
Dermatosis, -oses	Another word for skin disease.
Dermographism	Literally means "drawing on the skin" and refers to a commonly found condition where the skin over-reacts to mild trauma, such as rubbing, to produce wheals and erythema.

Cyst

Desquamation	Refers to skin disease where the skin comes off in scales (e.g., the peeling after severe sunburn).
Distal feeding	Distal enteral feeding involves putting a soft plastic tube into a stoma or fistula to provide food to the bowel downstream. It is a very safe way to feed people (see http://i-rehab.org.uk/).

Dystrophy	Abnormal formation of an organ. In dermatology, it is usually used in nail diseases where nail dystrophy can result from a number of diseases, particularly psoriasis, lichen planus, and alopecia areata.
Ecchymosis	A large extravasation of blood into the skin such as a bruise.
Emollient	An ointment, cream, or lotion designed to soften or smooth the skin.
Epithelioma	A term usually used to mean a malignant neoplasm of an epithelium.
Epithelium	A tissue composed of packed cells which lines a body surface either internal or external (e.g., epidermis) (see appendix 3).
Erosion	A break in the epidermis that does not extend to the dermis. Often caused by rupture of a superficial blister.
Erythema	Redness of the skin due to dilatation of the cutaneous blood vessels. It will therefore blanche on pressure unlike purpura.
Erythema nodosum	This is an immunological reaction to various things including infections (streptococcal, mycoplasma, mycobacterial, and fungal), drugs, and diseases of unknown etiology (e.g., sarcoid). It is characterized by painful red nodules especially on the shins but also elsewhere. The patient may feel generally unwell and have arthralgia. The inflammation is within the subcutaneous fat (panniculitis).
Etiology	Study of the causes of disease. Also used to mean the "ultimate cause" of a particular disease.
Excoriation	An erosion caused by scratching, frequently linear in shape.

Erythema

Erosion
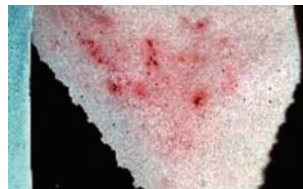
Excoriation

Familial polyposis coli (familial adenomatous polyposis)	Hereditary disease where premalignant polyps of the large bowel proliferate. Malignant change in these polyps is common.
Fistuloclysis	Enteral feeding via an intestinal fistula (see "Distal feeding").
Folliculitis	Inflammation of the hair follicles.
Fungate	To erupt like a fungus. Refers to a malignant tumor growing proud of a surface.
Furuncle	A pyogenic infection of a single hair follicle. Appears as an erythematous, tender lesion surrounding a pustular hair follicle.

Furuncle

Folliculitis

Glabella	The bony prominence above the bridge of the nose between the eyebrows.
Granulation tissue	A mass of new capillaries and fibrous tissue in a healing wound (see appendix 3).
Granuloma	Sometimes used to refer to a mass composed of granulation tissue such as the overgranulating papules seen around stomas. Strictly, this is a histological term for a feature of chronic inflammation where inflammatory cells accumulate in diseased tissue, usually around foreign material. Inflammatory cells may combine to form giant cells. These features are seen in tuberculosis and Crohn's disease among many others.
Guttate	Covered in small marks. In dermatology, usually used to describe a form of small-plaque psoriasis occurring after infection.
Hirschsprung's disease (primary megacolon)	Congenital, neurological abnormality of a segment of colon that results in failure of peristalsis and consequent constipation with megacolon.
Humectant	In food and pharmaceutical technology, a substance added to a product to maintain a high water content.
Hydrocolloid	A suspension of particles, often proteins or polysaccharides, in solution. In hydrocolloid, the solvent is water. Hydrocolloids such as pectin and gelatin are the base for many wound dressings, as well as the adhesive barriers, washers, and seals used for stoma appliances.
Hypercoagulability	Enhanced tendency of the blood to coagulate. This may be because of dehydration or excess platelets, hereditary abnormality of clotting factors, or abnormal clotting proteins found in some diseases such as lupus erythematosus.
Hyperkeratosis	Thickening of the stratum corneum or keratin layer of the skin. May be a physiological response to repeated friction, etc., or a feature of a primary skin disease.
Hyperplasia	Expansion of a tissue by increase in cell numbers.
Iatrogenic	This term refers to any illness caused by the intervention of a medical practitioner.
Ichthyosis	A group of hereditary diseases characterized by dry, scaly skin.
Immunobullous disease	A group of blistering diseases caused by an immune response, usually antibody mediated, against one or other component of the skin (see "Pemphigus" and "Pemphigoid").
Impetigo, impetiginized	Impetigo is a superficial infection of the skin caused by the bacterium *Staphylococcus aureus* and characterized by superficial erosions, sometimes blisters and usually a honey-colored exudative crusting. When any skin disease is secondarily infected with *S. aureus*, producing the features described above, it is said to be impetiginized (e.g., impetiginized eczema).
Induration	Skin that is palpably hard and thickened.
Ischiorectal fossa	The fat-filled space at the pelvic outlet between the ischium (bone) and the rectum.
Isomorphic phenomenon	See "Koebner phenomenon" and compare with "Pathergy."
Keloid	A progressive, slow-growing scar which is raised and extends beyond the borders of the site of initial trauma.
Koebner phenomenon	The tendency of some skin diseases, particularly psoriasis and lichen planus, to appear in damaged skin. This occurs only in patients who already have the skin disease or a predisposition to it.
Lichen sclerosus	An autoimmune disease of unknown cause characterized by sclerotic plaques in the skin with a particular predilection for the genitalia and perianal skin.
Lichenification	Thickening of the skin with increased skin markings, usually resulting from repeated rubbing.
Macule	A flat localized area of color change, usually 5 mm or less in diameter.
Marjolin's ulcer	Carcinoma developing in a long-standing scar or ulcer.
Megacolon	Large dilated colon, usually as a result of neurological aberrations of the colon, especially Hirschsprung's disease.

Keloid

Lichenification

Macule

Mesentery	Two-layered fold of peritoneum binding part of the small bowel to the posterior abdominal wall.
Metaplasia	A condition where the cells of a tissue transform from one defined type to another more suited to a changed environment. This modification occurs without any malignant features.
Metastasis, -static	Spread of malignant disease from one part of the body to another.
Milium	A small white cyst containing laminated keratin.
Monoclonal antibody	Antibodies produced by a single clone of B-lymphocytes that have been immortalized by fusion with a myeloma cell line. The antibodies therefore are all the same and recognize only one bit of one antigen (termed an epitope).

Milia

Myeloproliferative disease	Neoplastic proliferation of bone marrow-derived tissue (e.g., primary polycythemia and thrombocythemia).
Neoplasm, -plastic	An abnormal new growth of tissue. It may be benign or malignant.
Neutrophil	The characteristic cell of acute inflammation. Neutrophils have a primary role in nonspecific immunity, phagocytosing microorganisms and debris.
Nodule	A spherical lump, either in or below the skin (or other body surface), that can be palpated or observed and is >5 mm in diameter.
Nummular	Coin-shaped; used to describe skin lesions.
Orosomucoids	α_1-Acid glycoprotein, an acute phase protein (inflammatory marker) regarded by some as more specific for bowel inflammation.

Nodule

Papilloma	Benign neoplasm of a surface epithelium. In the skin, the histological findings include acanthosis, usually with lengthening of the rete ridges.
Papule	A well-demarcated solid elevation of the skin that can be palpated or observed. The term papule is commonly used for lesions that are <5 mm in diameter, although for practical reasons such exact size distinctions are not always adhered to.
Paraproteinemia	Presence in the blood of a particular immunoglobulin (antibody) or component protein produced by one proliferating clone of plasma cells. Paraprotein occurs in benign monoclonal gammopathy and myeloma, among others.

Papule

Parastomal	At the side of a stoma.

Pathergy	Literally "diseased reactivity." This term refers to the breakdown and ulceration of the skin at sites of even minor trauma, which is seen in certain diseases. As these diseases are usually characterized by ulceration anyway (pyoderma gangrenosum, Behçet's disease, and Wegener's granulomatosis), the term is effectively synonymous with the Koebner phenomenon.
Pemphigoid	A severe autoimmune blistering disease, particularly of older people. The blisters are caused by the skin splitting at the junction between dermis and epidermis. The cause is unknown.
Pemphigus	A severe autoimmune blistering disease that may affect mucous membranes as well as skin. The blisters result from a loss of epidermal cell cohesion. The cause is unknown but this group of diseases may be associated with solid tumors.
Perianal	Around the anus.
Perioral	Around the mouth.
Peristomal	Around the stoma.
Perivascular	Around blood vessels.
Phimosis	Tightness of the end of the foreskin that prevents retraction over the glans penis.
Plaque	A solid elevation of the skin that can be palpated or observed and is >2 cm in diameter.
Pompholyx	Vesicular eczema of the palms and/or soles.
Post-inflammatory hyperpigmentation	Enhanced skin pigmentation which can follow any inflammatory process (e.g., eczema).
Presternal	In front of the sternum, for example, presternal skin is the skin overlying the sternum.
Proctectomy	Excision of the rectum.
Pruritus	Itch.
Purpura	Purple discoloration in the skin that does not blanche on pressure. The discoloration is caused by blood in the dermis which has leaked from capillaries as a result of capillary fragility, inflammation, or a bleeding tendency. Compare with "Ecchymosis."
Pustule	A visible collection of free pus.
Retinoid therapy	A group of therapeutic agents that are analogues of vitamin A and act by modifying cell turnover in the skin. The group includes acitretin and isotretinoin, which are used for psoriasis and acne, respectively.
Scale	White flakes on the skin formed from keratin of the horny layer. It often accompanies inflammatory disorders.
Scar	Replacement of skin by fibrous tissue as a response to trauma or disease.
Sclerosis	Hardened, thickened areas of the subcutaneous tissues, resulting from chronic inflammation or abnormal growth of fibrous tissue. It may also involve the dermis, when the overlying epidermis may be atrophic (q.v.).
Seroma	A collection of serum, usually near a surgical wound site and associated with leaky or damaged vessels.
Serosa	Membrane lining (mesothelium) of the large body cavities (e.g., abdomen) and used for the outer membrane covering of the gastrointestinal tract.
Serpiginous	Creeping like a snake's path.
Seton suture	A suture that is looped through an anal fistula to keep it open and allow any pusto drain, thereby preventing abscess formation.

Plaque

Pustule

Scale

Scar

Squamous	Refers to epithelium that comprises an outer layer of large flattened cells. The skin is a stratified squamous epithelium.
Stria, -ae	Stretch mark(s).
Sycosis	Chronic, pyogenic (pus producing) infection of the whole hair follicle.
Synergistic gangrene	One of the necrotizing subcutaneous infections. It usually follows abdominal surgery and may be caused by a variety of coinfecting organisms, hence the term synergistic. These include streptococci, Bacteroides sp., gram-negative bacteria, and staphylococci. Where Streptococci are involved, the infection is effectively the same as necrotizing fasciitis. If such a process involves the lower abdomen and scrotum in men, usually diabetics, the term Fournier's gangrene is sometimes used.
Telangiectasia	Literally, dilation of the smaller (more distal branches) blood vessels. This usually refers to localized dilation of skin capillaries, which may be seen after certain inflammatory processes affecting the skin or be secondary to systemic disease (e.g., spider nevi associated with liver disease).
TNF-α	A proinflammatory cytokine that stimulates the acute phase of inflammation. It is a mediator in the inflammatory processes of many diseases (e.g., psoriasis, rheumatoid, and Crohn's disease).
Trephine	Strictly, an instrument used to remove a disc of bone, especially from the skull. The term is also used for the hole produced and, by extension, for other surgically produced holes (e.g., in the abdominal wall when forming a stoma).
Tubercular	Relating to, or directly resulting from, tuberculosis (e.g., tubercular abscess).
Ulcer	A circumscribed, depressed lesion in which the epidermis and at least part of the dermis have been lost.
Urticaria	A group of conditions, of various causes, characterized by itchy, red swellings of the skin and secondary to the triggered release of inflammatory mediators, including histamine.

Ulcer

Usage test (use test)	In investigation of contact sensitivity in stoma patients, this refers to applying a dummy appliance and all washing or other materials to the nonstoma side of the abdomen for five days in order to assess for a possible reaction that would manifest as a dermatitis.
Verruca, -ous	Refers to a viral wart. Colloquially a verruca is a viral wart on the sole of the foot (plantar wart). "Verrucous" means having the features of a wart, the term usually referring to the rough surface.
Vesicle	An elevated, fluid-containing lesion <5 mm in diameter (compare with "Bulla").
Wegener's granulomatosis	A granulomatous, small-vessel vasculitis of unknown cause which produces a triad of upper and lower respiratory tract granulomas and a glomerulonephritis. The skin is frequently involved with vasculitic lesions that may ulcerate.
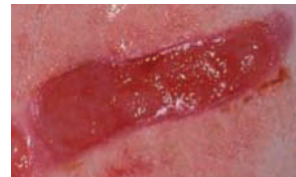
Vesicles

Appendix 2: Stoma Appliance Terminology

The illustration shows a typical, one-piece, drainable, convex ileostomy pouch or bag. The terminology for the parts of an appliance can be confusing and there may be several synonyms. These are listed in the table below.
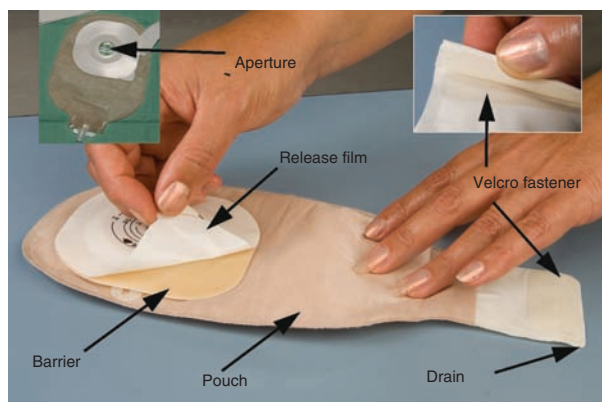
Name	Synonym
Stoma bag (the whole device)	Appliance
	Pouch
Bag	Pouch
Barrier	Wafer
	Flange
	Backplate
	Faceplate
	Adhesive plate
Release film	Adhesive cover (removed before the stoma bag is fitted)
Aperture	Hole (for placing over the stoma)
Drain	Outlet
Clip	Tie fastener

Appendix 3: Skin Physiology and Response to Injury

ANATOMY AND PHYSIOLOGY OF THE SKIN

A basic understanding of the skin's physiology, anatomy, and response to injury is helpful when assessing peristomal skin abnormalities. The skin represents a protective barrier against the external environment. This is achieved not only by the physical properties of the outer horny layer, but also by several glandular, immunological, and nervous structures. These organs and their functions are outlined in Table A3.1.

The skin comprises two principal layers: the epidermis and the dermis (Fig. A3.1). The epidermis varies in thickness from 0.1 mm on eyelids to 1 mm on the palms and soles of the feet; it is often subdivided into four further layers or strata: basal, spinous, granular, and corneal (Fig. A3.1 and text below). The tenfold variation in epidermal thickness highlights the protective function of the epidermis. In fact, it will become thicker at any site in response to repeated trauma such as from friction, pressure, or scratching. This is achieved by an expansion of the stratum spinosum and stratum corneum, in particular. These processes of cell division and maturation, which determine epidermal thickness, are tightly regulated by local signalling proteins (cytokines and growth factors). The lower layer of the epidermis consists of the basal keratinocytes. These cells continually divide to produce new cells that will progress toward the skin surface over a period of about 60 days. They first form the stratum spinosum, also called the spiny or prickle-cell layer because the tight bonds between the cells appear as prickles histologically. This layer provides much of the strength of the epidermis. In individuals who have hereditary or acquired abnormalities of these intercellular bonds (e.g., pemphigus and Hailey–Hailey disease), the skin is fragile and easily blistered. As the basal layer produces new keratinocytes, the stratum spinosum is gradually moved up to form the granular layer, by which time the cells

Table A3.1 Functions of the Skin

Skin structure	Functions
Stratum corneum (horny layer)	Protection against trauma, either physical, chemical, heat, or ultraviolet light.
Keratinocytes	Vitamin D synthesis necessary for normal calcium metabolism.
Melanocytes	Protection of the keratinocyte nuclei from ultraviolet light damage. Skin pigmentation.
Langerhans cells	Bone marrow derived cells involved in immunological surveillance (see chap. 3).
Sensory nerves	Sensory communication providing an awareness of pain, temperature, vibration, itch, and touch.
Motor nerves	Involved in controlling blood flow, sweat gland function, and the hair movements when cold or scared (piloerection or "goose bumps").
Blood vessels (under nervous control)	Temperature regulation by increasing or decreasing the flow of blood through the skin. Communication via flushing or pallor of the skin as in embarrassment or fear, respectively.
Sweat glands	Temperature regulation via evaporation of sweat. Protection against infection: sweat contains urea and ammonia so that it is acidic (pH 4.0–6.8) and discourages the overgrowth of some pathogenic bacteria.
Pilosebaceous units (hair follicle plus sebaceous gland)	Protection against infection: the sebaceous glands produce greasy secretions that limit the proliferation of certain bacteria and fungi. Protection by waterproofing the skin. At certain moist body sites where waterproofing is needed, sebaceous glands occur without an associated hair follicle. These areas include around the eyes, mouth, anus, and genitalia where the glands may be abundant. The hair provides warmth, adornment, and denotes sexual differentiation and maturity.
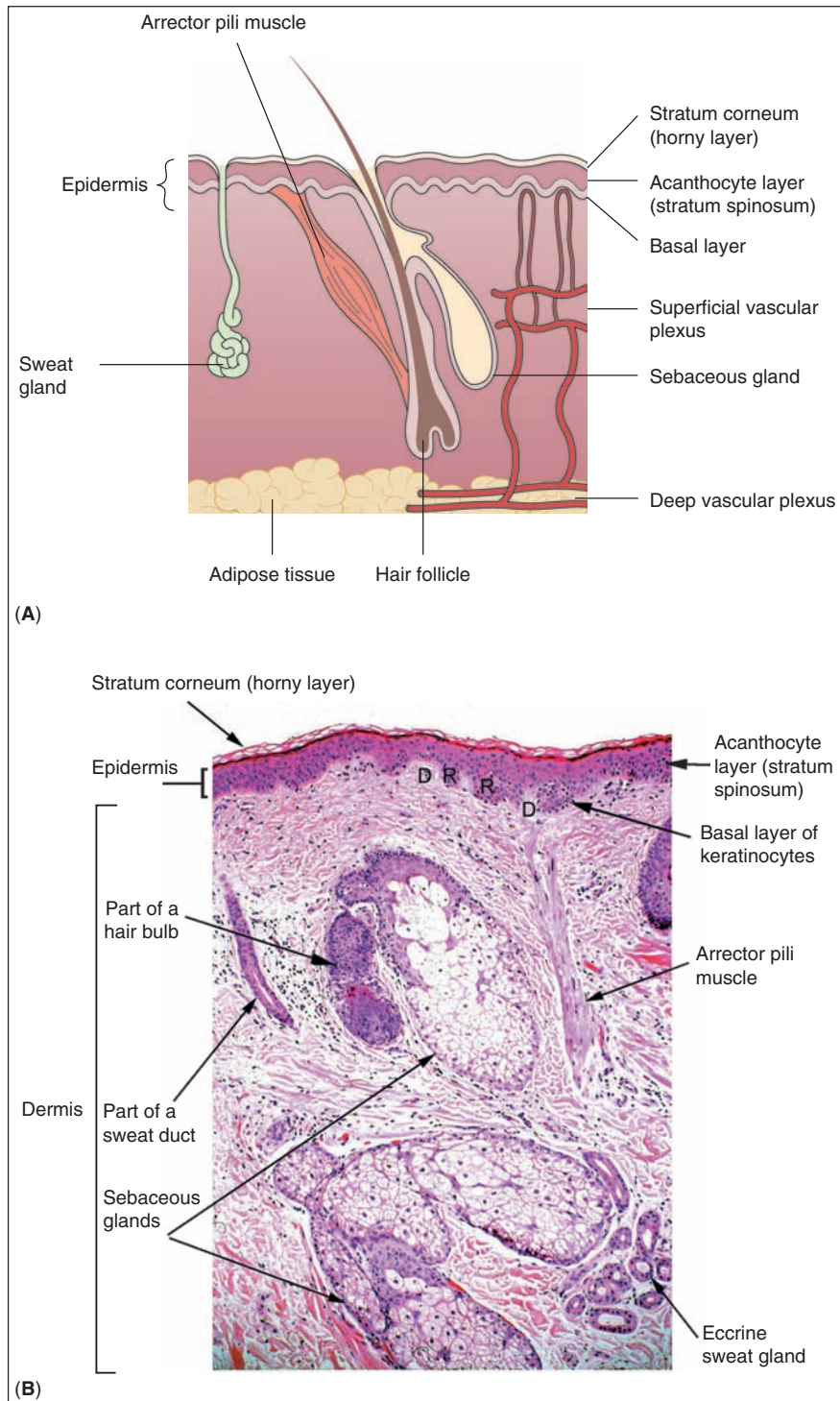
Figure A3.1   (**A**) A diagram of a section through normal skin. (**B**) A photomicrograph of a histologically stained section of normal skin. The sebaceous glands shown will empty into one hair follicle, coating the hair with their greasy secretions. The arrector pili muscle is responsible for moving the hair, as when they "stand on end." The dermal papillae (D) are the projections from the dermis that interlock with complimentary projections of the epidermis termed rete ridges (R).

are becoming flatter. They also lose cytoplasm, and this is replaced by keratin proteins. The cells flatten further and lose their nuclei as they move on to the horny layer (stratum corneum), with the result that this layer consists of stacks of flattened dead cells that form a waterproof barrier. The epidermis also contains melanocytes and Langerhans cells (Table A3.1).

The dermis and epidermis are firmly bonded together by means of strong collagen fibers; interlocking projections from both surfaces serve to increase the surface area for adhesion. This interface is the subject of considerable research interest because hereditary abnormalities of the bonding proteins, as well as some acquired diseases, will impair the adhesion between epidermis and dermis, resulting in fragile skin.

The dermis consists of a network of elastic fibers, collagen fibers, and ground substance proteins produced by fibroblast cells. This fibrous structure provides strength and confers the elastic, cushioning qualities to the skin. The dermis contains a network of blood and lymph vessels, pilosebaceous units (hair follicle and grease gland apparatus), sweat glands, and nerves. These are described in Table A3.1.

RESPONSE OF THE SKIN TO INJURY

Repeated friction, scratching, chemical irritation, or ultraviolet light exposure triggers the basal keratinocytes to proliferate and increase the thickness of the epidermis. This process manifests most commonly as thickening of the skin of the hands (with or without callus formation) when one undertakes unaccustomed manual work. However, it is a normal physiological response evident in many other situations. It is seen, for example, as lichenification (thickening of the skin), a reaction to repeated rubbing or scratching in certain pruritic skin diseases such as eczema.

When the skin is cut, burned, or otherwise traumatized, a series of repair responses is triggered. In general, superficial damage, involving only the epidermis or upper dermis, will heal without significant scarring. This is because the epidermis can grow from the wound edges or hair follicles in the base to cover the wound. Deeper wound usually cause scars. In a deep incisional wound such as a surgical incision, the cut edges are adjacent and fit together so that healing can take place with minimal scarring. In order to assist healing, significant wounds are sutured so that the edges are everted and held in contact (primary intention healing). Even if a wound is large and there has been loss of tissue, primary intention healing will be achieved if the wound edges can be brought together cleanly and sutured. If, however, such a wound is left to heal, the resulting scar undergoes contraction (secondary intention healing), which reduces the size of the defect but increases the likelihood of an irregular skin surface.

The processes involved in wound healing are as follows:

- Hemorrhage is stopped when the clotting cascade and platelet aggregation combine to plug the holes in damaged vessels. Clotted blood may fill large areas of the wound (hematoma), and this clot is subsequently replaced by scar formation.
- An immediate result of the damage is the triggering of an inflammatory response. Signalling chemicals, including chemoattractant molecules and growth factors, are released by aggregating platelets and by damaged keratinocytes. These signals increase local blood flow (flare response) and blood vessel permeability leading to tissue edema (wheal response). A local nerve reflex also contributes to the blood vessel changes in skin injury.
- The chemoattractants bring about an influx of white blood cells, initially neutrophils followed by monocytes which become activated to macrophages. These phagocytic cells remove bacteria, foreign bodies, and other debris, including clot. Growth factors, released particularly by macrophages, stimulate formation of the new blood vessels that will provide the route by which nutrients, etc., reach the healing wound. This new blood vessel formation is termed granulation tissue because of the granular appearance of the new blood vessel loops. As the healing process continues, new vessel formation diminishes and many of the newly formed vessels involute to leave only the essential dermal capillary network for healthy skin.
- While these processes are going on, the dermal fibroblasts are manufacturing collagen and ground substance that will form the healing scar tissue.
- Aberrations of the wound healing process that are relevant to peristomal skin are occasionally seen. In some people, the scar forming process can produce large scars that extend well above

the skin to form a ridged irregular skin surface. If the prominent scar remains within the area of skin injury, it is termed a hypertrophic scar. If the hypertrophy extends laterally into normal skin, the lesions are termed keloids. Keloids probably result from individual variations in the growth factor control of fibroblast function (possibly insulin-like growth factor). They are more common in younger adults when growth hormone levels are highest and in some races, particularly Africans and Orientals. Keloid, hypertrophic, and even normal scars produce an irregular skin surface that can interfere with normal stoma appliance adhesion.

- Another problem associated with healing wounds is overgranulation ("proud flesh"). In this condition, the control of granulation tissue formation and removal is incorrect, resulting in tender, bleeding areas associated with recent wounds. Sometimes discrete nodules termed pyogenic granulomas occur. These consist of lobules of proliferating capillaries, hence the more correct term "lobular capillary hemangioma." These areas of excess granulation tissue relate to the frustrated healing of a recent wound, and the abnormal process is probably driven by local infection. The "granulomas" seen around stomas [see section "'Granulomas' (Papular Overgranulation Sometimes with Bowel Metaplasia)" in chap. 3] result from fecal/urine irritation and local infection/colonization with bacteria may be contributory.

Appendix 4: Topical Corticosteroid and Other Treatments for Peristomal Rashes

Peristomal skin disorders present unique problems for topical treatment because the creams, ointments or oily lotions, in which topical steroids are usually formulated, impair the adhesion of a stoma pouch to the skin. An ideal topical steroid preparation for peristomal use would be a commercially available, oil-free, aqueous spray without any irritating alcohol content, which nevertheless dried rapidly to leave a slightly sticky surface. Unfortunately, such a preparation is no longer available at least in the United Kingdom, and other products have to be adapted for use. One approach is to apply a topical steroid cream or ointment under occlusion with a hydrocolloid or vapor-permeable membrane, before fitting the stoma appliance. However, unless the affected area is relatively small, this may also interfere with proper bag adhesion. We have developed an alternative approach to this problem using aqueous/alcohol lotions containing corticosteroids to treat a variety of inflammatory dermatoses. The lotions we have used are proprietary scalp applications containing 40% to 50% isopropyl alcohol, which has an antibacterial action and aids evaporation (Table A4.1). Alternatively, a range of corticosteroids can be compounded in isopropyl alcohol (40%). Because they contain no oils, these lotions do not impair bag adhesion.

These preparations are applied to clean skin when the stoma bags are changed, up to a maximum frequency of once daily (Fig. A4.1). Alcohol-containing lotions or foams cause stinging discomfort on broken skin. In this situation, the lotion can be applied to the adhesive barrier of the stoma bag and the alcohol allowed to evaporate for approximately 15 minutes prior to placing the bag on the skin (Fig. A4.1) (this does not apply to Clarelux™ foam). Some patients have tried to speed up evaporation with a hair drier. This should be *discouraged*, as the alcohol lotions are inflammable. Lotions containing coconut oil, liquid paraffin, or glycerine are not used because of reduced bag adhesion. Propylene glycol can impair adhesion a little, but patients rarely find it a problem (Clarelux and Synalar™ preparations).

Alternative vehicles, which have been used for applying corticosteroid to inflamed peristomal skin without impairing bag adhesion, include steroid nasal sprays, ear or eye drops, and asthma inhalers (beclomethasone dipropionate). Ulcerating lesions may be treated with topical corticosteroids formulated in carmellose sodium paste. This is available commercially in the United Kingdom as corticosteroid in carmellose sodium paste (see p. xii) (E.R. Squibb Ltd.). Steroid impregnated, vapor-permeable tape (Haelan™ tape, Typharm Ltd.) is particularly effective in treating shallow inflammatory ulcers (Dr. Adrian Ive, personal communication). The tape is very thin and small pieces do not interfere with bag adhesion (Fig. A4.2). Because it is impregnated with the active steroid (flurandrenolone), other steroid preparations need not be applied beneath it. The tape is replaced at stoma-bag changes, up to a maximum of once a day. Scalp gels containing corticosteroids are available (Synalar gel™, Bioglan, Hitchin, U.K.) and have been used effectively to treat peristomal dermatoses but they may contain propylene glycol which sometimes impairs bag adhesion.

Table A4.1 Commercially Available Corticosteroid Scalp Lotions that Can Be Used for Peristomal Dermatoses

Corticosteroid	Trade name and manufacturer	Excipients in addition to isopropyl alcohol
Betamethasone valerate 0.1%	Betnovate™; GlaxoSmithKline	Carbomer, sodium hydroxide, and water
Betamethasone dipropionate 0.05%	Diprosone™; Schering-Plough	Carbomer, sodium hydroxide, and water
Clobetasol propionate 0.05%	Dermovate™; GlaxoSmithKline	Carbomer, sodium hydroxide, and water
Clobetasol propionate 0.05% spray foam	Clarelux™; Fabre	Cetyl alcohol, propylene glycol, and stearyl alcohol

(**A**)

(**B**)

(**C**)

(**D**)

Figure A4.1 (**A**) Once the protective release film has been removed from the stoma-bag's adhesive barrier, a few drops of steroid lotion are put onto the adhesive. This need only be put on the area that will cover the affected skin. It may be smeared a little to spread it. (**B**) When it has dried for 15 minutes, the adhesive continues to glisten a little but will adhere normally to skin. (**C** and **D**) A young woman with an ileostomy for ulcerative colitis who suffers from psoriasis with seborrhoeic eczema ("sebopsoriasis"); note the typical involvement of the lower abdominal fold. The images show her skin before and after one week of daily treatment with clobetasol propionate 0.05% scalp foam (Clarelux; Fabre). She continues to use the foam intermittently (less than once a week) in order to maintain control of the sebopsoriasis. The product contains some alcohol and will sting on broken skin.
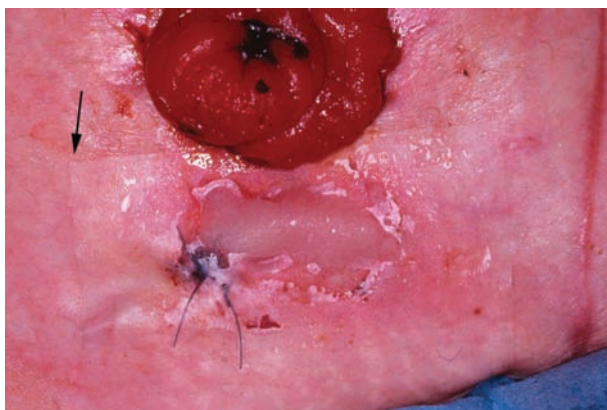
Figure A4.2 This patient with ulcerative colitis has a pyoderma gangrenosum ulcer beneath the ileostomy. This has been filled with carmellose sodium paste [corticosteroid in carmellose sodium paste (see p. xii)] containing tacrolimus. The whole area has then been covered with Haelan tape. The corner of this very thin film is shown by the arrow.

(A)

(B)

(C)
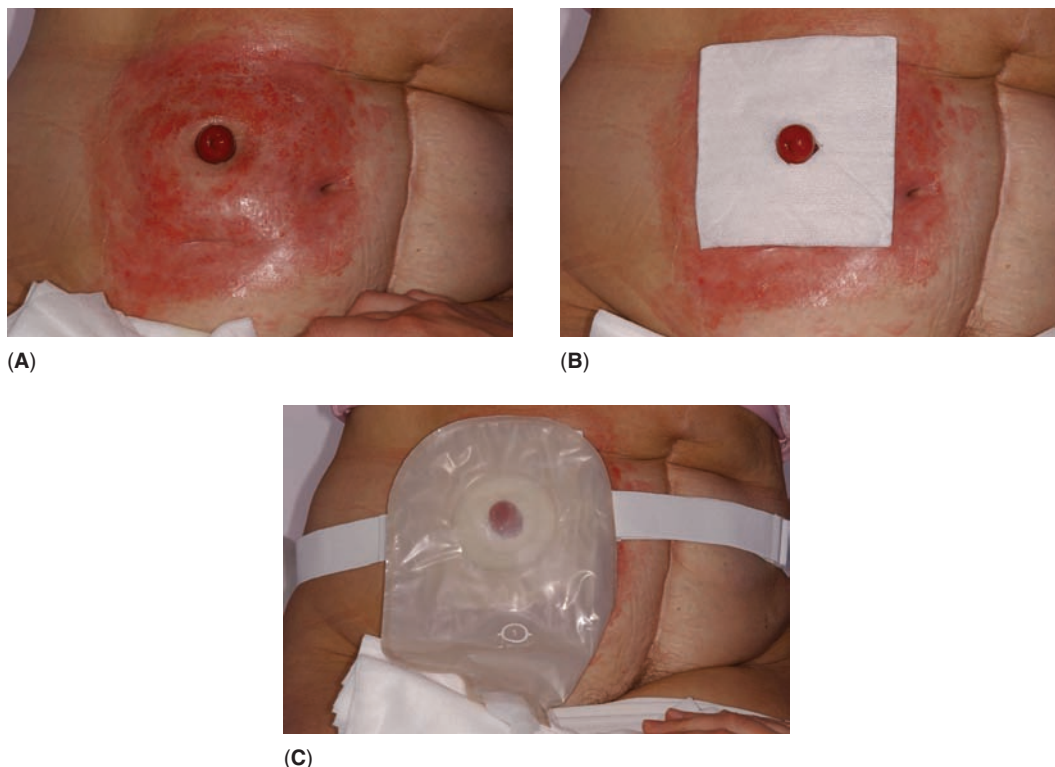
Figure A4.3 (**A**) Patient with eroded eczema surrounding the stoma, tacrolimus ointment was applied. (**B**) A piece of gauze covers the area and (**C**) a bag is held in place with a waist belt and without removing the release film from the barrier.

Corticosteroids are nonspecific, anti-inflammatory agents. It is therefore important to identify specific causes of peristomal rashes, particularly infections, allergy, and irritant dermatitis, for which effective, specific interventions are available. Under the occlusion of a stoma bag, the strength of topical steroids is effectively increased. This potentially increases the possibility of steroid-related cutaneous atrophy and the propensity for systemic absorption. It is, therefore, important to remember that these therapies are intended for temporary use only, to control severe dermatoses and for occasional use thereafter. Initial treatment is for a maximum of four weeks. In cases where the dermatosis begins to recur after treatment has stopped, most patients are able to control it with applications every two to four weeks, making steroid side effects very unlikely. If more frequent applications are necessary for prolonged periods, other treatment options should be considered under the supervision of a dermatologist.

Similar considerations apply to any topical preparation for peristomal skin. In our practice, this principally applies to tacrolimus (see chap. 6, p. 200) and topical antiseptics (see chap. 4, p. 106).

There is a further approach that can be useful in selected patients where the techniques above have been unsuccessful and before considering systemic therapies. This was devised by one of our patients and requires that the stoma spout is at least 1 cm long and that the patient can sit relatively still for approximately two hours a day (Fig. A4.3). The patient applies the corticosteroid (or tacrolimus) as the proprietary ointment or cream to the affected skin and then covers it with a single sheet of gauze with a hole cut for the stoma. A bag is applied without removing the release film from the adhesive barrier and a waist belt is attached to hold the bag in place while the patient sits still for two hours or so (e.g., watching television). After the allotted time, the skin is wiped clean and a bag is applied normally. This approach relies on the fact that the clinical effectiveness of the proprietary creams, etc., is greater than those made up in

lotions or pastes and that most of the active ingredient is transferred through the skin in the first two hours of application (1).

REFERENCE

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▌ Appendix 5: Diagnostic Guide

1: Rash (inflammation or skin discoloration)

Go to page 251

What is the most prominent feature of the peristomal skin problem?

2: Discrete, raised lesions (papules, nodules)

Go to page 252

Skin infections may present atypically in peristomal skin and almost any skin disorder can become secondarily infected. Therefore all rashes and ulcers should be swabbed for microbiological examination.

3: Ulceration

Go to page 253

1: Rash

Blue discoloration from stoma appliances especially urostomies (see chap. 3).
Consider discoloration from vascular proliferation arround the stoma.

Blue

Vascular proliferation

Is pigmentation bluish or brownish?

No

Brown

Brown pigmentation may be associated with irritant lichenification (see chap. 3) or post-inflammatory changes (see chap. 3).

Is the skin red and inflamed?

Yes

Fecal leakage

Is there obvious fecal or urine leakage on to the skin?

Yes → Fecal or urine irritant dermatitis (see chap. 3).

No

Is the area of irritation predominantly in a crescent shape under the stoma?

Yes → Consider fecal or urine irritant dermatitis occurring because the stoma bag aperture is too large, leaving an exposed crescent-shaped area of skin (see chap. 2).

No

Irritant dermatitis

Is the skin surrounding the stoma scarred or irregular?

Yes → Consider fecal or urine irritant dermatitis occurring because of poor bag adhesion to the irregular surface (see chap. 3).

No

Is there skin disease elsewhere?

Yes → Consider particularly psoriasis, eczema, lichen sclerosis and blistering diseases (see chap. 5).

No

Psoriasis

Is the rash associated, with a new appliance or medicament or a new batch of supplies?

Yes → Consider allergic contact dermatitis or chemical irritant dermatitis (see chap. 3).

No

Is there evidence of skin infection?

Yes → All rashes should be investigated for signs of infection as they may present atypically (see chap. 4).

No

Non-infective, non-allergic dermatitis (see chaps. 2 and 3).

Staphylococcal skin infection

2: Raised Lesions

Viral warts

Do they appear on the mucosa of the stoma?

Yes → Viral warts (see chap. 4). Consider skin neoplasms (see chap. 5) or dermatitis artefacta (see chap. 3).

No → Are they around a urostomy?

Are they around a urostomy?

Yes → Chronic papillomatous dermatitis (see chap. 3). Consider skin neoplasms (see chap. 5), viral warts (see chap. 4) or crystalline excrescences (see chap. 3).

Chronic papillomatous dermatitis

No → Irritant acanthomas (see chaps. 2 and 3). The area affected may be a crescent immediately beneath the stoma. Consider skin neoplasms (see chap. 5). Consider metastases (see chap. 6).

Irritant reaction

Do the lesions have a warty, whitish surface?

Yes (→ up to "Do they appear on the mucosa of the stoma?")

No → Are the skin lesions red or flesh colored?

Are the skin lesions red or flesh colored?

Yes → Do they bleed easily and have a moist surface?

Do they bleed easily and have a moist surface?

Yes → Irritant over-granulations with bowel metaplasia (see chap. 3).

Granulomas

No → Exclude malignancies or Crohn's disease of the skin (see chap. 6).

No → Are there several dome-shaped papules?

Are there several dome-shaped papules?

Yes → Crohn's disease of the skin, particularly if the stoma spout has become very short or there are fistulas (see chap. 6).

Cutaneous Crohn's disease

No → Consider benign or malignant neoplasms of the skin (see chap. 5) or metastases to skin (see chap. 6). Consider biopsy.

Metastatic adenocarcinoma

3: Ulceration

This ulceration may result from rubbing, skin pressure from a convex appliance or a hernia. It may also occur from skin tearing on removing appliances particularly in the elderly patients (see chap. 2). Consider pyoderma gangrenosum (see chap. 6).

Yes

Is direct trauma to the skin from the stoma appliance, supports, or clothing possible?

Wound dehiscence

Wound dehiscence (see chap. 1). Consider pyoderma gangrenosum.

No

Yes

Is the ulceration in a surgical scar?

No

Is the ulceration very superficial in an area of inflamed skin?

Yes

Is there skin disease elsewhere?

Yes

Consider pre-existing skin disease, such as eczema or psoriasis, affecting peristomal skin (see chap. 5).

Erosive irritant dermatitis

No

Consider erosions associated with irritant dermatitis or tearing of the skin from frequent appliance changes (see chaps. 2 and 3).

No

Is the ulceration painful with an overhanging purple edge?

Is the ulceration bland with an non-inflamed edge?

Is there any wound breakdown or surrounding cellulitis changes?

Consider pyoderma gangrenosum (see chap. 6)

Consider Crohn's disease of the skin (see chap. 6); this can present like pyoderma gangrenosum

Consider Nicorandil ulceration (see chaps. 5 and 6)

consider infection (see chap. 4)

Appendix 6: Skin Manifestations of Systemic Anticancer Therapy

Kim Last

There are barely a handful of reports of stoma-related side effects of chemotherapy. This appendix, therefore, provides an overview of the cutaneous side effects of systemic anticancer therapies.

THE GOOD

Cetuximab and panitumumab are monoclonal antibodies that bind to the epidermal growth factor receptor (EGFR), by inhibiting ligand binding and inducing receptor dimerization and downregulation. The tyrosine kinase inhibitors erlotinib and gefitinib target the EGFR and are also licensed as anticancer biological agents (Fig. A6.1). Anti-EGFR therapy has activity against colorectal cancer, head and neck, lung, and pancreatic cancers. An acneiform rash (pustular or maculopapular follicular eruption) occurs in virtually 90% of patients treated with an anti-EGFR agent, being grade 3 or 4 severity in up to 20%. The presence and severity of a rash is strongly correlated with tumor response and overall survival. Paronychia occurs in 15% of patients and xerosis in 35% of patients. Other cutaneous side effects of anti-EGFR therapy are painful fissuring of the soles and palms, alterations in hair growth, and mucositis. These skin toxicities usually disappear without sequelae within four weeks of anti-EGFR therapy discontinuation. Treatment of these skin side effects remains empirical with no prospective randomized control trial data to guide management to date. Consensus treatment guidelines have been produced by several interested groups.

Figure A6.1   Acneiform rash in a 40-year-old man receiving erlotinib for small cell lung cancer. The field of radiotherapy is spared.

THE BAD

Hypersensitivity reactions are common with systemic anticancer treatments. With docetaxel, paclitaxel, and pemetrexed, a hypersensitivity reaction is so frequent, and life threatening in a small number, that prophylactic dexamethasone is given beginning the day before treatment. Hypersensitivity reactions are seen with repeated administration of oxaliplatin and carboplatin in around 10% of patients. Symptoms and signs of hypersensitivity reactions include erythema, facial flushing, pruritus, rash, hives, tachycardia, dyspnea, fever, tongue swelling, edema, chills, weakness, burning sensations, vomiting, dizziness, and headache (see chap. 6).

THE COMMON

Cutaneous side effects are listed as common for virtually all chemotherapy and antineoplastic biological agents, for example, 70% of infusions of docetaxel (a semisynthetic taxoid) are associated with skin reactions. These include hypersensitivity, alopecia, sunlight sensitivity, nail pigmentation, nail onycholysis, erythrodysesthesia, and scleroderma. Chilled mittens and boots can be worn to reduce the likelihood of onycholysis.

Palmar-plantar erythema (PPE) or hand-foot syndrome is a common side effect of liposomal doxorubicin, 5-fluorouracil, and its oral prodrug capecitabine. PPE begins as redness and dryness followed by paresthesia and painful erythema of the palms and soles and ultimately blistering, fissuring, and ulceration. The severity of PPE is dose dependent, and leads to a chemotherapy dose reduction in up to 40% of patients. It is treated empirically with emollients, oral pyridoxine, and topical steroids.

THE INTERESTING

Flagellate erythema is an interesting side effect of bleomycin and has also been rarely described secondary to docetaxel (Fig. A6.2). A positive effect of capecitabine and 5-fluorouracil administration can be the coincident treatment of patient's actinic keratoses (precancerous skin lesions). Radiation recall dermatitis can occur days to years after the radiotherapy and arise in any site that has been previously irradiated; it presents as a painful dermatitis. Precipitating chemotherapeutic agents include gemcitabine and docetaxel.

Figure A6.2 Flagellate erythema, literally means "like the marks from whipping." In this young woman, it was secondary to bleomycin that she had received for lymphoma.

❙ Further Reading

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Index

Dermatology

About the book

Although nearly two-thirds of patients with an ileostomy, colostomy or urostomy can experience skin problems that interfere with their normal daily life, there has been very little information published that attempts to explain the problems to the whole team involved in care for the patient. This innovative handbook bridges the gaps between the dermatologist, the stoma specialist, the colorectal surgeon, and the wider multidisciplinary team: it addresses the questions of what pathology is involved, what can be done by nurses, when to refer to a dermatologist, and what can be done by a dermatologist. Now in its second edition, this acclaimed reference has been revised throughout and contains new material particularly on nutrition, on irritable bowel syndrome, and on children with stomas.

'This book fills a gap in the literature and does so extremely well. It is a pleasure to use. The stoma nurses in my hospital love it,' *BMA Medical Book Award 2001 Report* (Highly Commended) [of the first edition]

'Lucid and informative ... a longed for contribution towards increasing our knowledge and understanding ... I warmly recommend this volume.' *Acta Dermato-Venereologica* [of the first edition]

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In 1997 they began a research project to examine and identify peristomal skin problems. The results have been widely published in nursing and medical journals and at local, national and international conferences. The team went on to achieve a quality award for best service improvement.

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