How do we classify this?

- Open?
- Closed?
- Tile?
- Young-Burgess?
- AO/OTA?
- Letournel?
It all goes back to ANATOMY!
Osteology

- Sacrum
- Iliac Wing
- Acetabulum
- Pubis
- Ischium
Ligamentous Anatomy

- Pubic Symphysis
- Anterior Sacroiliac Ligaments
- Posterior Sacroiliac Ligaments
- Sacrospinous Ligaments
- Sacrotuberous Ligaments
Vascular Anatomy

- External Iliac System
- Internal Iliac System
  - Posterior Division
  - Anterior Division
Nervous Anatomy

- L4/L5 nerve roots
  - Anterior sacrum

- Sciatic nerve
  - Greater sciatic notch

- Obturator nerve
  - Lateral obturator foramen
Imaging

- Screening AP Pelvis
- Circumferential compression changes appearance
• General idea
  – Stable
  – Unstable
• Immediate interventions if needed
  – Circumferential compression
  – Reduction of hip dislocation
Inlet

Anterior / Posterior Displacement

Internal / External Rotation
Outlet

Cranial / Caudal Displacement
CT Scan

Study SOFT TISSUE WINDOWS 1st!!!!

Look at bony injury last.
CT Scan – Soft Tissue Windows

Air Densities = Open Fracture

Hematoma = Morel-Lavallee
CT Scan – Inguinal Hernia

- Impacts open approaches
- May preclude percutaneous implant placement
CT Scan – Lumbar Hernia

- Detachment of abdominal wall from iliac wing
- Repair with iliac window approach
CT Scan – Hematoma

- Look for “midline shift”
- Associated vascular injury?
CT Scan – Posterior Ring

Iliac Fracture

SI joint Disruption

Sacral Fracture
Posterior Ring – Iliac Fracture

- Displaced or nondisplaced?
- Internal or external rotation mechanism?
Posterior Ring – SI Joint Disruption

- Complete or Incomplete?

- Anterior sacral crush?
Posterior Ring – Sacral Fractures

- Complete or Incomplete?
- Extraforaminal, transforaminal, or median?
- Intraforaminal debris?
Posterior Ring – Bilateral Sacral Fractures

- Lumbosacral dissociation – “U”, “Y”, and “H” patterns
- Sagittal Images to look for transverse component of fracture
- Spinal canal compromise
Lumbosacral kyphosis leads to an “inlet” appearance on AP View.
Posterior Ring – Sacral Dysmorphism

- Residual upper sacral disk
- Acute alar slope
- Mammillary processes
- “Tongue-in-groove” articulation
- Noncircular upper sacral foramina
- Fixation implications for SI screws
CT Scan – Anterior Ring

- Symphyseal disruption and/or rami fractures?
- Unilateral or bilateral?
- Horizontal or vertical pattern?
- Isthmic diameter of superior ramus for fixation
- Associated acetabular injury?
Magnetic Resonance Imaging

- Shows ligamentous injury
- Role undefined
Classification
Tile Classification

- Based on cadaveric sectioning
- Posterior ring only!

A: Stable
B: Partially stable
C: Completely unstable
Tile Classification

- A: Stable
- B: Rotationally unstable, vertically stable
- C: Rotationally and vertically unstable

A1: Avulsion injury
A2: Iliac wing or anterior ring from direct blow
A3: Transverse sacrococcygeal fracture
Tile Classification

- **A**: Stable
- **B**: Rotationally unstable, vertically stable
- **C**: Rotationally and vertically unstable

**B1**: Open book (external rotation)

**B2**: Lateral compression injury (internal rotation)

**B2-1**: Ipsilateral anterior and posterior injuries

**B2-2**: Contralateral (bucket-handle) injuries

**B3**: Bilateral
Tile Classification

- A: Stable
- B: Rotationally unstable, vertically stable
- C: Rotationally and vertically unstable

C1: Unilateral
  C1-1: Iliac fracture
  C1-2: Sacroiliac fracture-dislocation
  C1-3: Sacral fracture
C2: Bilateral, with one side type B, one side type C
C3: Bilateral
Young and Burgess Classification

• Grouped by mechanism of injury

  - Lateral Compression (LC)
  - Anteroposterior Compression (APC)
  - Vertical Shear (VS)
  - Combined Mechanism of Injury (CMI)
Young-Burgess Lateral Compression

1: Sacral + superior/inferior pubic rami fractures (unilateral or bilateral)

2: Crescent (± sacral) + superior/inferior rami fractures

3: LC1 or 2 with contralateral SI joint injury (windswept pelvis)
Young-Burgess Anteroposterior Compression (APC)

1: Pubic symphysis rupture

2: PS + Anterior SI ligament rupture
   a: SS and ST intact
   b: SS or ST disrupted

3: PS + ASI + Posterior SI ligament rupture
Young-Burgess Vertical Shear

• Shearing mechanism rather than external rotation
• Doesn’t fit other classifications
LeTournel Classification

- Left complete SI dislocation
- Pubic symphysis disruption
- Displaced right transverse acetabular fracture
- Right complete SI dislocation

Describe injuries → Simple!!
Open Pelvic Fractures

- Jones Classification
  - I: Stable pelvic ring
  - II: Rotationally or vertically unstable pelvis without rectal or perineal wound
  - III: Rotationally or vertically unstable pelvis with rectal or perineal wound

- Gustilo-Anderson doesn’t apply
  - Originally devised for tibia fractures
Summary Case
19 yo female thrown from horse
19 yo female thrown from horse

- Displaced Sacral Fracture
- Minimally Displaced Anterior Column Acetabular Fracture
- Inferior Ramus Fracture
Computed Tomography
Computed Tomography

L4 and L5 Nerve Roots run here
Visualize and protect nerve roots prior to reduction!
Remove anterior fragment prior to reduction!
Postoperative Result

DISTAL
Summary

• Anatomic knowledge = POWER!

• Proper Imaging = PLANNING!

• Classification = UNDERSTANDING!
• For questions or comments, please send to ota@ota.org