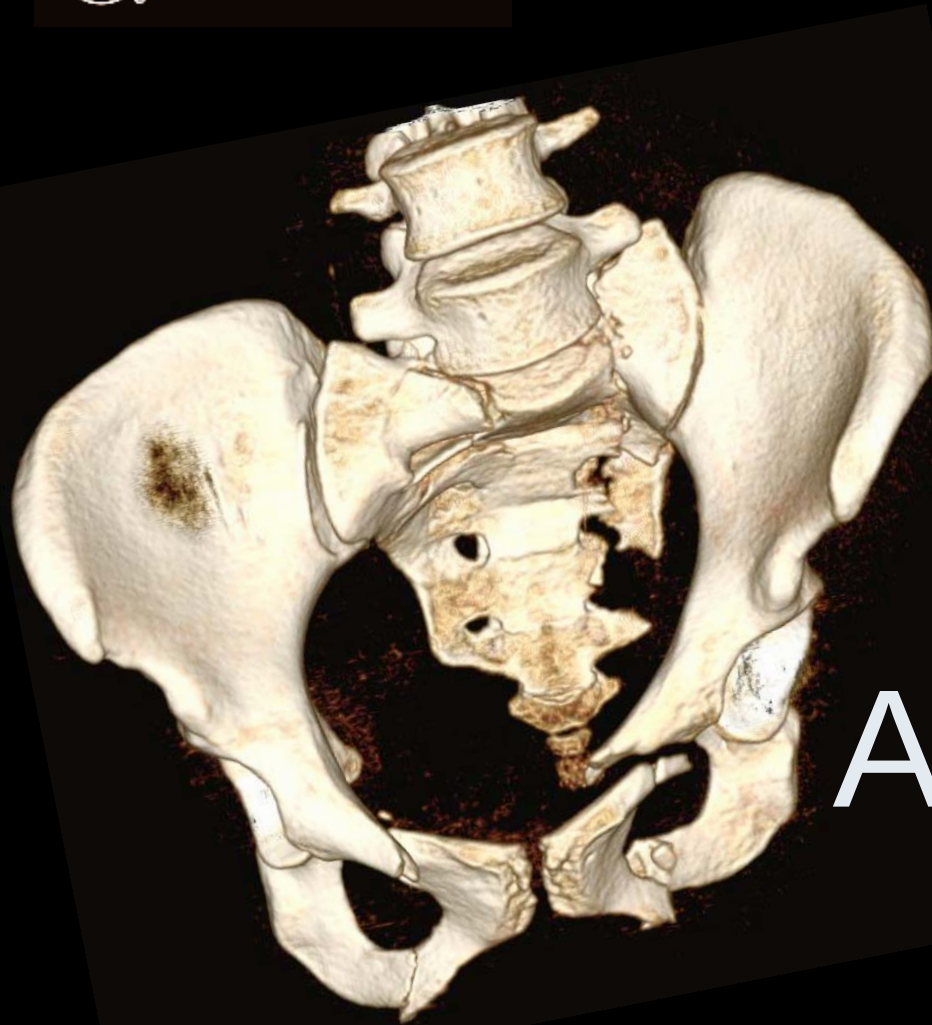




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Pelvic Trauma

Atlas of Pelvic Fractures

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Patient Presentation

Patient is a 21-year-old woman who was struck by a motor vehicle at high speed, while crossing the street.
By report she was thrown approximately 100 feet.

She arrived intubated and sedated.
Stable after receiving 4 L of crystalloid,
packed red blood cells and FFP





Menu of Diagnostic Tests for Pelvic Trauma

Ultrasound: Check for hemoperitoneum

Plain radiograph: Inlet, outlet and Judet (oblique) views

CT scan: Gold standard

Retrograde cystourethrogram: If suspected GU trauma

Diagnostic peritoneal aspirate: If hemodynamically unstable



Imaging Obtained for Our Patient

Portable chest

CT head w/o contrast

CT C-spine w/o contrast

CT chest w/contrast

CT abd and pelvis w/contrast

Foot xray

Patient requires full-body CT scan





Imaging Findings from Our Patients

Pelvic fractures

Spinous process fracture C6-T4

R Pneumothorax

Lacerated liver

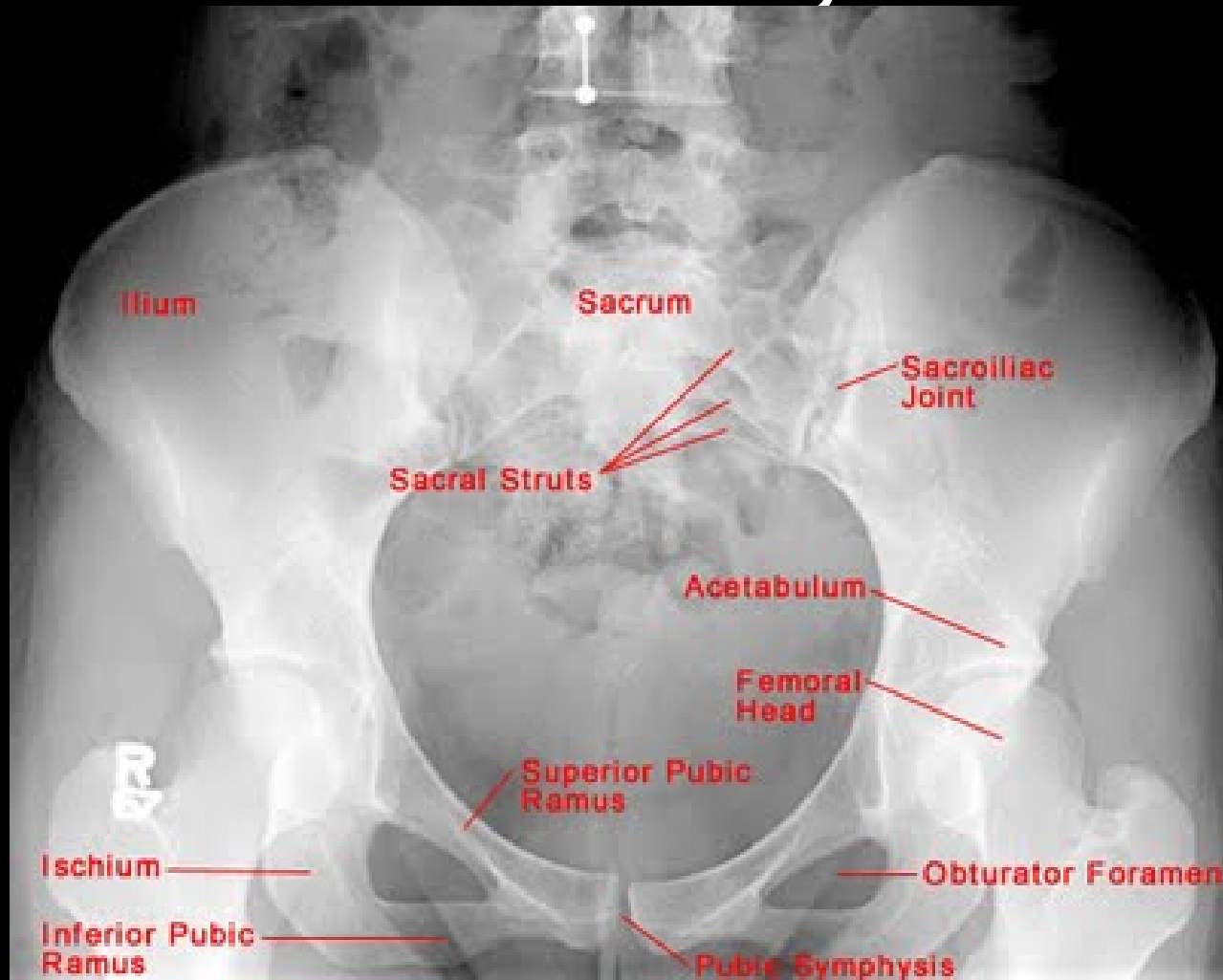
Comminuted fracture of humerus

Sternoclavicular dislocation

Multiple rib fractures



Normal Pelvic Anatomy





Normal Pelvic Anatomy: Contours

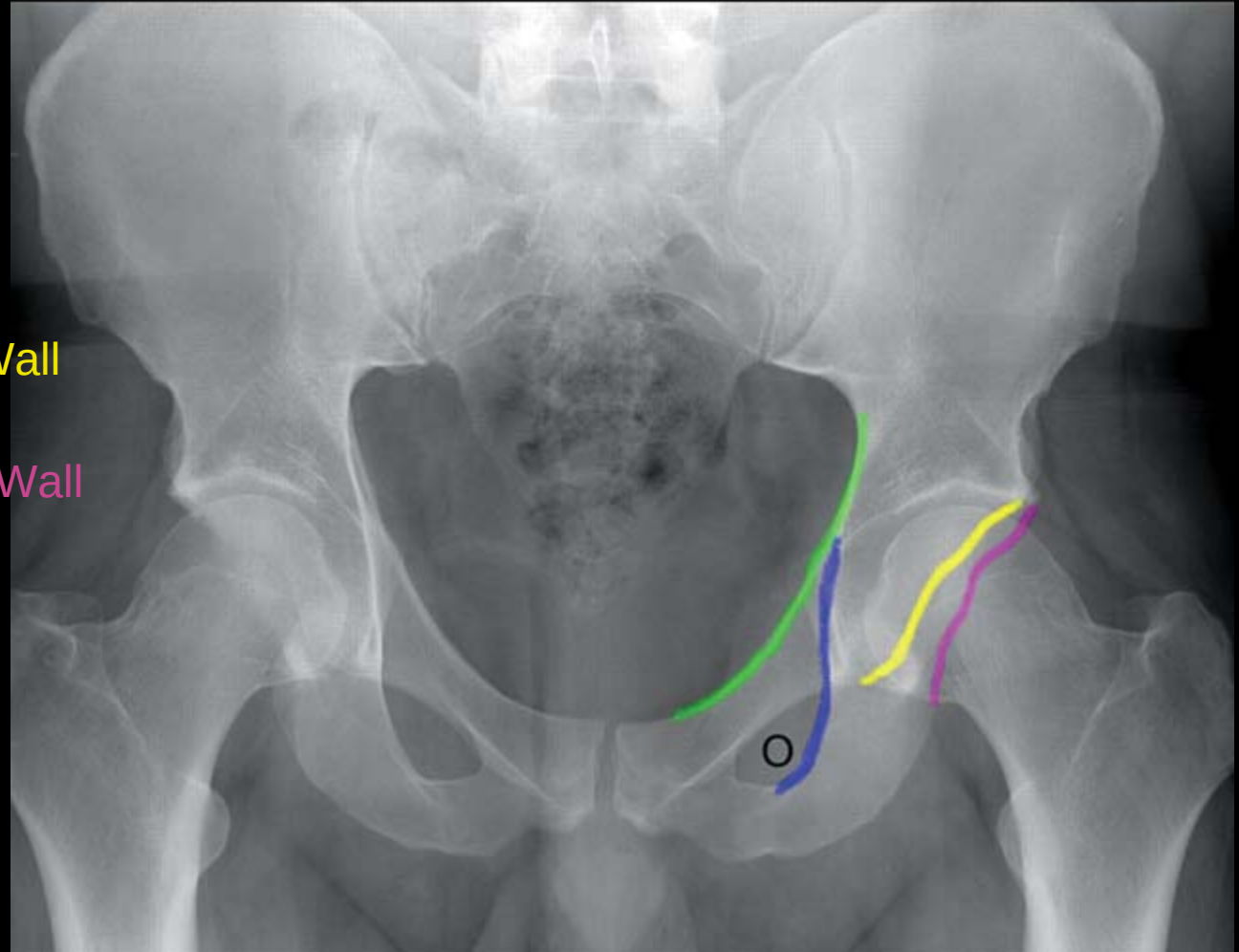
Iliopectineal Line

Ilioischial Line

Anterior Acetabular Wall

Posterior Acetabular Wall

Obturator Foramen





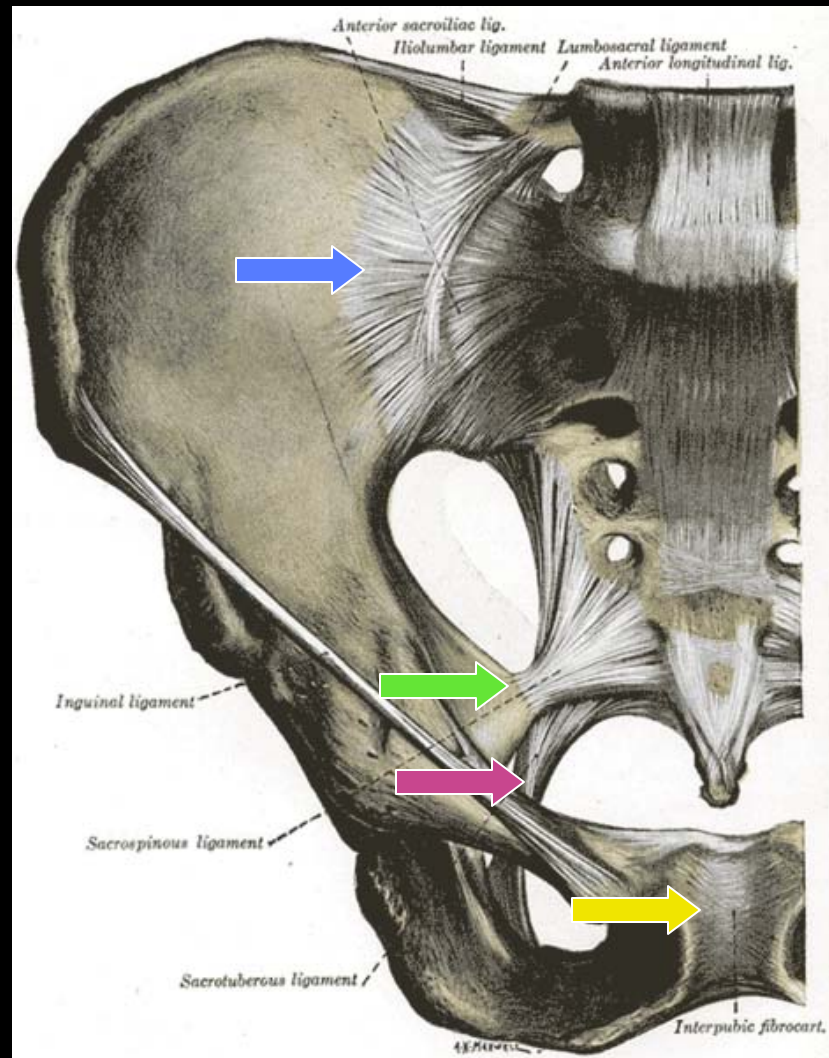
Normal Pelvic Anatomy: Ligaments

Sacroiliac ligament

Sacrospinous ligament

Sacrotuberous Ligament

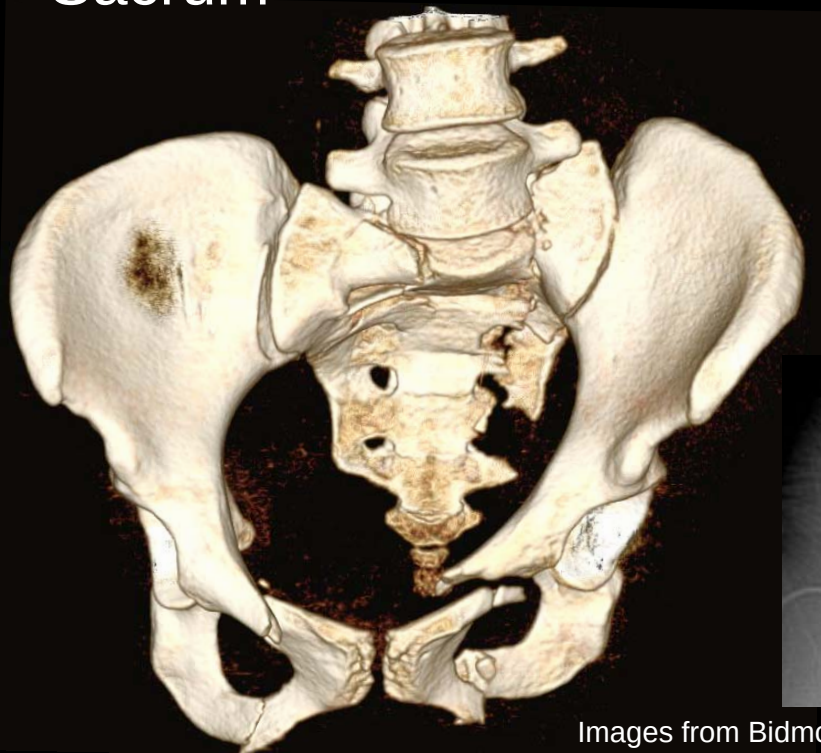
Pubic symphysis





Abnormal Pelvic Anatomy of Our Patient

Pelvic fracture present in:
Bilateral superior and inferior pubic rami
Sacroiliac joints
Sacrum





Statistics on Pelvic Trauma

Most common mechanism of pelvic fracture:

MVA 58%

Pedestrian struck by vehicle 22%

Falls 30%

Associated injuries with pelvic trauma:

Venous hemorrhage 38%

Visceral injury 17%

Bladder/urethra injury 6%

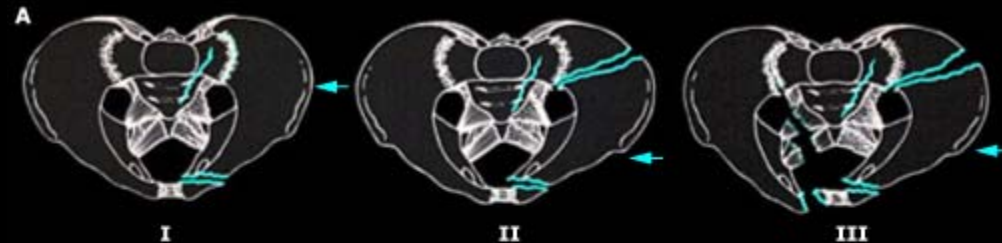
Nerve deficits 15%

Thoracic aorta rupture 1%



Most Common Fractures of the Pelvis

Lateral Compression



AnteroPosterior
Compression



Vertical Shear Injury



The blue arrows illustrate the force direction.

A) Lateral compression injuries with subsequent bilateral involvement as forces increase;

B) Anteroposterior injuries with progression of injury;

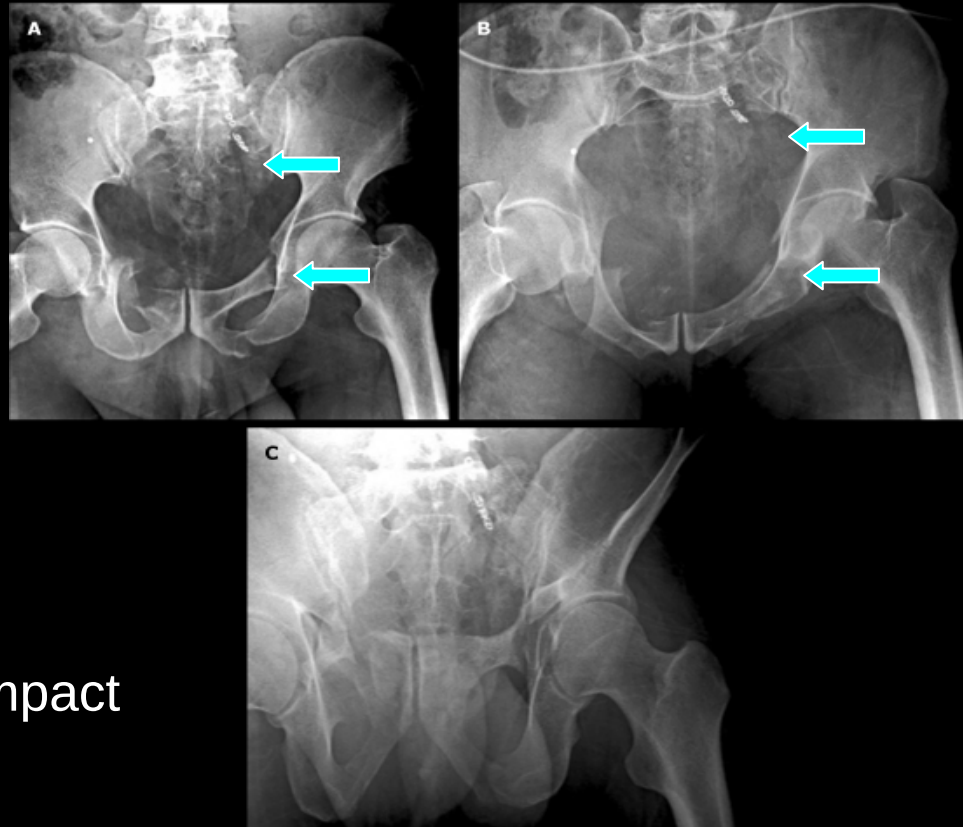
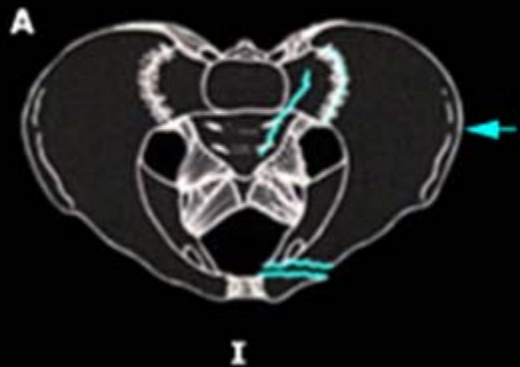
C) Vertical shear injury.

Burgess, AR, Eastridge, BJ, Young, JW, et al. Pelvic ring disruptions: effective classification system and treatment protocols. J Trauma, 1990, 30:848.



Lateral Compression Fracture: Type I

Most common



Sacral fracture on side of impact

- A) Type I lateral compression fracture with bilateral superior and inferior rami fractures and left sacral fracture.
B) Inlet view showing greater detail of the pelvic ring disruption.
C) Outlet view illustrating greater detail of the sacral fracture in addition to the bilateral rami fractures.
Images from Jim Fiechtl, MD.



Lateral Compression Fracture: Type II

Crescent “Iliac wing”



Crescent fracture on side of impact



A) Type II lateral compression fracture with left sided rami and sacral fractures.

B) CT scan illustrating the classic crescent fracture pattern.

Images from Jim Fiechtl, MD.



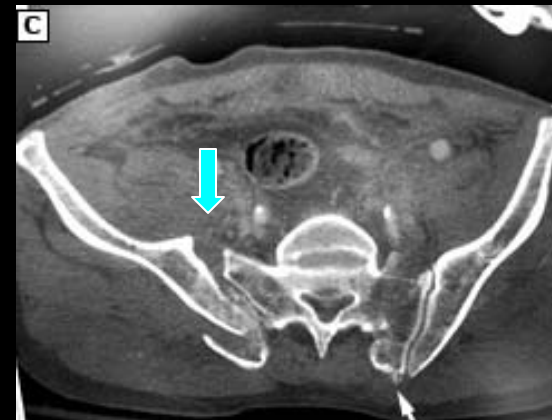
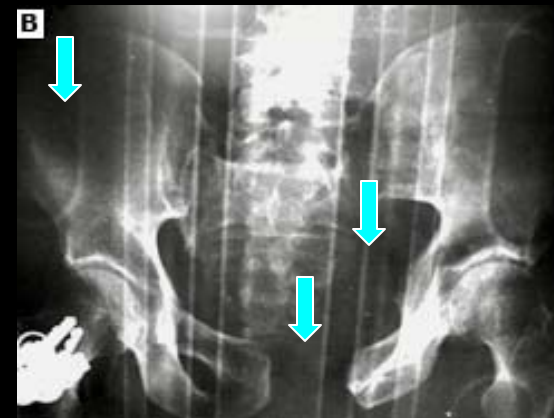
Lateral Compression Fracture: Type III

“Wind swept pelvis”

“crescent and open book”



Type I or II crescent injury
with contralateral open book injury



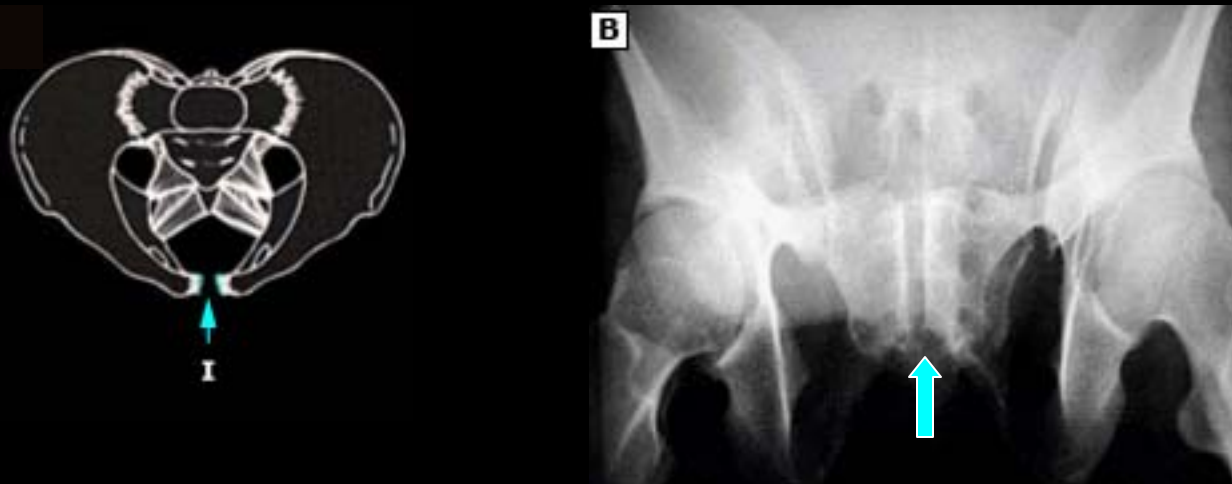
(B) Anteroposterior plain radiograph;
(C) CT scan.

Images from Sagi, Claude. Lower extremity: Pelvic ring fractures.

In: Rockwood and Green's Fractures in Adults, vol 2, 7th ed, Bucholz, RW, Court-Brown, CM, Heckman, JD, Tornetta,



AP Compression Fracture: Type I



Usually less than 2cm spread with intact posterior
Pelvic ring ligaments

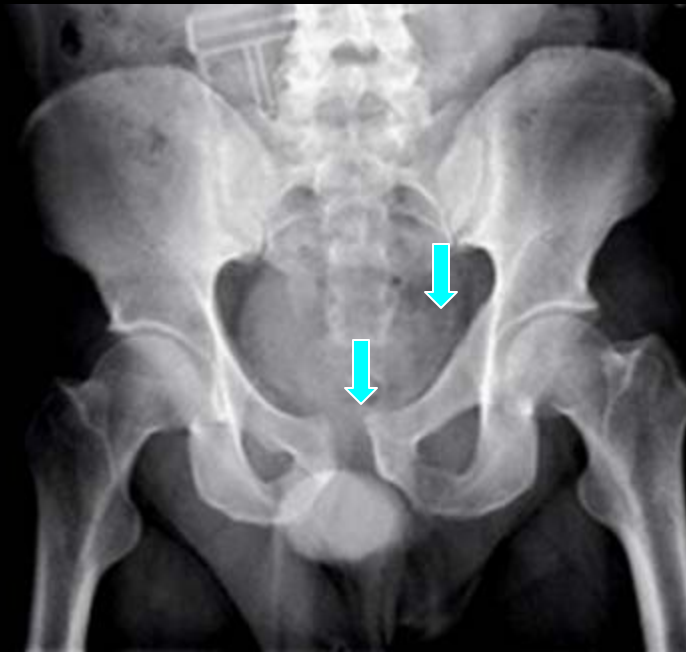
(B) Plain radiograph with outlet view.

Images from: Sagi, Claude. Lower extremity: Pelvic ring fractures.

In: Rockwood and Green's Fractures in Adults, vol 2, 7th ed, Bucholz, RW, Court-Brown, CM, Heckman, JD, Tornetta



AP Compression Fracture: Type II



Opening of sacroiliac joint, sacrotuberous, and sacrospinous ligaments

AP radiograph; Sagi, Claude. *Lower extremity: Pelvic ring fractures*.

In: *Rockwood and Green's Fractures in Adults*, vol 2, 7th ed, Bucholz, RW, Court-Brown, CM, Heckman, JD, Tornetta, P (Eds), Lippincott Williams & Wilkins, Philadelphia 2010.



AP Compression Fracture: Type III



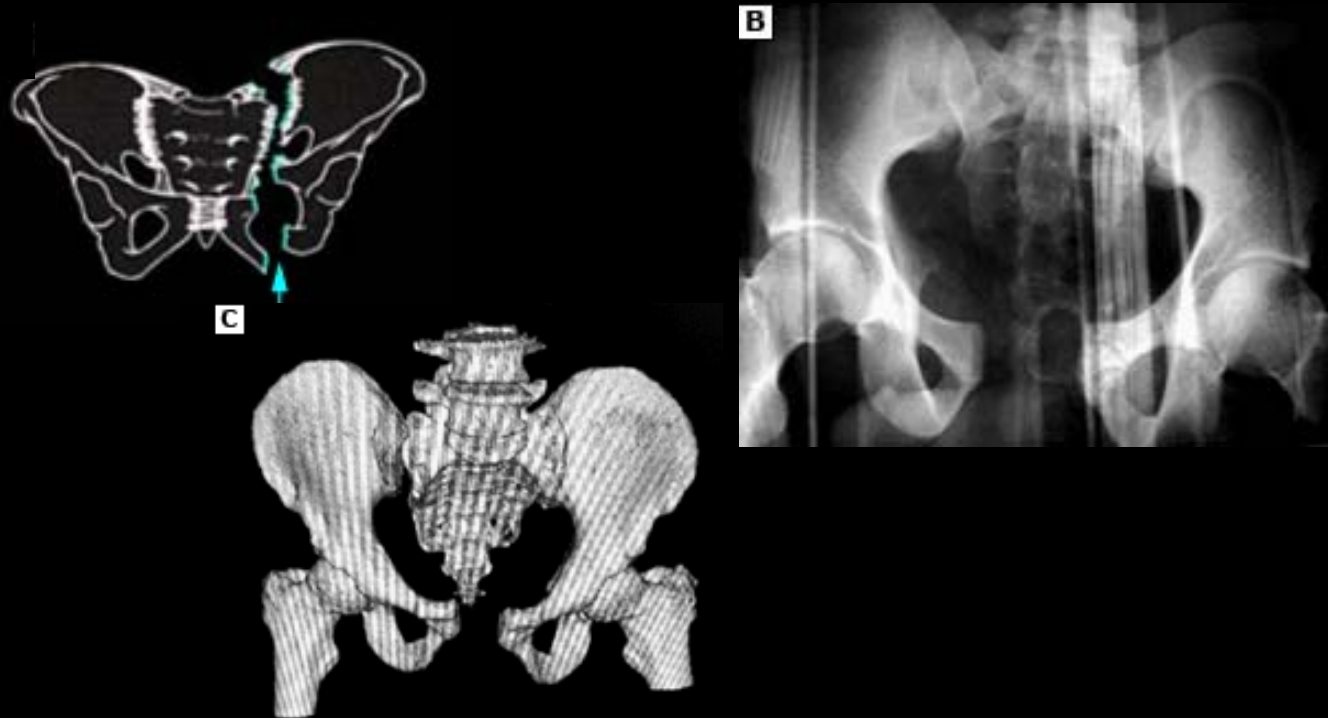
Complete disruption of sacroiliac joint

(B) AP radiograph;

from: Sagi, Claude. *Lower extremity: Pelvic ring fractures*. In: *Rockwood and Green's Fractures in Adults*, vol 2, 7th ed, Bucholz, RW, Court-Brown, CM, Heckman, JD, Tornetta, P (Eds)



Vertical Shear Stress Fracture



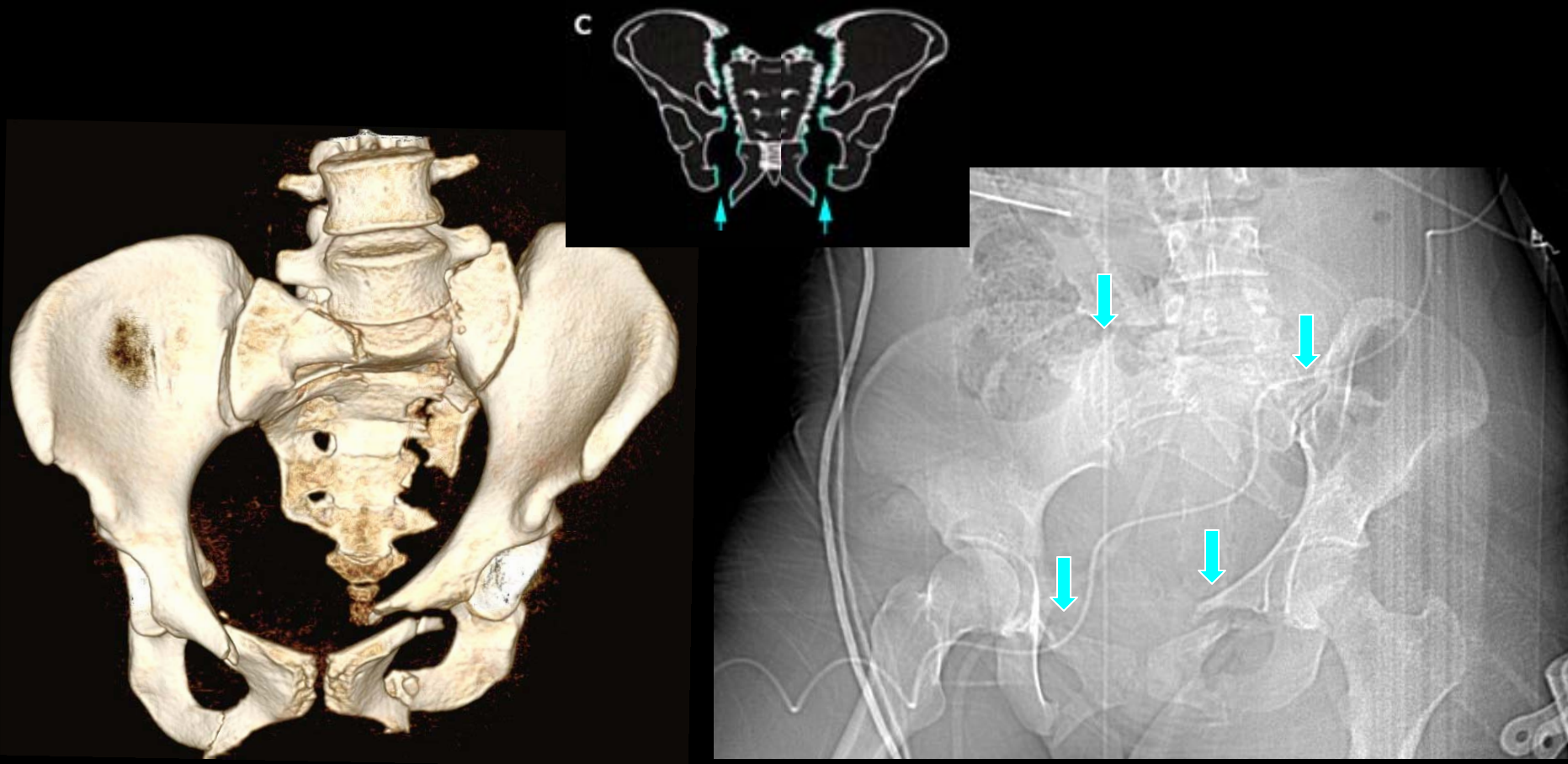
Wide pubic symphysis, broken SI ligament with
unilateral or bilateral rami fracture

(B) AP radiograph; (C) 3-dimensional reconstruction from a CT scan.

from: Sagi, Claude. *Lower extremity: Pelvic ring fractures*. In: *Rockwood and Green's Fractures in Adults*,
vol 2, 7th ed, Bucholz, RW, Court-Brown, CM, Heckman, JD, Tornetta, P (Eds), Lippincott Williams & Wilkins



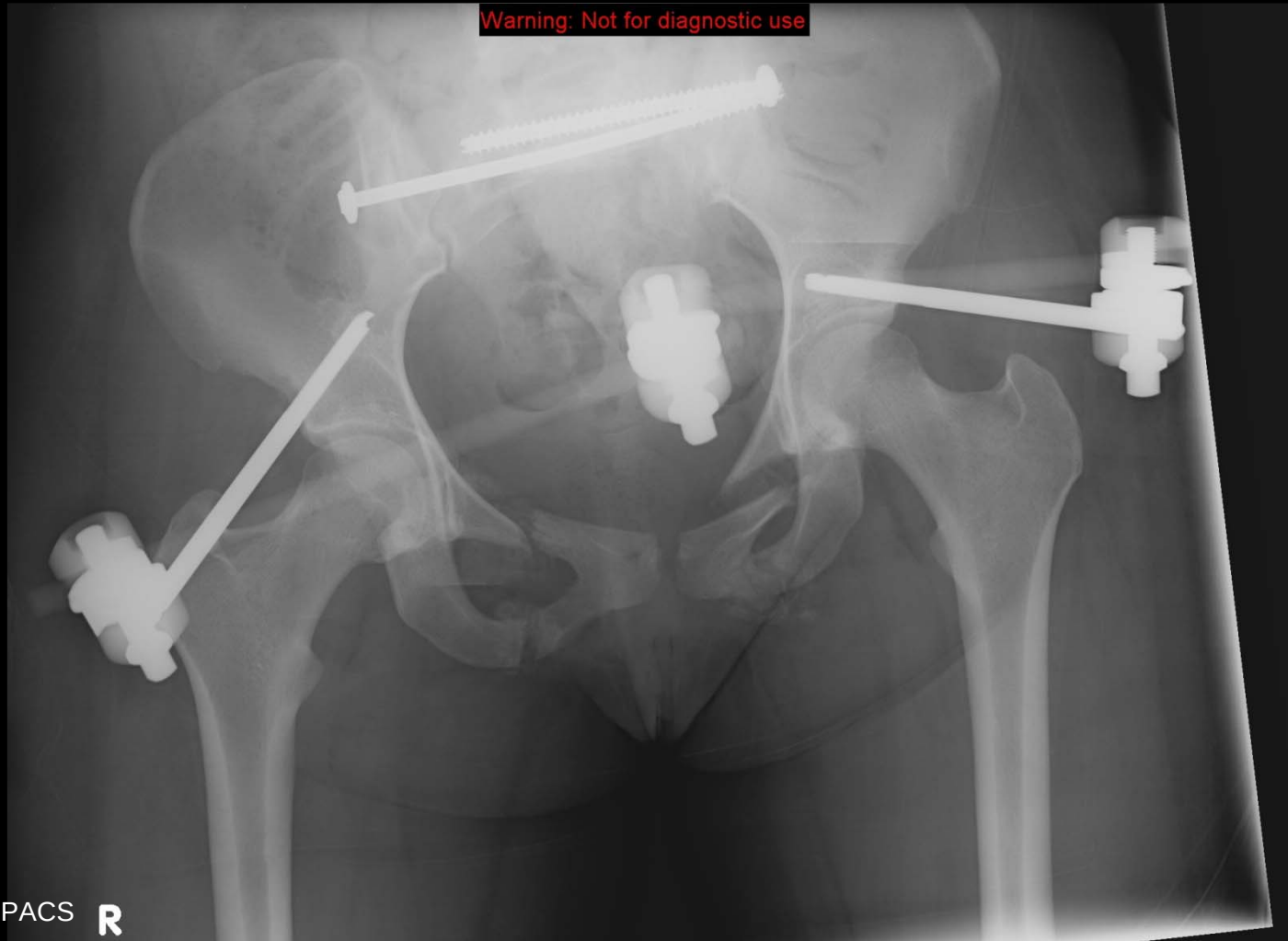
Patient's Injury Classified



Vertical Shear: broken SI ligament with bilateral rami fracture

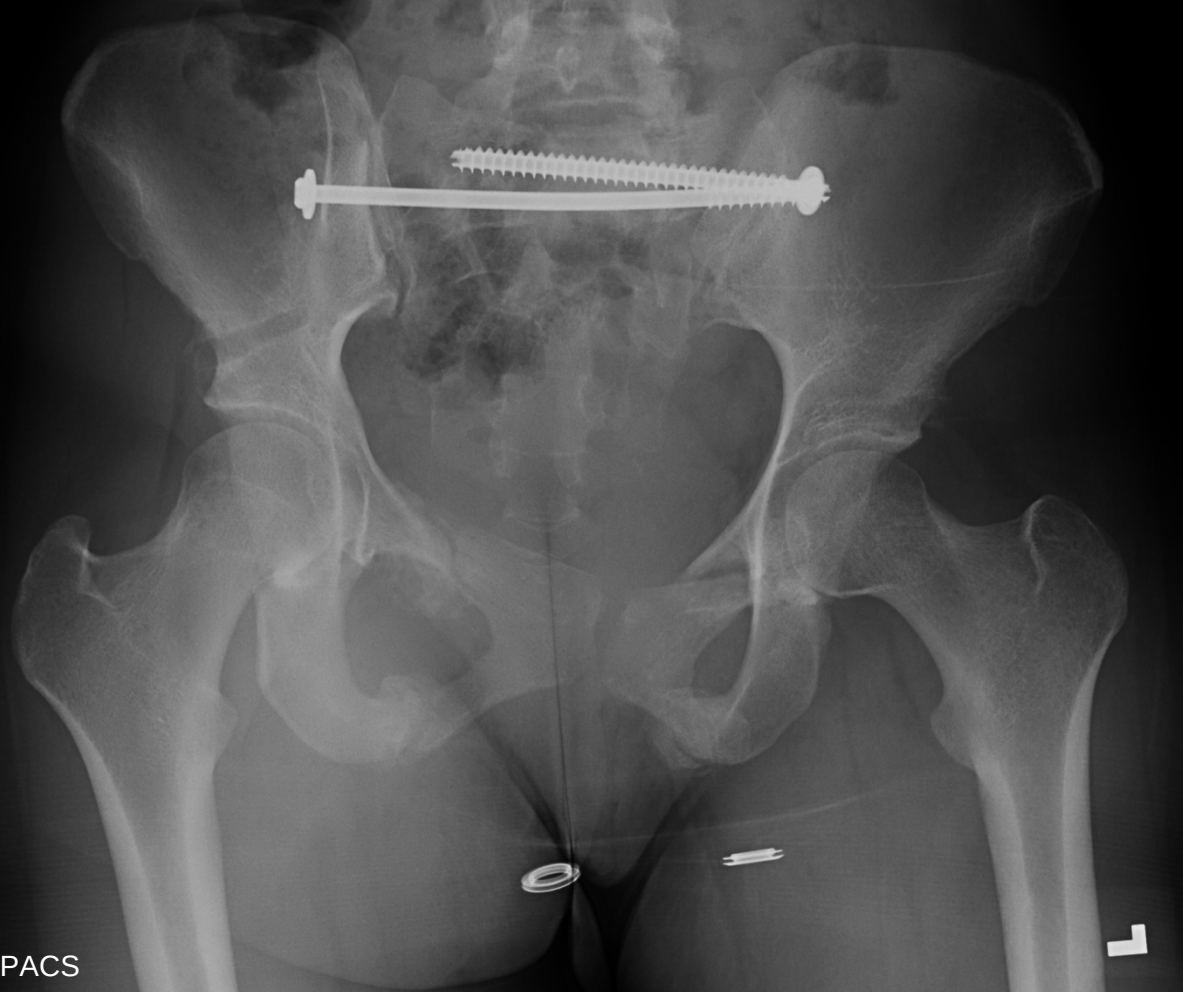


Surgery to Stabilize Our Patient's Pelvis





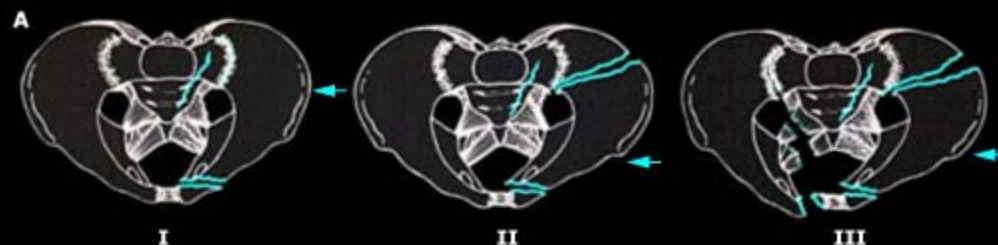
Follow up Removal of Hardware and Stabilization of SI Joints





Summary

Lateral Compression



AnteroPosterior
Compression



Vertical Shear Injury



With our patient showing evidence for vertical shear



Thanks!

Dr. Gillian Lieberman, Course Director
Emily Hanson, Educational Coordinator
Daniel Barkhuff, MS3 involved in case



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