# Pelvic ring and acetabular fractures: the basics

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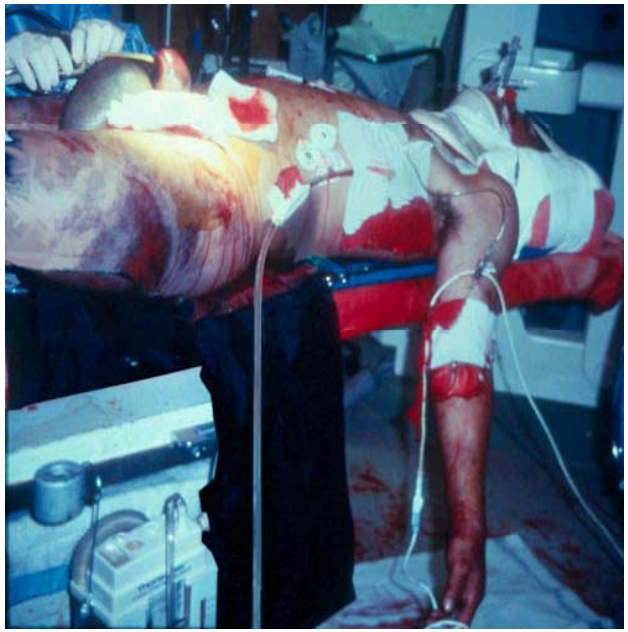
Trauma Association of Canada 2014

# Objectives

- At the end of this presentation, you will comprehend:
  - pelvic ring anatomy: osseous and soft tissue
  - injury mechanisms and their impact on the pelvic ring
  - acetabular fracture types



- Intubated with good AE
- BP 90/40  HR 140  GCS 8
- No external bleeding
- Pelvis “mobile”

- Transient response to IV fluid bolus
- RBC transfusion started

- CXR: normal
- FAST: normal
- AP pelvis

# Anatomy

Illustrator: Karl Wesker pp. 112-1

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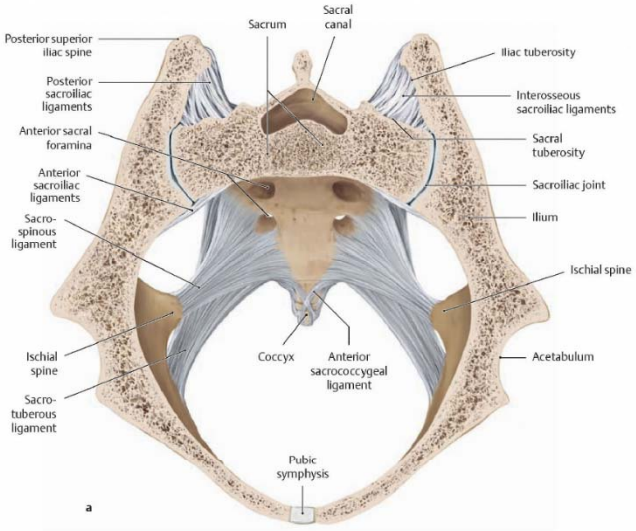

r: Karl Wesker pp. 112-113

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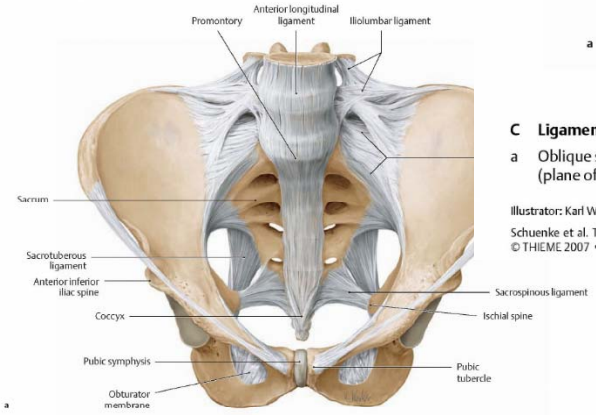


**C Ligaments of the sacroiliac joint**

a Oblique section through the pelvis at the level of the pelvic inlet plane, superior view (plane of section indicated in b).

Illustrator: Karl Wesker pp. 116-117

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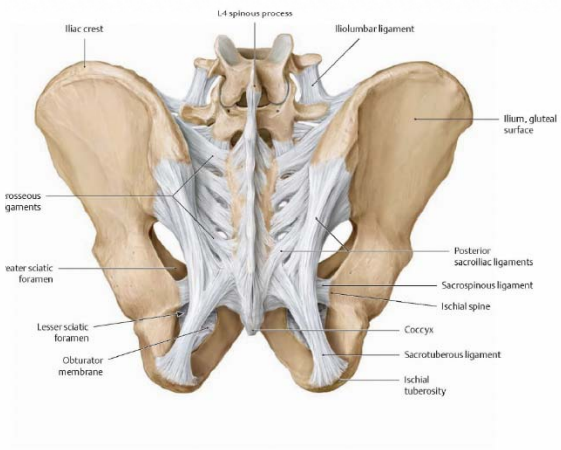


**A Ligaments of the male pelvis**

b Posterior view.

Illustrator: Karl Wesker pp. 114-115

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**A Ligaments of the male pelvis**

a Anterosuperior view.

Illustrator: Karl Wesker pp. 114-115

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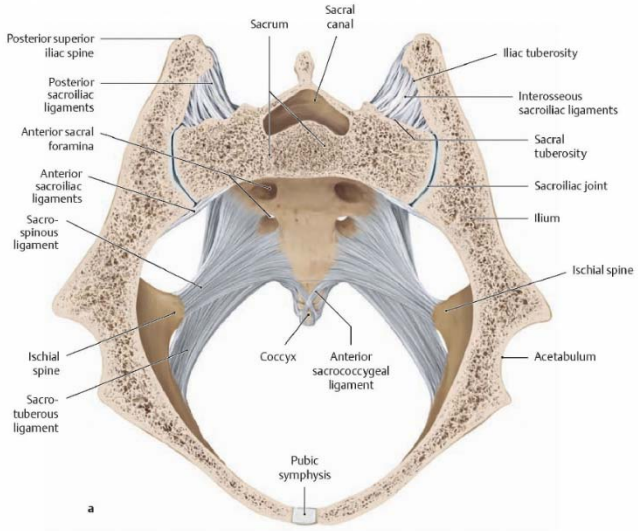
# It’s orthopaedics...




**C Ligaments of the sacroiliac joint**

a Oblique section through the pelvis at the level of the pelvic inlet plane, superior view (plane of section indicated in b).

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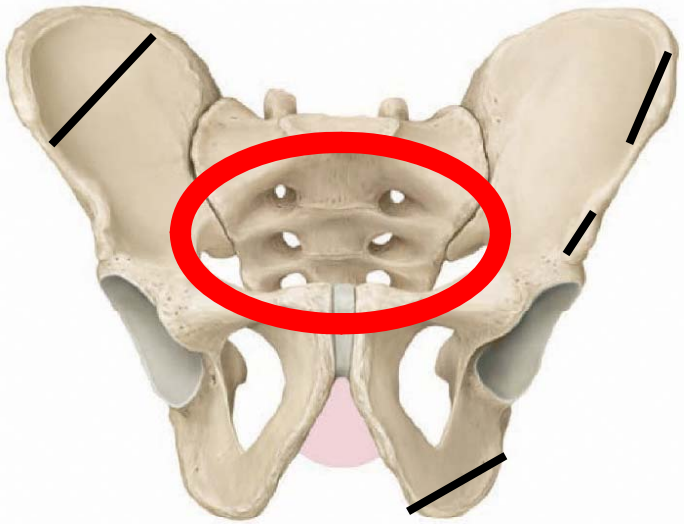
# Fracture classification

# Your classification system

| AIS 2005 | Injury Description | ⇒AIS98 | ⇐AIS98 | FCI |
|---|---|---|---|---|
| 856100.2 | **Pelvic ring** fracture NFS (arch) (code symphysis pubis separation + sacrococcygeal dislocation here) | 852600.2 | 852600.2 | 4 |
| 856101.3 | open but NFS | 852604.3 | 852604.3 | 2 |
| | **Use one of the following two descriptors for any one or combination of the following fracture descriptions *if the fracture is stable:* ischial tuberosity; pubic ramus with or without symphysis pubis involvement; undisplaced sacrum; transverse fracture of sacrum and coccyx with or without sacrococcygeal dislocation.** | | | |
| 856151.2 | **Pelvic ring** fracture, posterior arch intact; isolated fracture not destroying the integrity of the pelvic ring | 852600.2 | None | 5 |
| 856152.3 | open | 852604.3 | None | 5 |
| | **Use one of the following four descriptors for any one or combination of the following fracture descriptions *if the fracture is partially or vertically stable:* lateral compression; "open book"; symphysis pubis separation; sacroiliac joint anterior disruption; anterior compression of sacrum.** | | | |
| 856161.3 | **Pelvic ring** fracture, incomplete disruption of posterior arch NFS | 852604.3 | None | 4 |
| 856162.4 | open | 852604.3[b] | None | 2 |
| 856163.4 | blood loss ≤ 20% by volume | 852608.4 | None | |
| 856164.5 | blood loss > 20% by volume | 852610.5 | None | |
| | **Use one of the following four descriptors for any one or combination of the following fracture descriptions *if the fracture is totally unstable:* vertical shear; pubic rami fractures with sacroiliac fracture/dislocation.** (includes Malgaigne's #) | | | |
| 856171.4 | **Pelvic ring** fracture, complete disruption of posterior arch and pelvic floor NFS | 852606.4 | None | 2 |
| 856172.4 | blood loss ≤ 20% by volume | 852608.4 | None | |
| 856173.5 | blood loss > 20% by volume | 852610.5 | None | |
| 856174.5 | open | None | None | 2 |

# A type: rotationally and vertically stable



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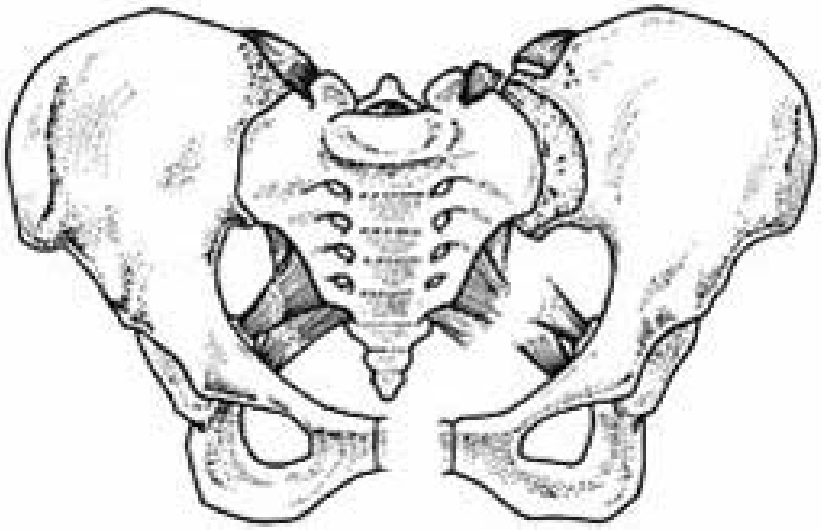
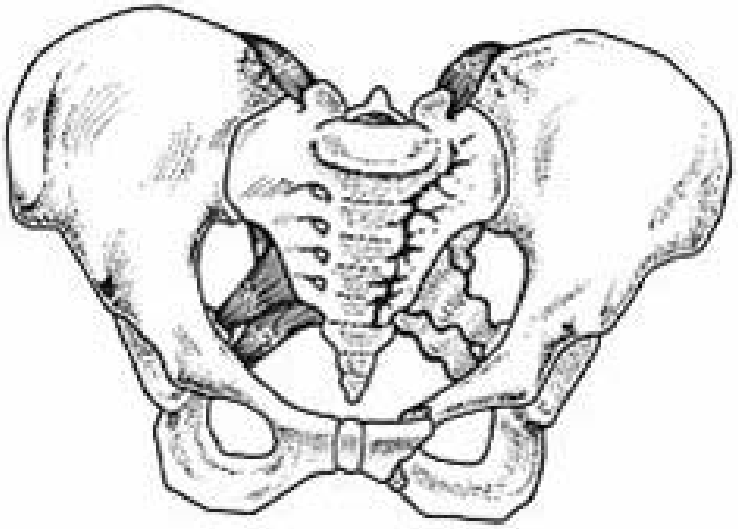
# B type: rotational instability

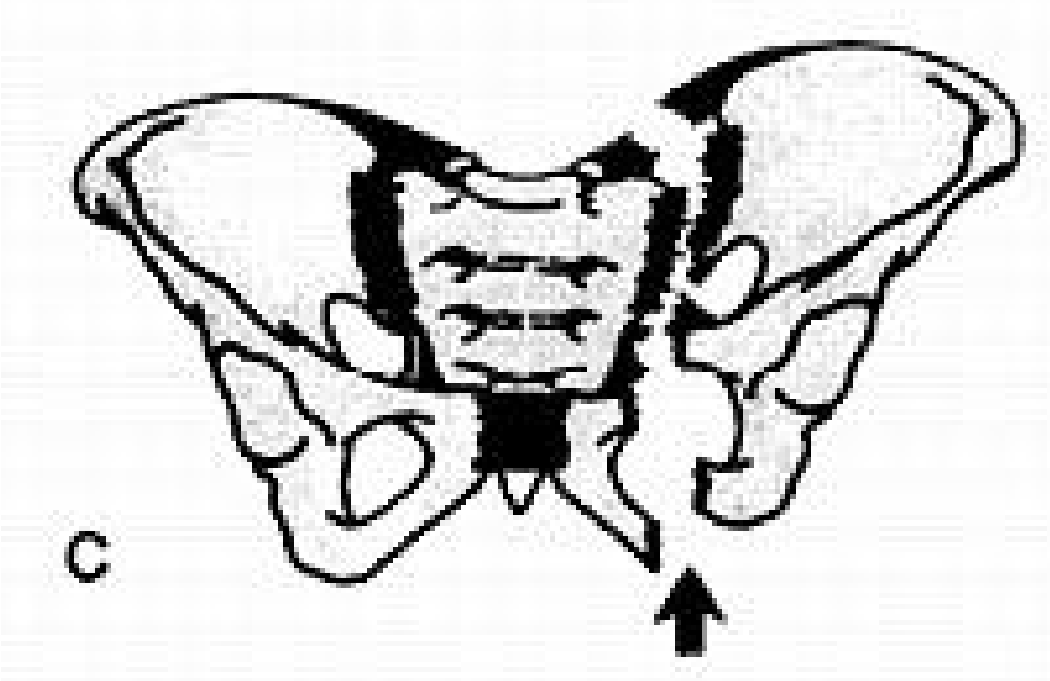


APC

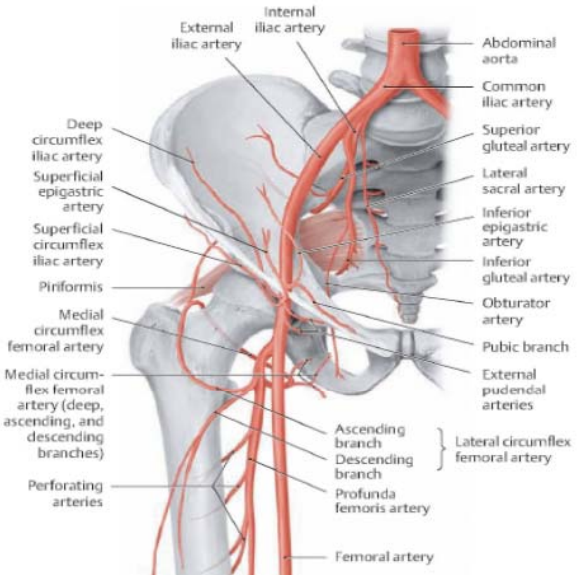


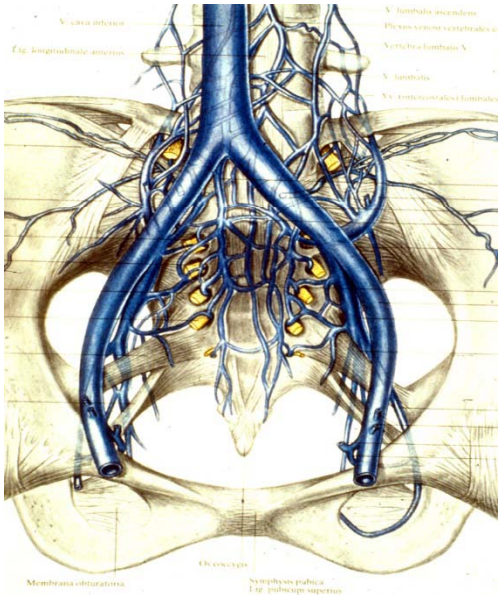
LC

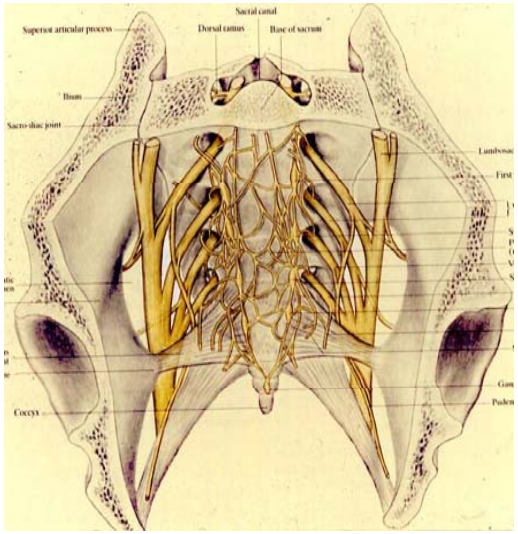
# C type: vertical instability

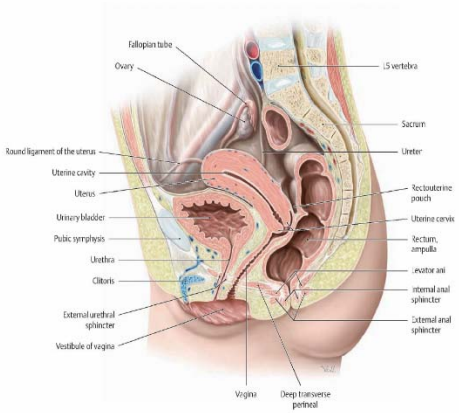


# Anatomy






**B Midsagittal section through a female pelvis**
Right half of the pelvis, viewed from the left side.

Illustrator: Markus Voll pp. 160-161
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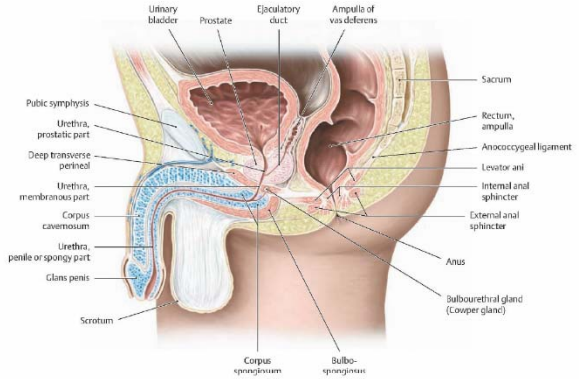


**A Midsagittal section through a male pelvis**
Right half of the pelvis, viewed from the left side.

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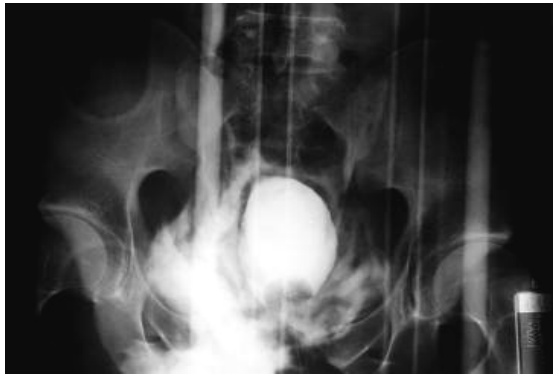
# Associated Injury- anatomic

- Hemorrhage
- Neurologic
- Urologic
- Gynecologic
- Gastrointestinal
- Soft Tissue

# Associated Injury mechanistic

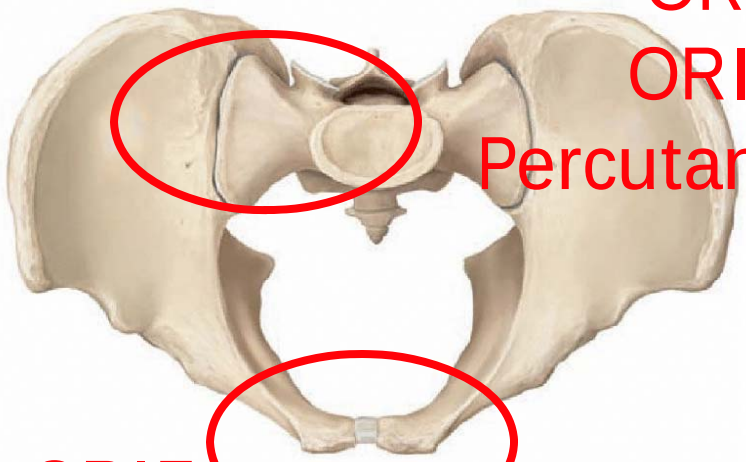
- Lateral Compression:
  - **Abdominal visceral injury**
  - **Head injury**
  - **Few pelvic vascular injuries**

- AP Compression:
  - **Urologic injury**
  - **Hemorrhage/pelvic vascular injury:**
    - **APC2-10%, APC3-22%**



# Treatment

# Anterior vs posterior pelvic ring



ORIF anterior

ORIF posterior

Percutaneous SI screws

Ex-fix vs ORIF

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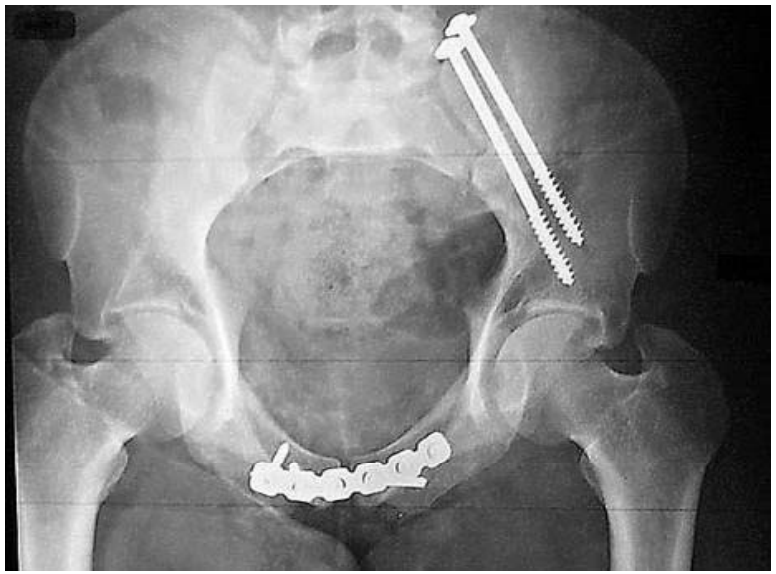
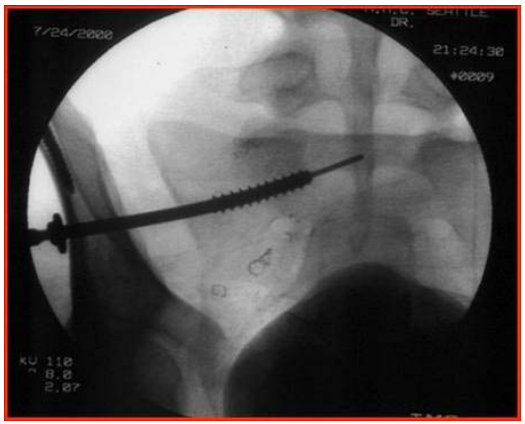
# APC

# LC

# LC- Crescent fracture



# VS


7/24/2000
21:24:30
#0009
KV 110
mA 8.0
2.07

7/24/2000
21:24:47
#0012
KV 110
mA 8.0
Xt 2.08
IMS

# Acetabular Fractures

# Your classification system

| AIS 2005 | Injury Description | ⇒AIS98 | ⇐AIS98 | FCI |
|---|---|---|---|---|
| 856200.2 | **Acetabulum** fracture NFS | 852600.2 | 852600.2 | 5 |
| 856202.3 | open, but NFS | 852604.3 | 852604.3 | 5 |
| 856251.2 | partial articular (involving one column) | 852600.2 | None | 3 |
| 856252.3 | open | 852604.3 | None | 3 |
| 856261.2 | partial articular (transverse, "T" shaped) | 852600.2 | None | 3 |
| 856262.3 | open | 852604.3 | None | 3 |
| 856271.2 | complete articular (involving both columns, with or without sacroiliac joint involvement) | 852600.2 | None | 2 |
| 856272.3 | open | 852604.3 | None | 2 |

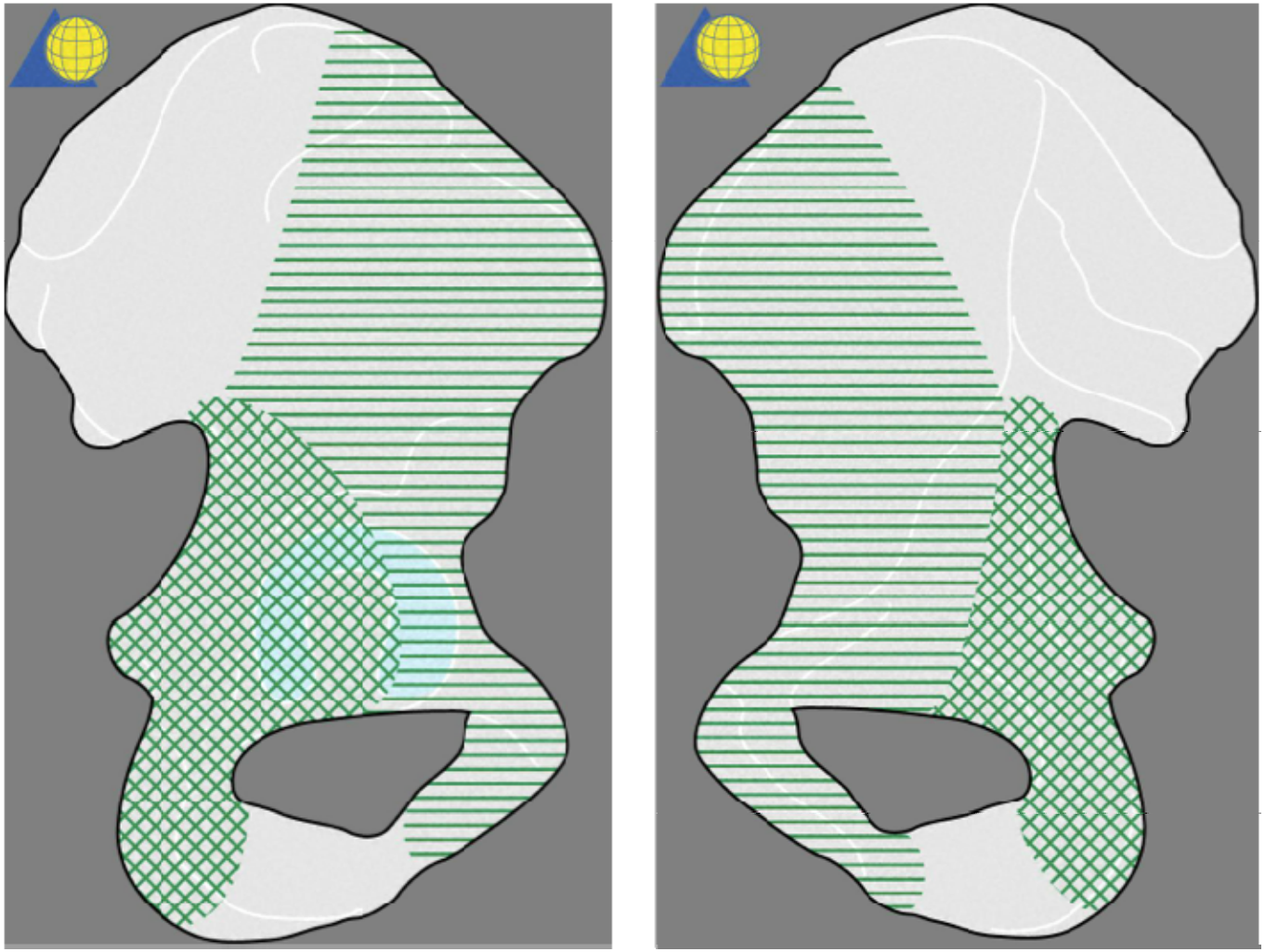
**Coding Guidelines:** ACETABULUM

**The acetabulum is classified by anterior or posterior column. The anterior column extends from the anterior half of the iliac crest to the pubis (iliopubic). The posterior column extends from the greater sciatic notch to the ischium (ilioischial).**

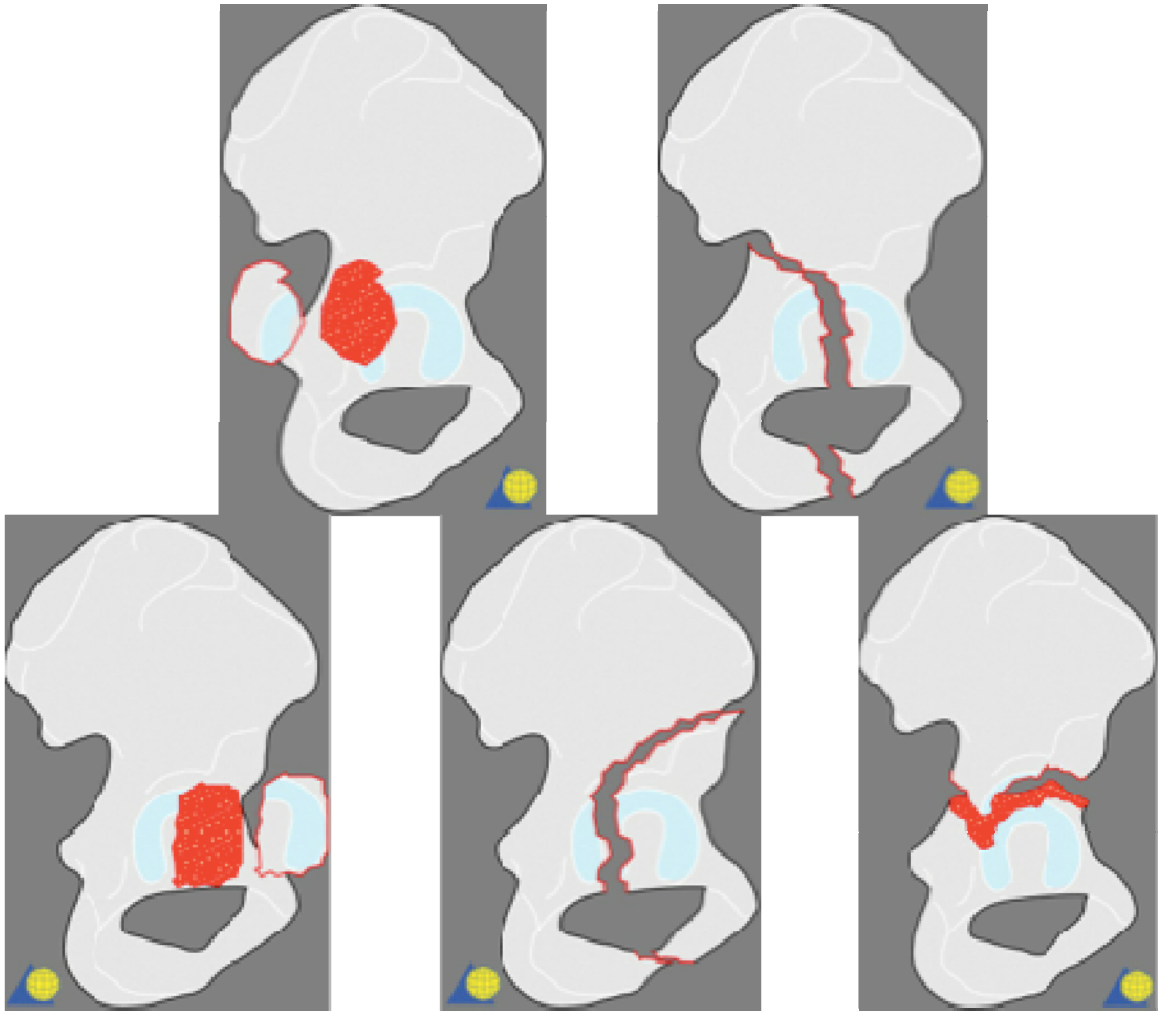
**A partial articular fracture can be one of two types: (a) a fracture involving only one column, either anterior or posterior, with the other column remaining intact; or (b) a fracture with a transverse component but with a part of the articular surface remaining attached to the ilium.**

**A complete articular fracture is one in which both columns are disrupted from each other and the attachment between the articular surface and the posterior ilium no longer exists.**

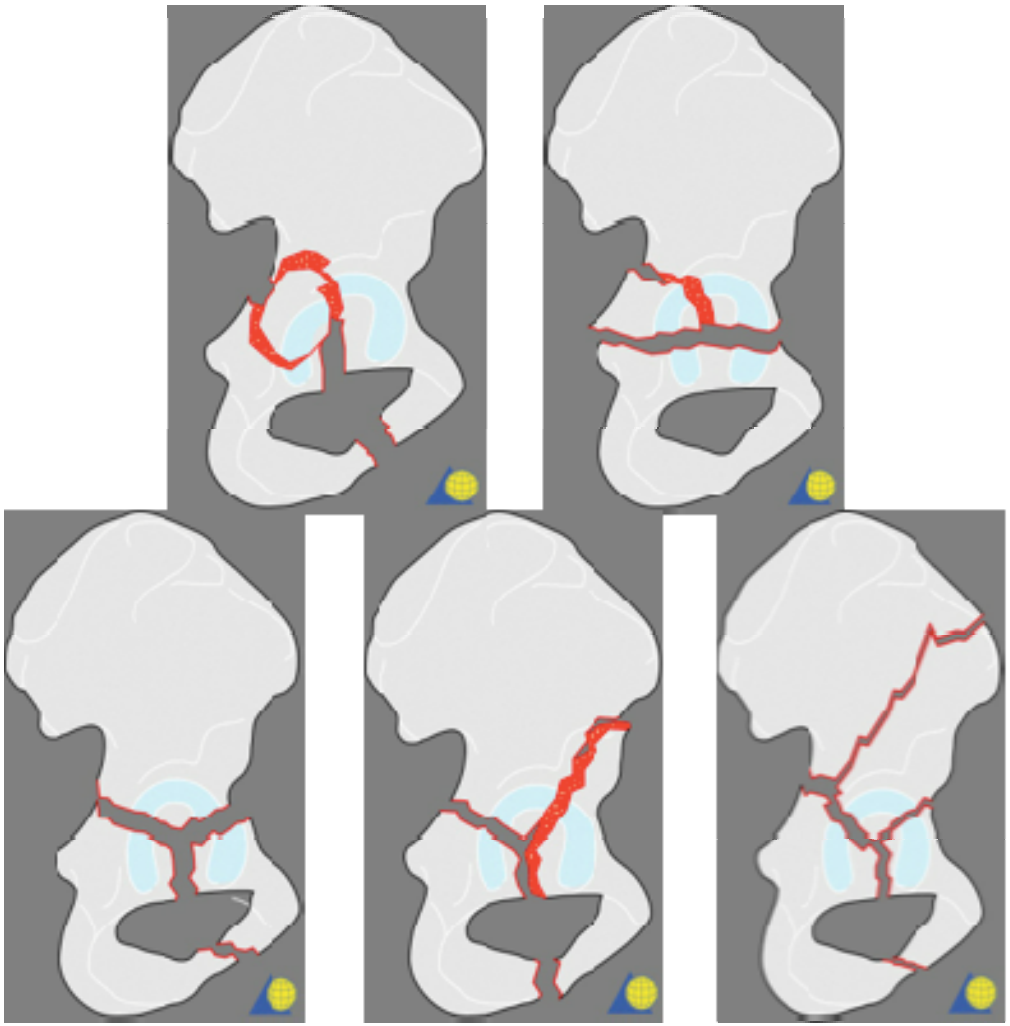
# Anatomy



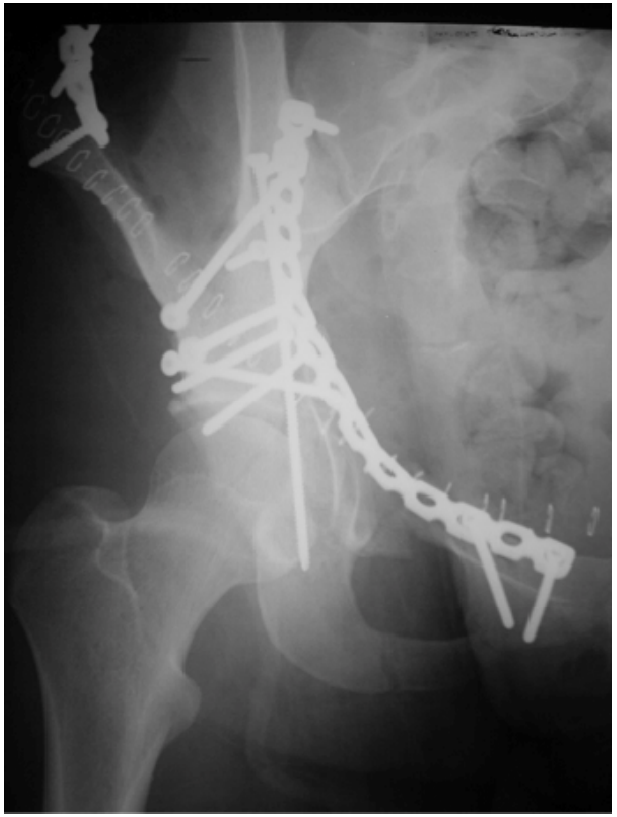
# Fracture types- elementary

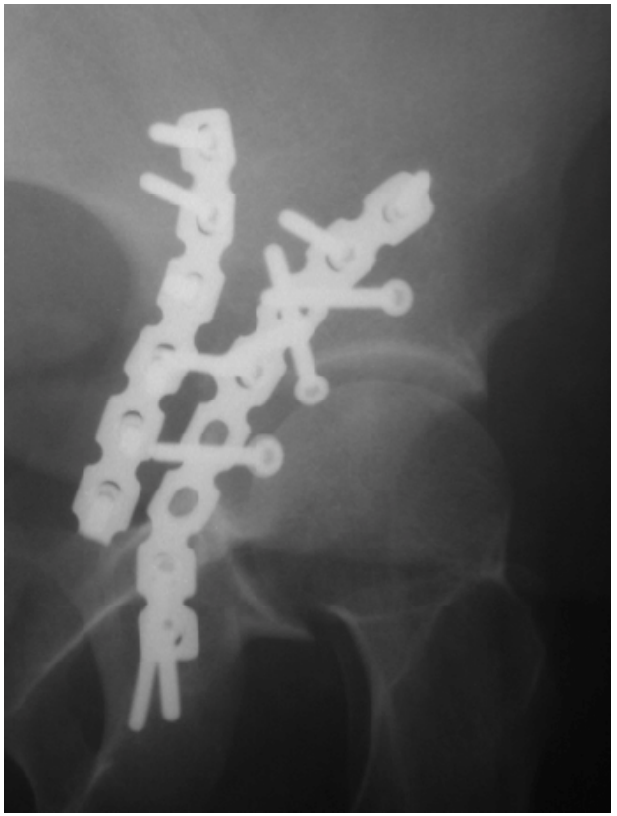


# Fracture types- associated



# Treatment





Questions?

# Summary

- The pelvic ring is a rigid structure: cannot disrupt in a single spot
- Stability depends vector and magnitude of force applied: stable, partially stable, unstable
- Acetabular fractures come in 10 varieties: complex, challenge to define morphology