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

http://www.ajronline.org/cgi/content-nw/full/187/4/915/FIG3
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

Images from Bidmc PACS
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%

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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.


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Lateral Compression Fracture: Type I

Most common

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.

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**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.

AP Compression Fracture: Type II

Opening of sacroiliac joint, sacrotuberous, and sacrospinous ligaments

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

Images from Bidmc PACS
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


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Thanks!

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Emily Hanson, Educational Coordinator
Daniel Barkhuff, MS3 involved in case
References

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