

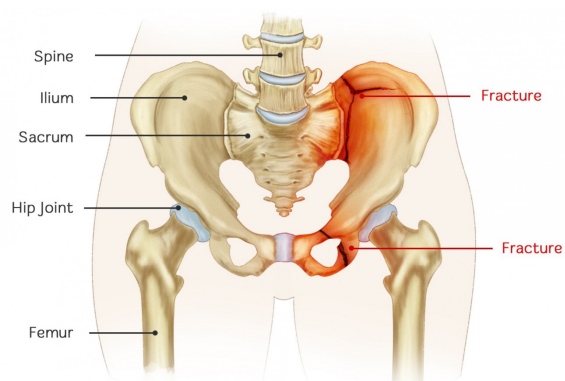
# Pelvic Fractures

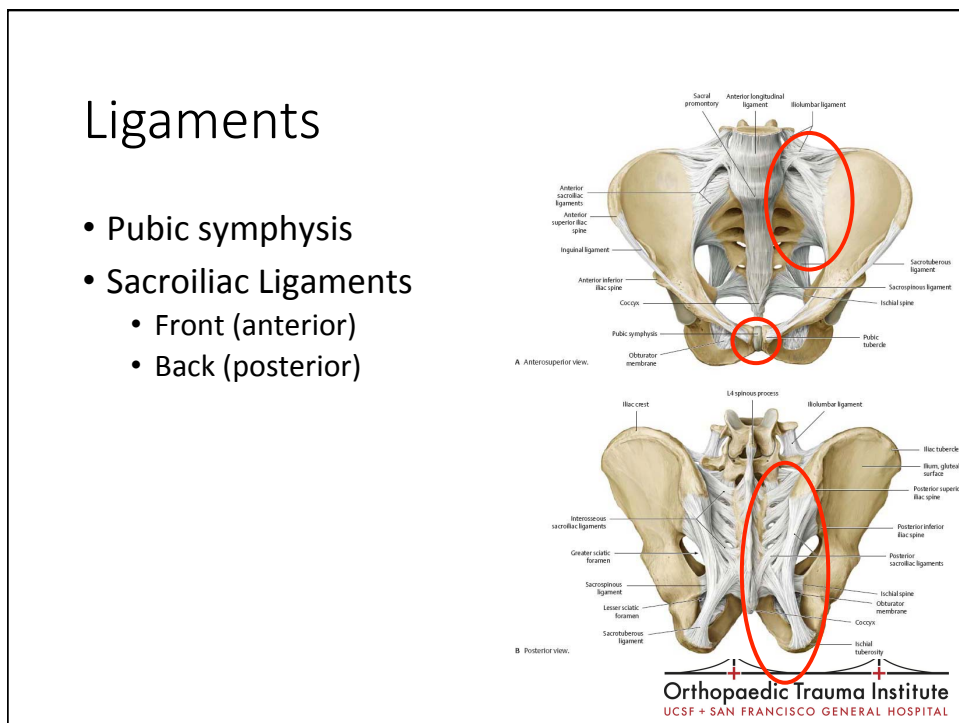
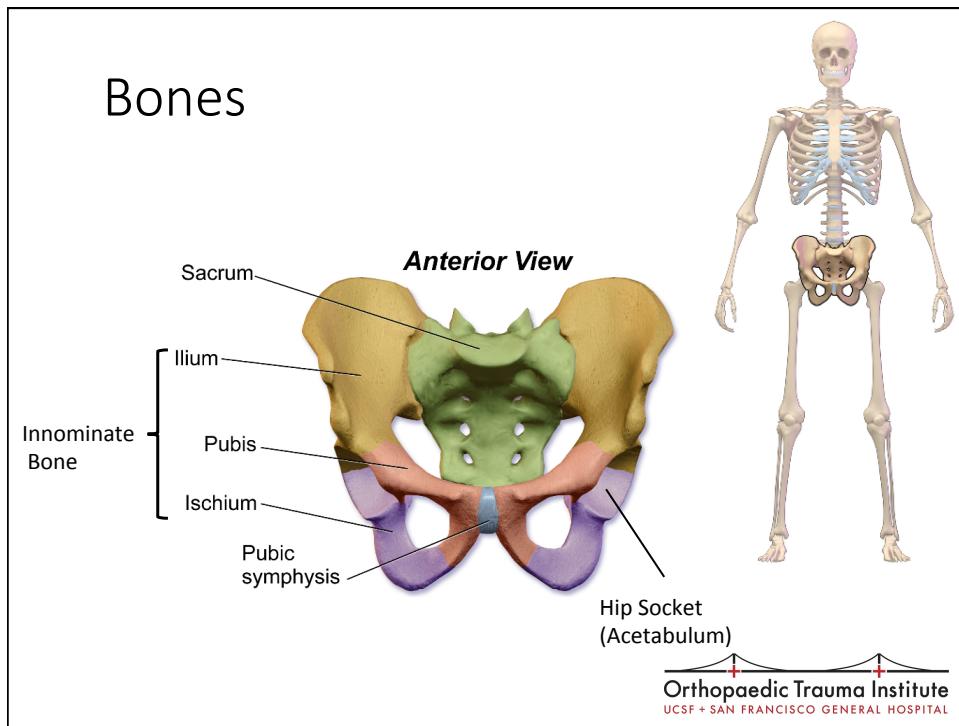
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UCSF/ZSFG Orthopaedic Trauma Institute  
Mini-medical school 2018



## Overview: Pelvic Fractures

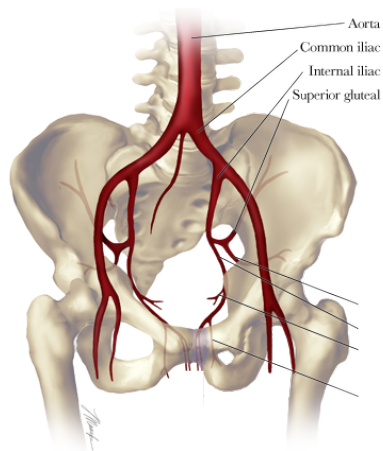
- Anatomy
- Types of Injuries
- Injury Mechanisms
- Treatment Options





## Blood vessels

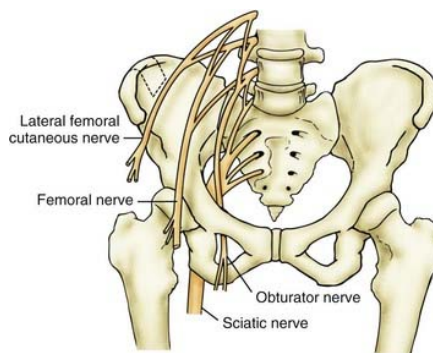
- Major vessels to:
  - Pelvic contents
  - Lower extremities
- Disruption leads to:
  - Major bleeding
  - Loss of blood flow to limb



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## Nerves

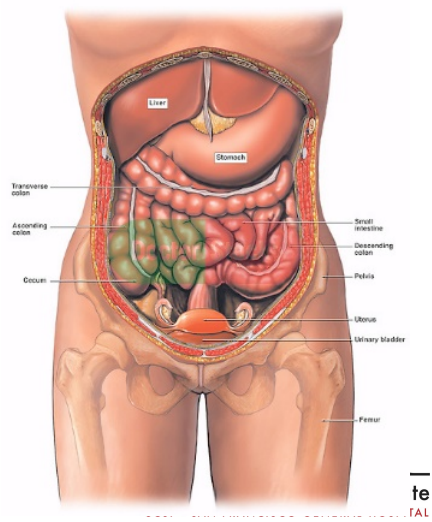
- Nerves emerge from lower lumbar spine and sacrum
- Two largest nerves are the sciatic and femoral nerves
- Injury can cause loss of limb function or loss of bowel and bladder function



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## Pelvic Contents

- Bladder
- Uterus
- Lower part of GI tract

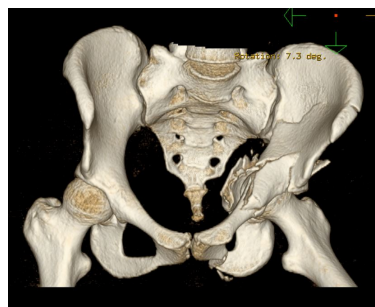
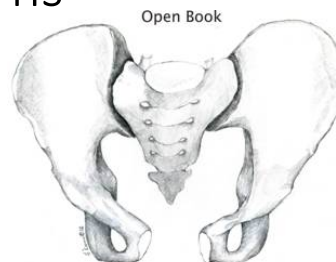


## Pelvic anatomy: Summary

- There is complex anatomy surrounding the pelvis!
- Fractures of the bone can be associated with other major injuries
  - Major ligament instabilities
  - Vascular injuries
  - Nerve injuries
  - Bowel and bladder injuries
- Surgical exposure is a challenge!

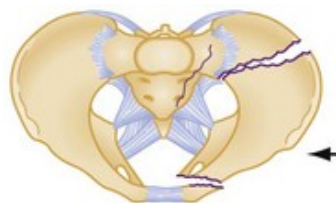
## Common injury patterns

- Pelvic Ring Injuries
  - A break in two parts of the ring (front and back)
  - Relationship between spine and hip becomes unstable, but hip joint is NOT involved
- Acetabular Fractures
  - Fractures involving the hip socket

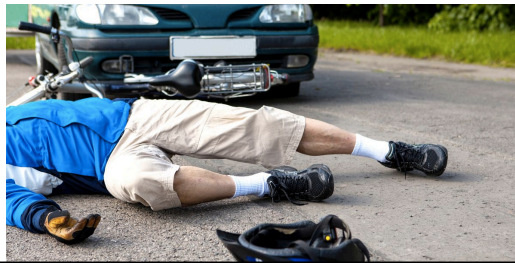
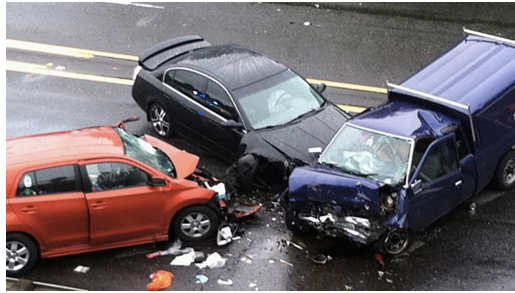


## Elements of a Pelvic Ring Injury

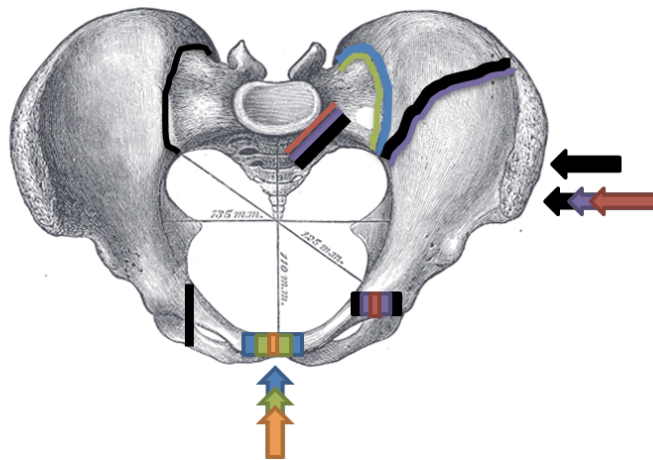
- Breaks in two places
  - Fracture
  - Ligament Tear
- Front (Anterior)
  - Pubic symphysis injury
  - Ramus fracture
- Back (Posterior)
  - Sacral or Iliac Fracture
  - Sacroiliac Ligament injury



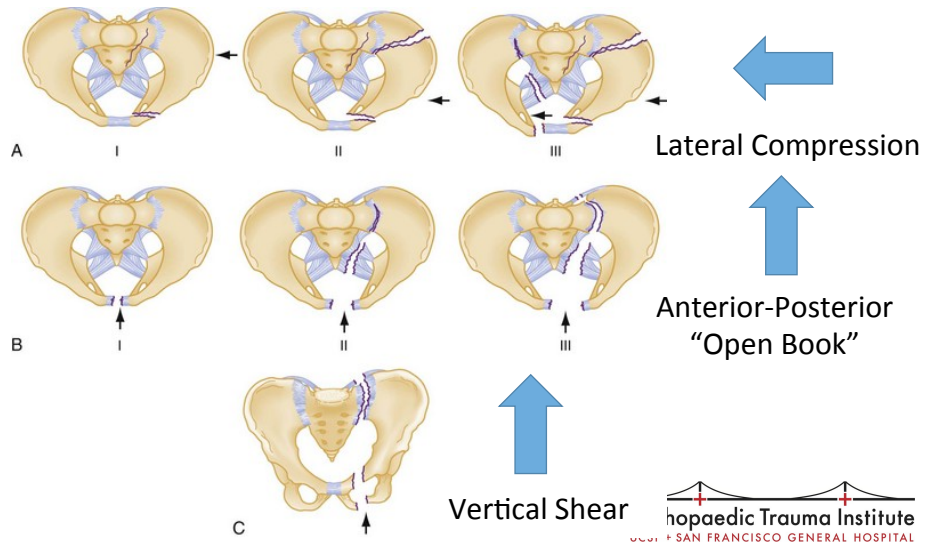
## What causes pelvic fractures?



## Direction of Force



## Common Fracture Patterns by Mechanism



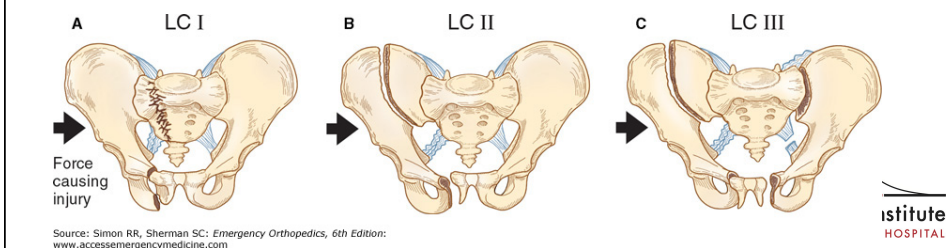
## What happens as bones age?

- Bad injuries can happen with less force

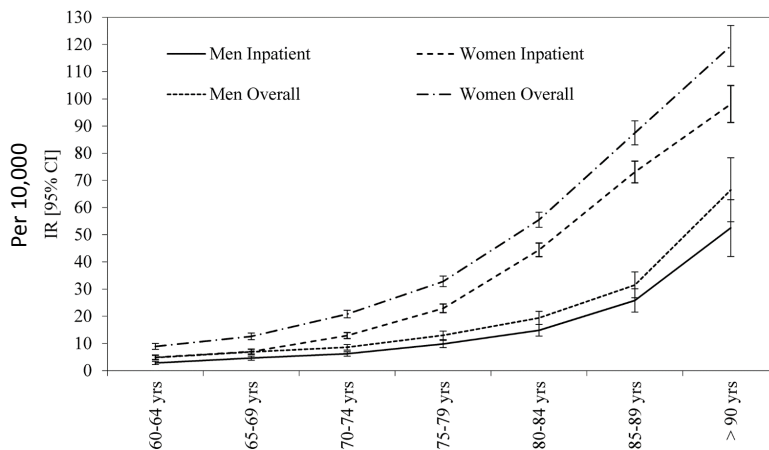


## Pelvic Ring Injuries from Falls

- Increasing lateral compression force leads to a spectrum of energy
- Energy + (Poor) Bone Quality = Fracture Severity



## Risk of Pelvic Fracture with Age

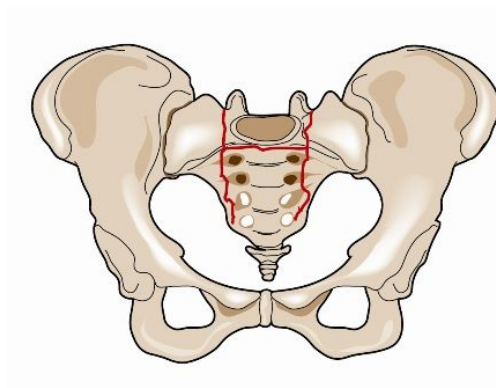


Andrich S, Haastert B, Neuhaus E, Neidert K, Arend W, Ohmann C, Grebe J, Vogt A, Jungbluth P, Rösler G, Windolf J, Icks A. Epidemiology of Pelvic Fractures in Germany: Considerably High Incidence Rates among Older People. PLoS One. 2015 Sep 29;10(9):e0139078. doi: 10.1371/journal.pone.0139078. Orthopedic Trauma Institute UCSF + SAN FRANCISCO GENERAL HOSPITAL



## Sacral Insufficiency Fractures

- Cracks develop in the back of the pelvis due to poor bone quality
- Can cause severe lower back pain
- Increasing incidence with age
- Treatment is conservative: Rest, early mobilization, physical therapy



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## Treatment: Pelvic Ring

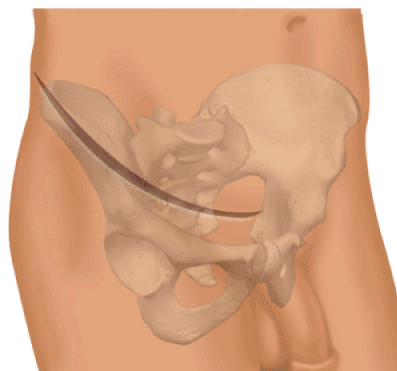
- Many are treated without surgery!
- Nearly all lateral compression injuries are managed with early mobilization
- If both front and back of ring are unstable, then surgery is needed



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## Treatment: Acetabular Fractures

- If displacement, surgery often necessary
- As little as 2mm of mismatch between pieces can cause arthritis
- Exposures are large, high risk



  
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## Pelvic Ring Injuries: The good news

- Bony injury more straightforward to fix
- Can often be done without large incisions
- The bone usually heals and doesn't cause long-term problems

  
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## Pelvic ring injuries: The bad news

- Commonly associated with other major injuries
  - Head injury
  - Abdominal injury
- High risk of major bleeding
- High risk of injury nearby structures
  - Bladder
  - Major nerves
    - Foot drop
    - Bowel or bladder incontinence



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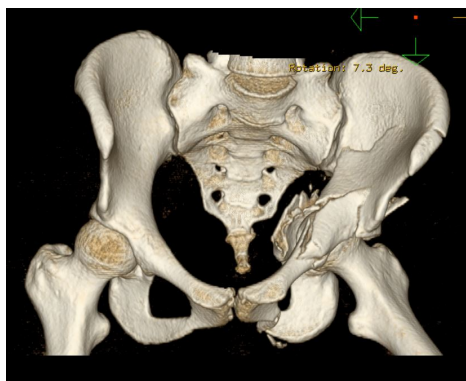
## Acetabular fractures

### Good:

- Lower risk of bleeding from fracture
- Less risk of damage to surrounding structures

### Bad:

- Complex injury to treat
- Requires large incisions
- High risk of arthritis long-term

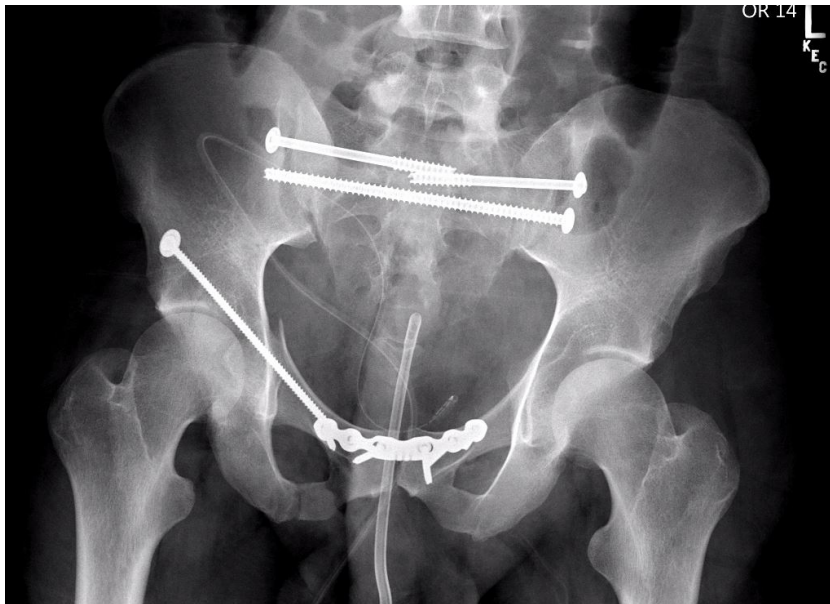


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# Example 1: 61yo man motorcycle crash

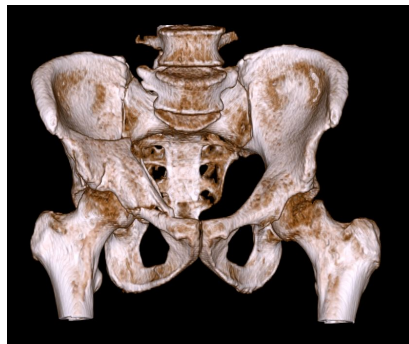


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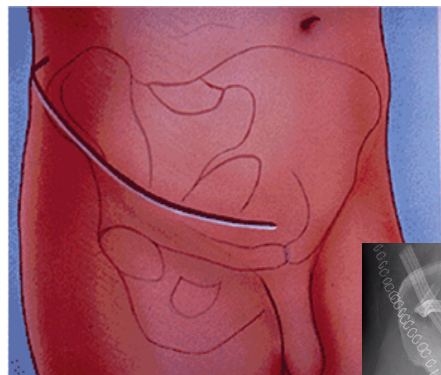


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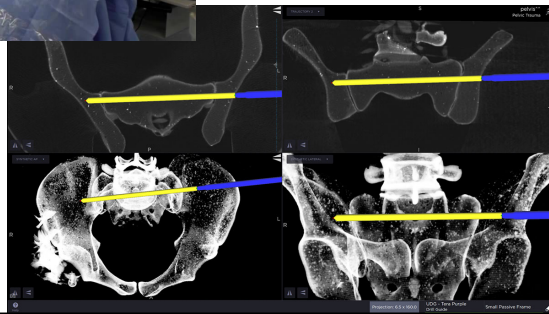
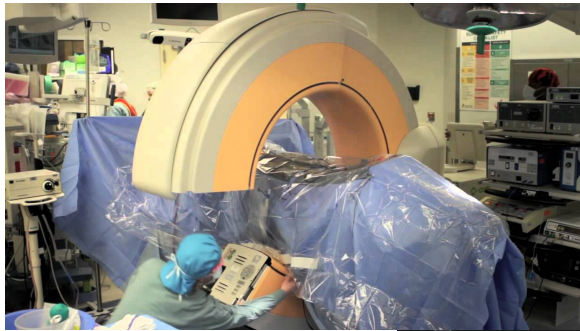
## Example 2: 71-year-old man fall from ladder



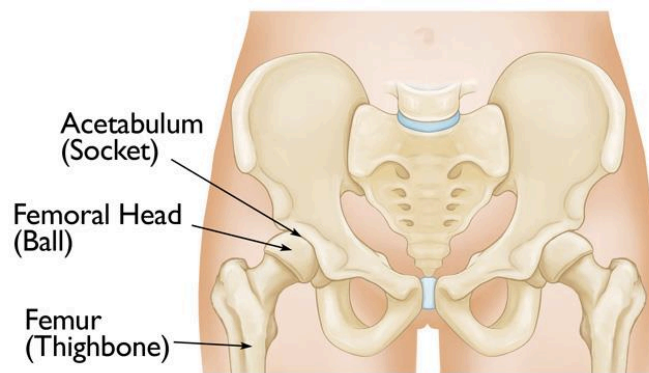
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## New Technologies



## Total hip replacement



## Fix and replace?



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## Conclusion

- Complex anatomy surrounds the pelvis
  - Complex multi-system injuries
  - Complex surgeries to reconstruct
- Pelvic fractures increase with age due to poor bone quality
- Pelvic ring injuries wide spectrum
  - Stable → Nonop (Most)
  - Unstable → Surgery
- Acetabular fractures affect the hip joint
  - More complex to treat
  - High risk of arthritis long-term

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