Acetabular fractures – initial care

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Pelvic fractures bleed to death
Acetabular fractures limp to death

Objectives

- Aetiology, biomechanics and anatomy
- Diagnosis and classification
- Initial treatment options
- Results

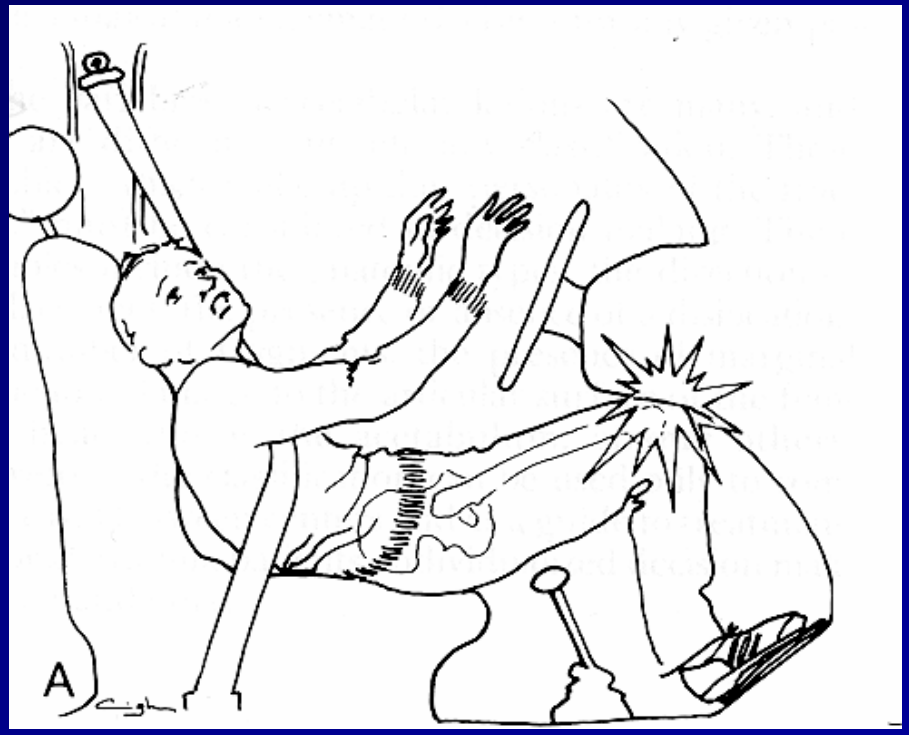
Aetiology & Biomechanics.

Prediction of # types:

Pennall:1975

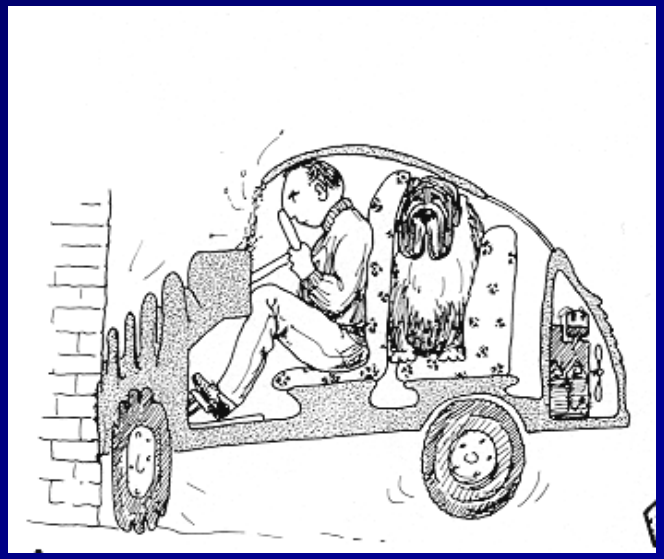
Letournel: 1993

Olsen: 1995



Aetiology & Biomechanics

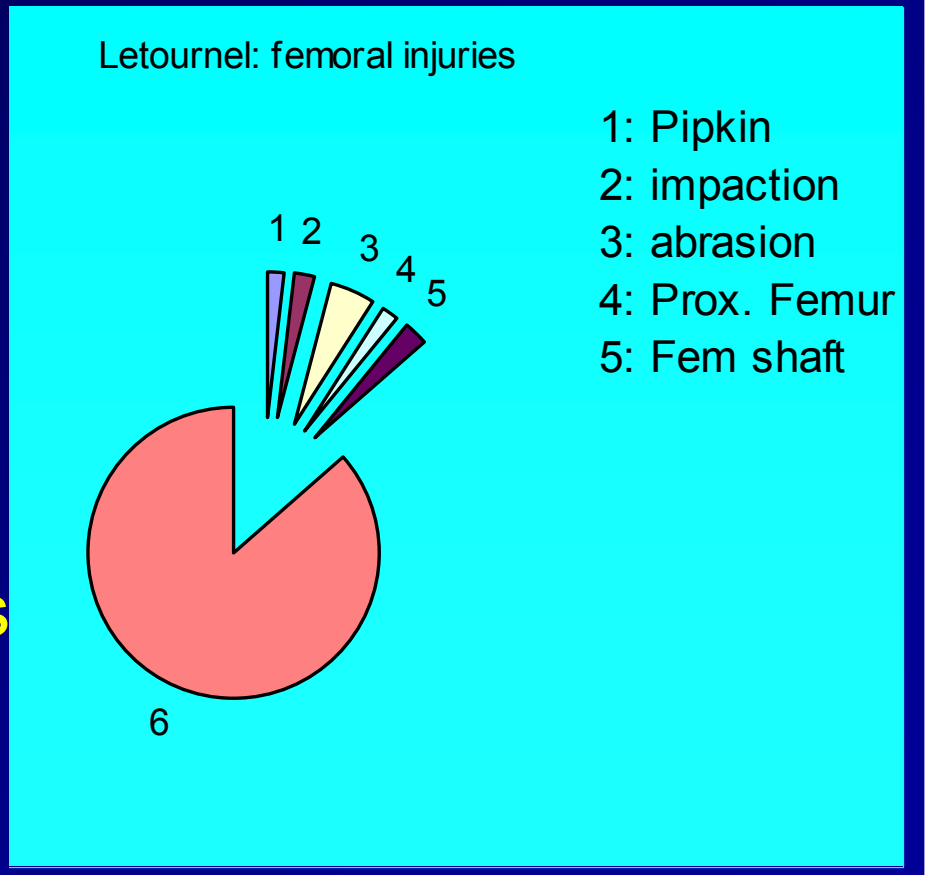
Association with other injuries



Incidence

Letournel:

- 940 cases:
- 1.9% head fractures
- 2.2% head depression fractures
- 5.1% cartilage abrasions
- 1.7% proximal femur
- 2.9% femoral shaft

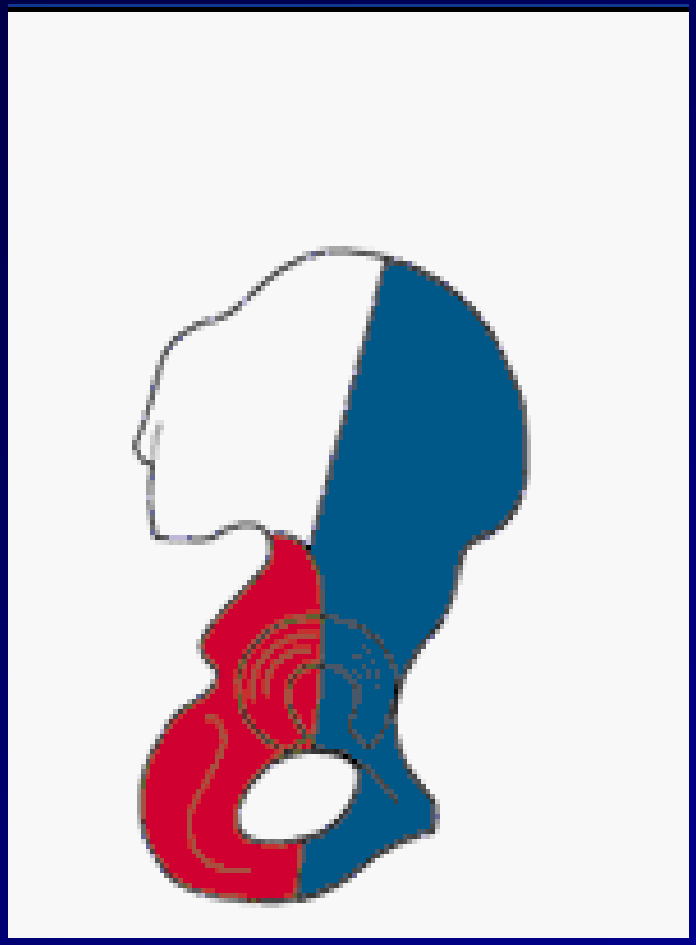


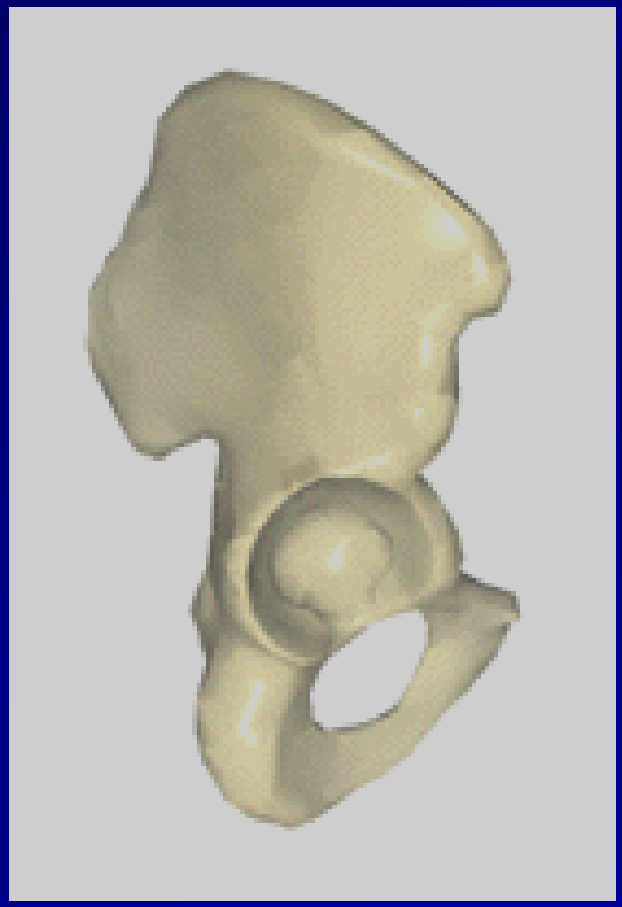
Incidence

Sunderland

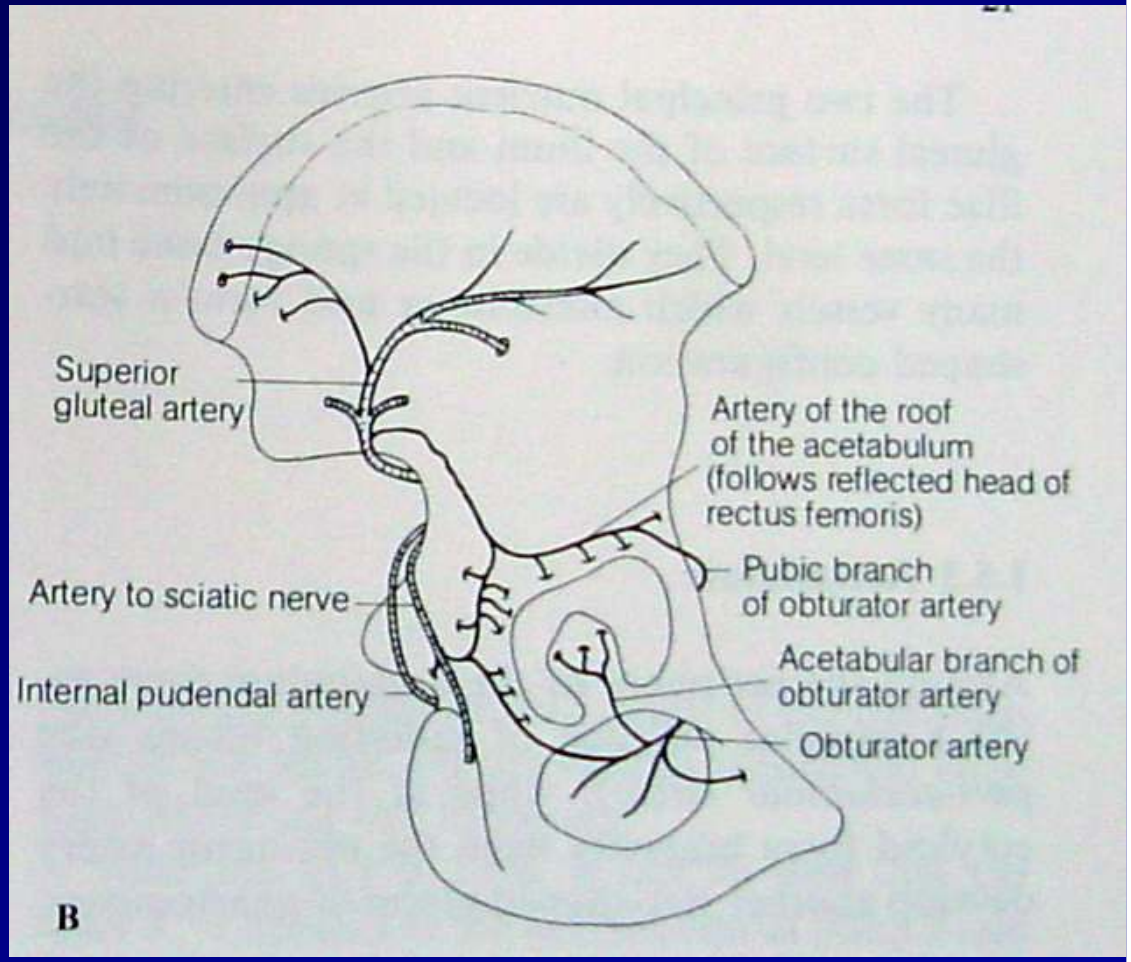
- 78 cases over 24 months:
  - 16 associated major injuries
  - 5 ipsilateral lower limb injuries
  - 2 femur fractures
  - 2 Pipkin + post wall fractures.

Anatomy

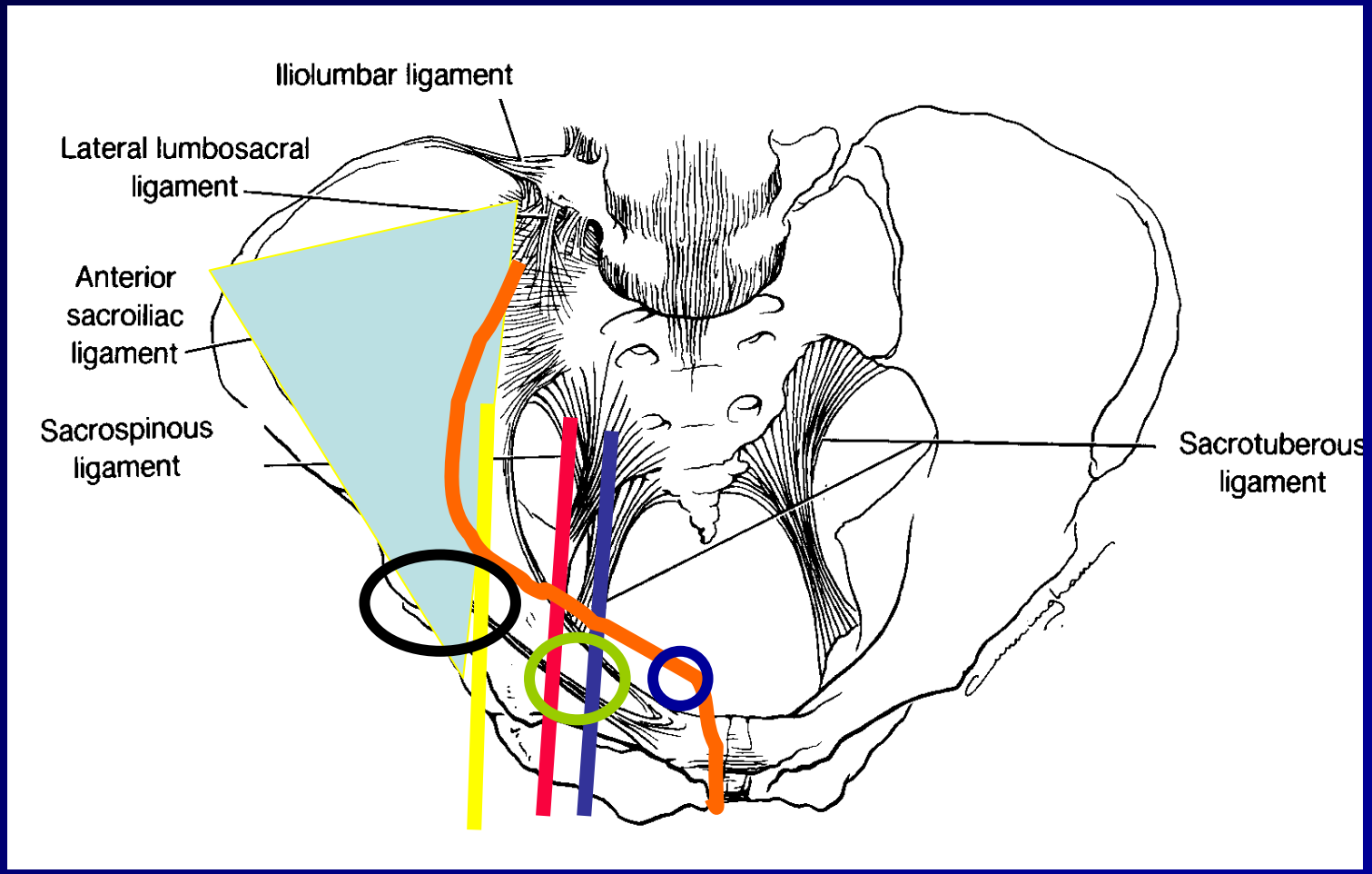




Gluteal vessels
Obturator Vessels
Sciatic Nerve
Femoral Nerve
Femoral vessels



Femoral Nerve
Femoral vessels

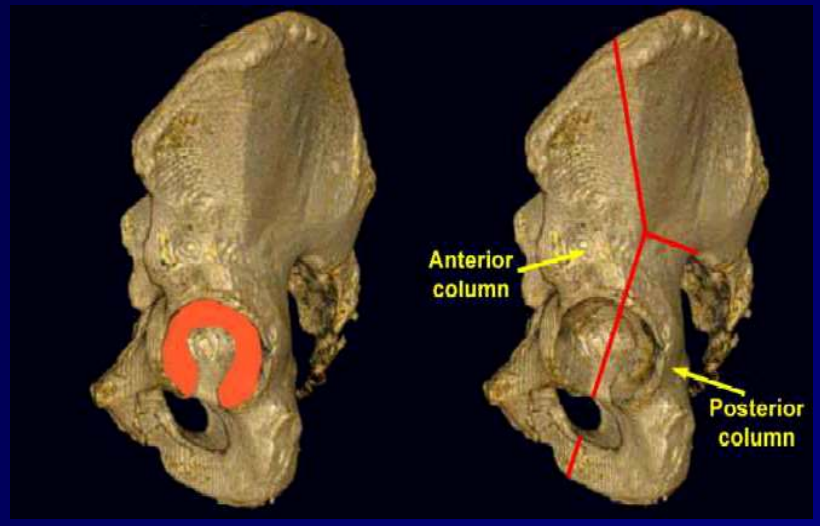


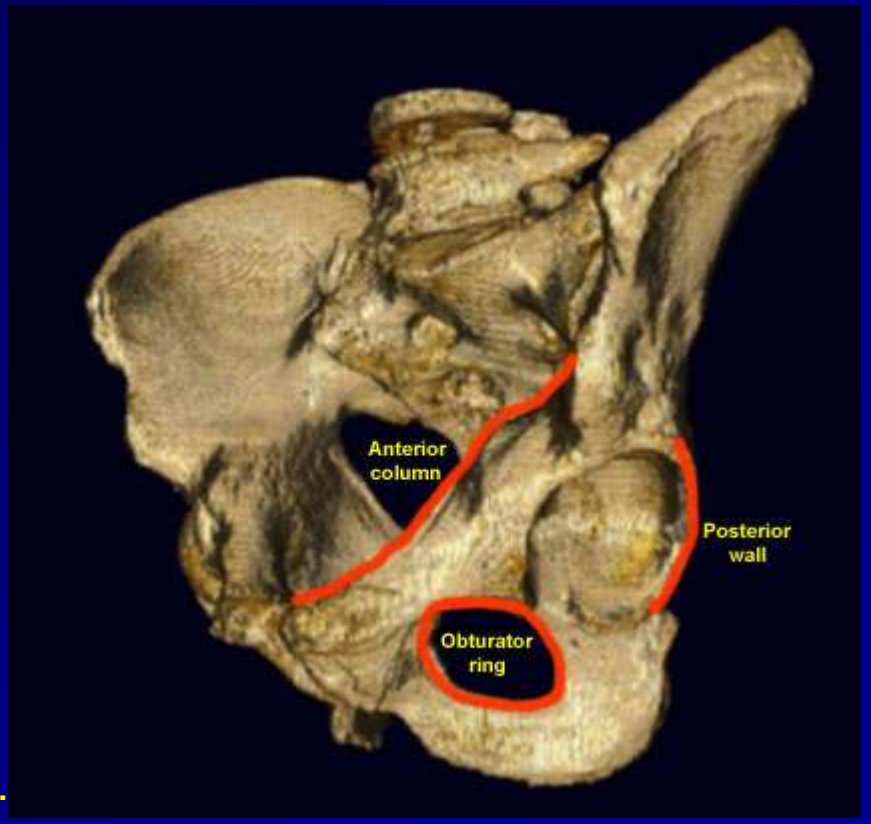
Gross anatomy

The important anatomic components

- Anterior column
- Posterior column
- Anterior and Posterior walls
- Dome
- Quadrilateral plate. (Tear drop)

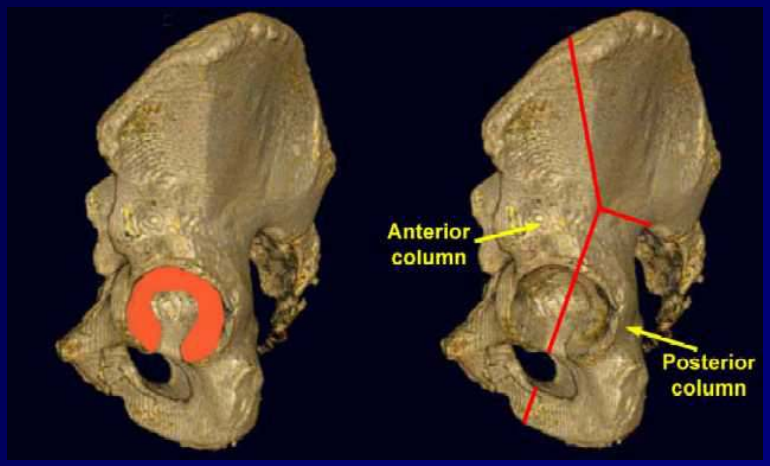
The anterior column

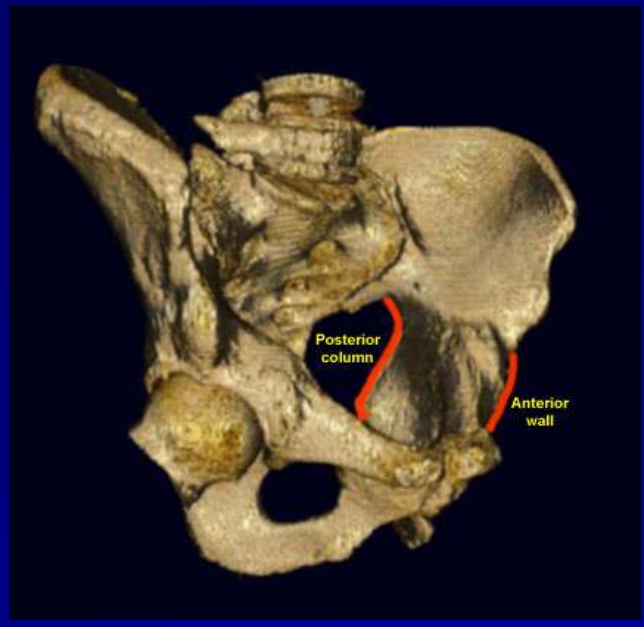




- larger of the 2 columns
- begins at the iliac wing and extends to incorporate the superior pubic ramus.
- The iliac wing is part of the anterior column (controversy)
  Ref: Redefinition of Letournel Anterior column: American Journal of Radiology 182: June 2004

The posterior column





- The posterior column begins at the sciatic notch and extends down the posterior acetabulum into the ischium.
- Both columns are attached to the axial skeleton by the sciatic buttress, which connects the acetabulum to the sacroiliac joint.

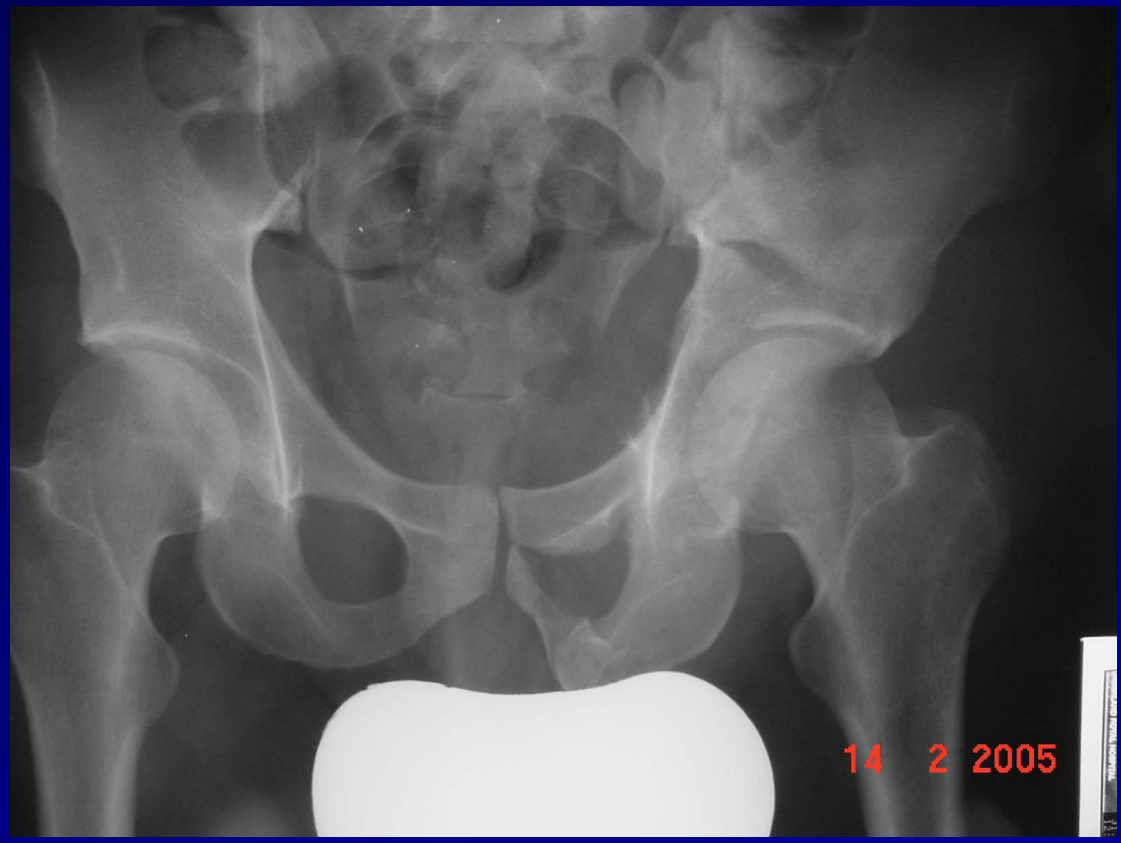
Walls and Dome

- Walls
- The posterior wall is larger than the anterior wall.
- The lateral portion of either wall is termed the acetabular rim.
- The quadrilateral plate is the medial wall of the acetabulum

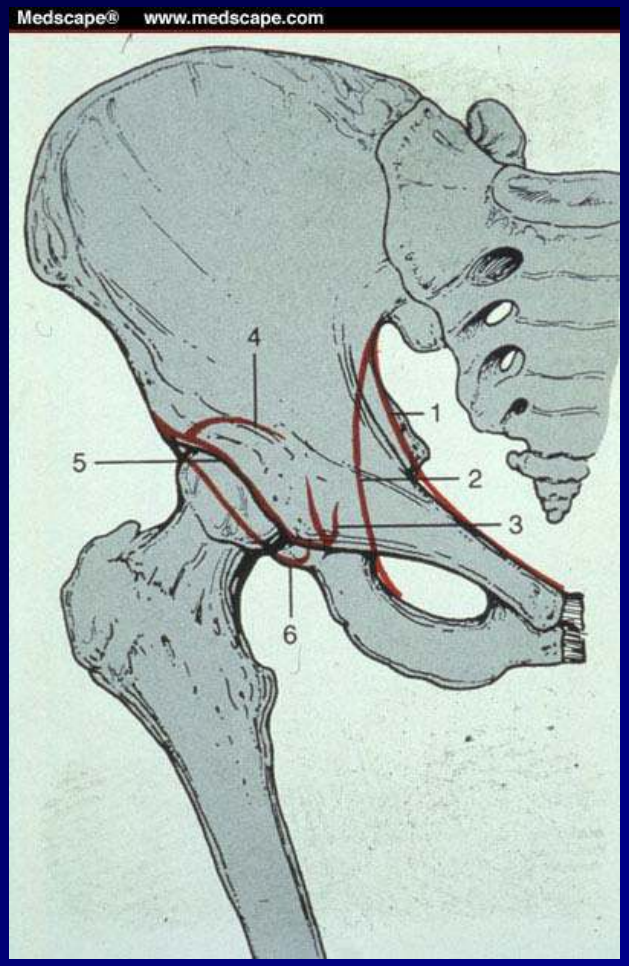
- The dome
- superior aspect that carries most of the weight-bearing forces.

Radiology

- Plain films
- Judet views
- CT
- Reformat



AP Pelvis Xray



6 major lines should be considered

- the iliopectineal line (1)
- the ilioischial line (2)
- the teardrop (3)

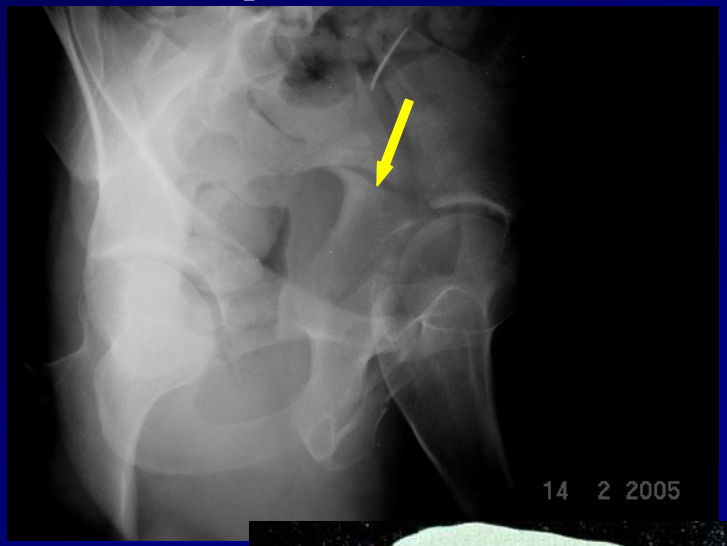
  medial portion - quadrilateral surface

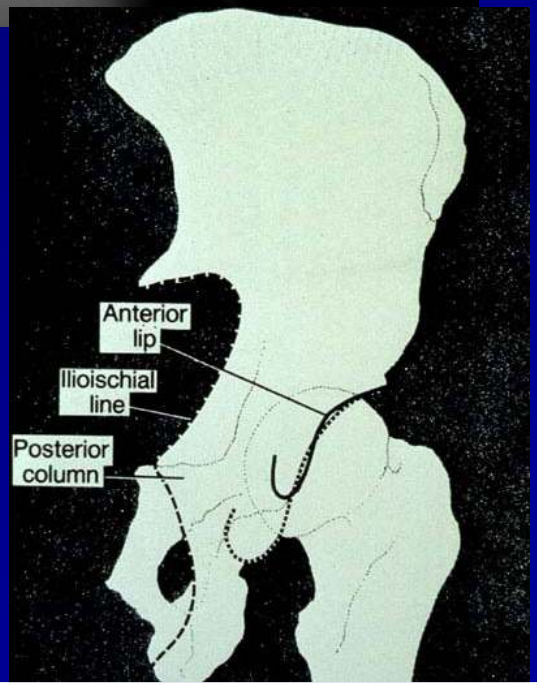
  lateral portion -the medial aspect of the acetabular floor
- the dome (4)
- the anterior wall (5)
- the posterior wall (6)

Oblique views are mandatory

Iliac oblique

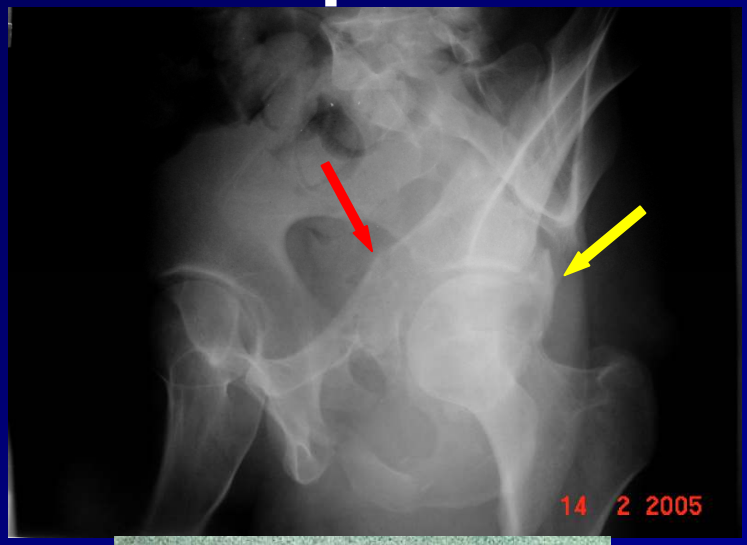
- Ilium
- Post. Column
- Anterior lip

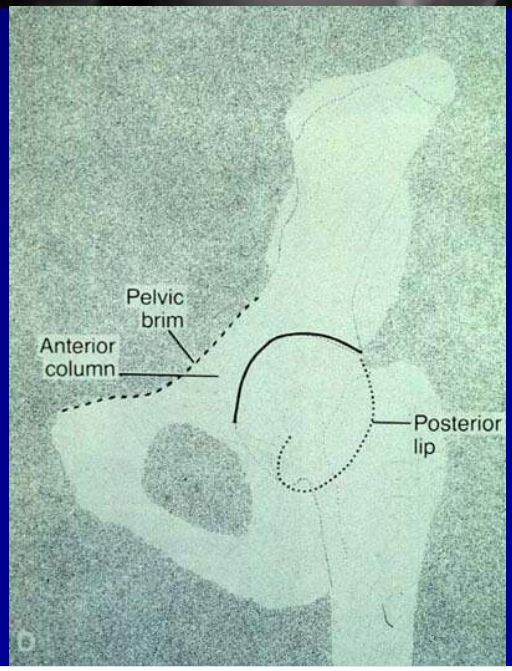




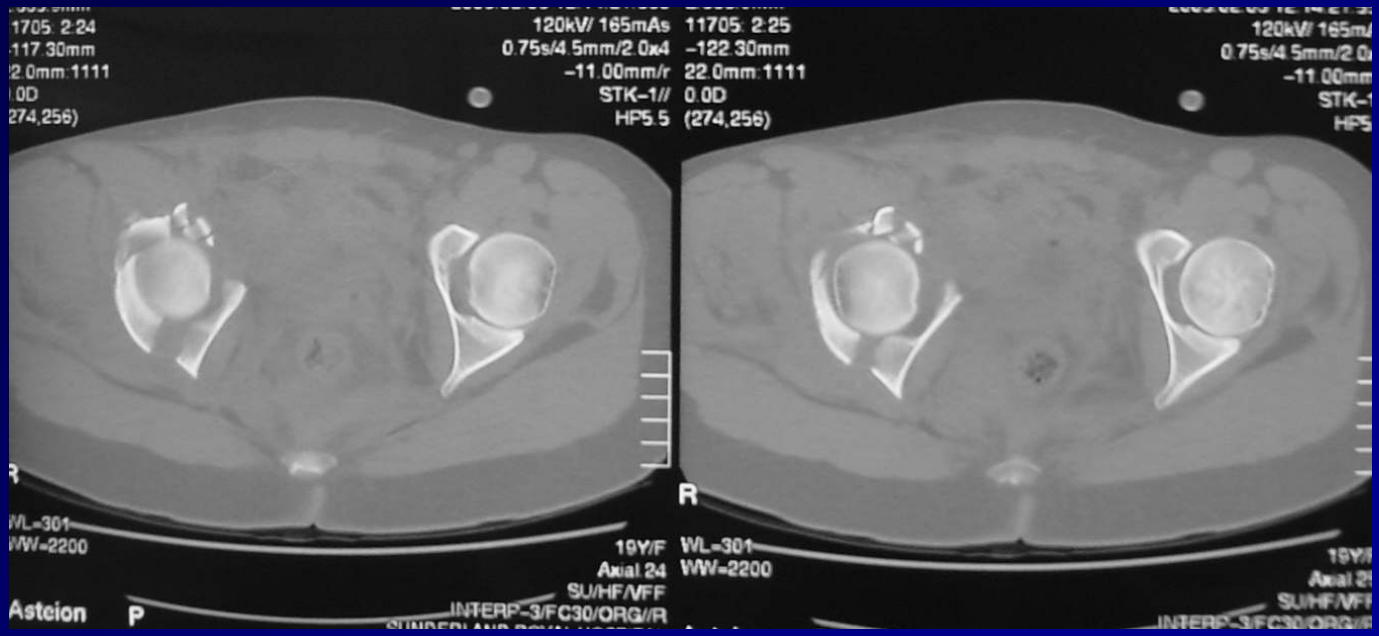
Obturator oblique

- Anterior column
- Posterior wall





CT



Patient must be square

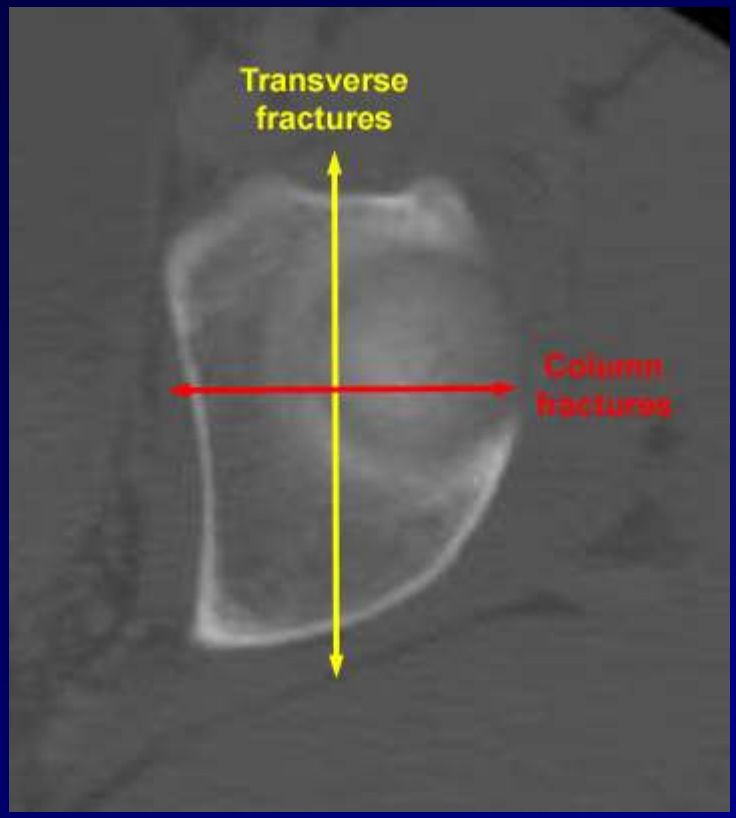
< 3mm cuts

Bone windows

Why CT ?

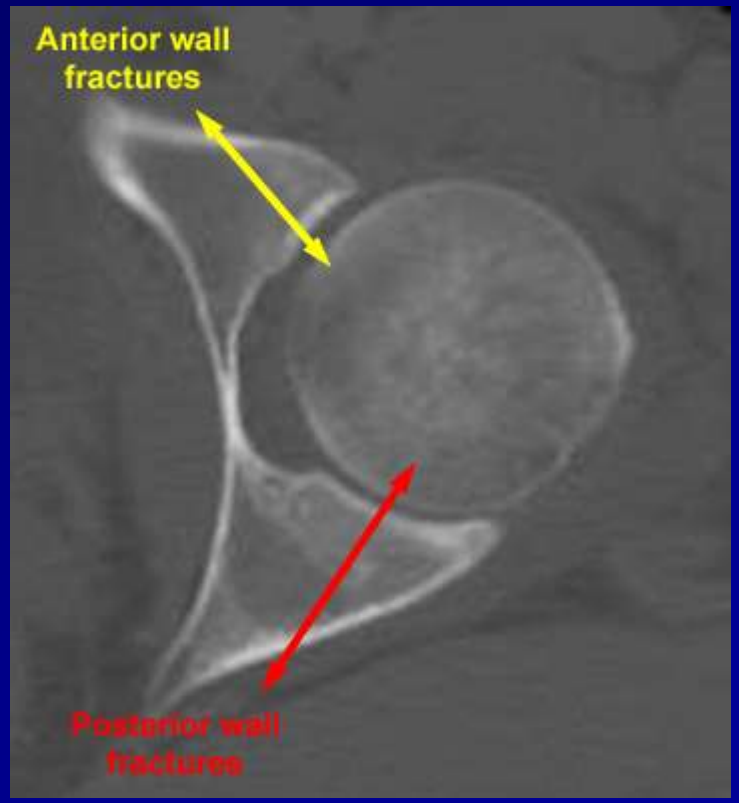
- To plan surgery
- Incarcerated Fragment
- Marginal impaction
- Head fractures

CT SCAN



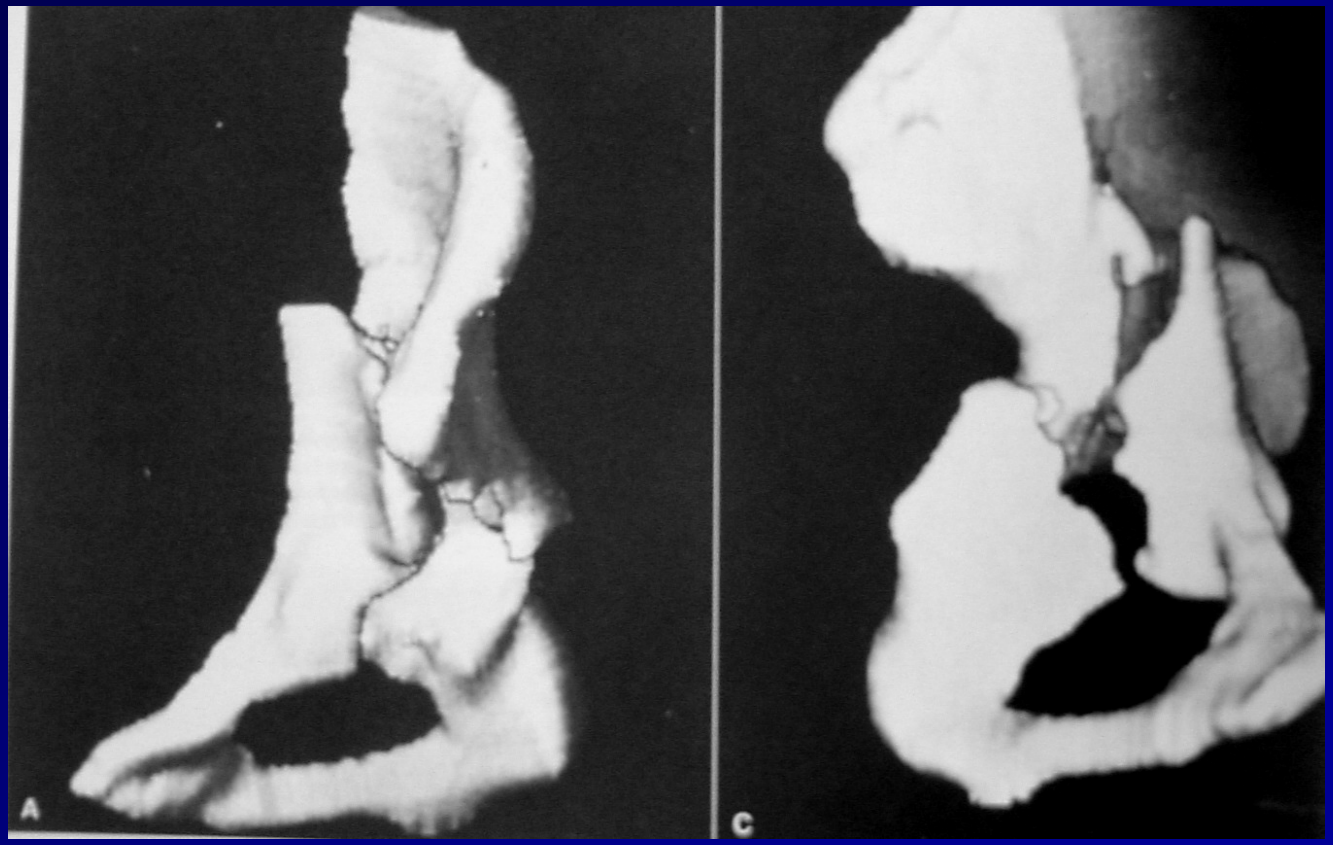
Transverse-type acetabular fractures have a vertical (sagittal) orientation.

Column-type fractures have a horizontal (coronal) orientation



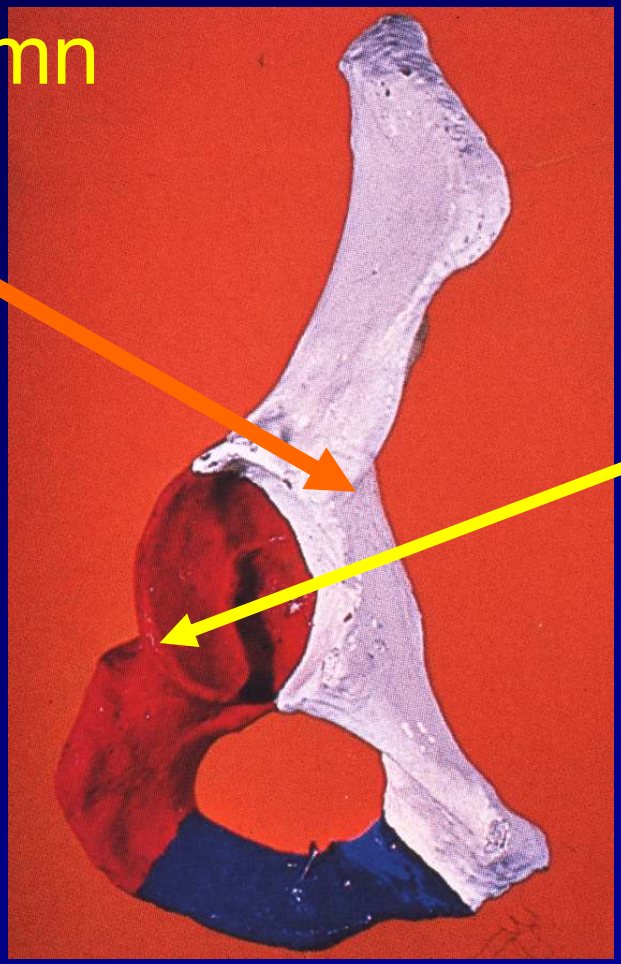
Wall fractures have an oblique orientation.

CT Reformat



Classification

Anterior column

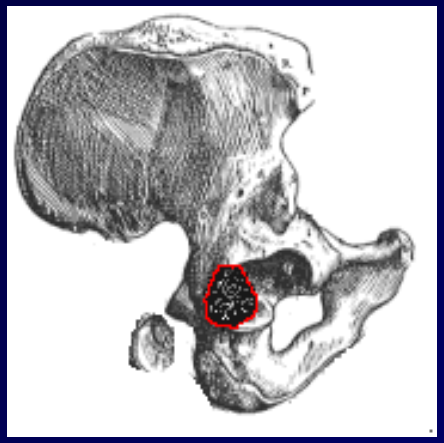


Posterior Column

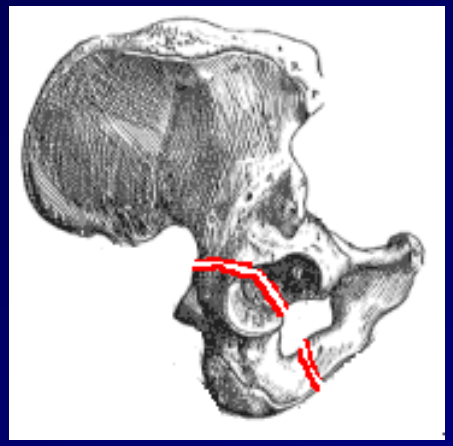
Classification

- Letournel
  - Morphology
  - 2 broad groups – simple & complex
  - Good intra/interobserver reliability. (Matta, 2003)
- AO
  - Articular morphology
  - Direction of displacement
  - Sub-divisions

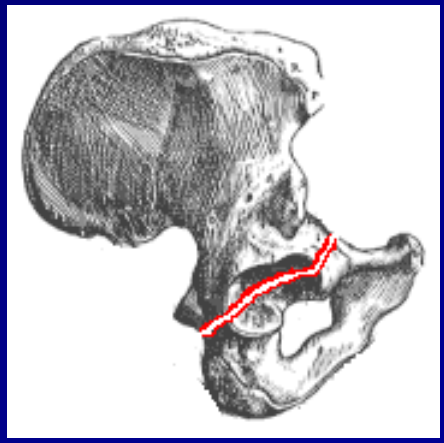
Letournel: simple fractures



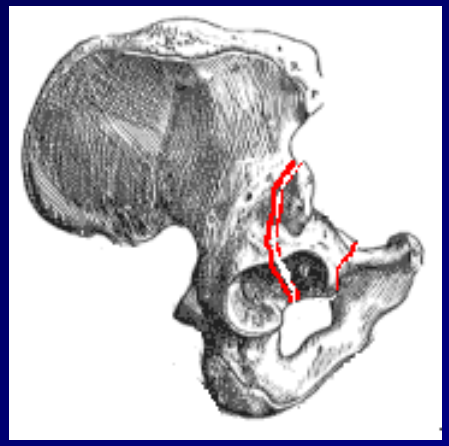
posterior wall



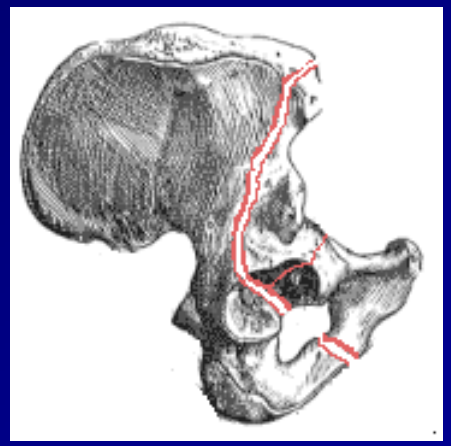
posterior column



transverse

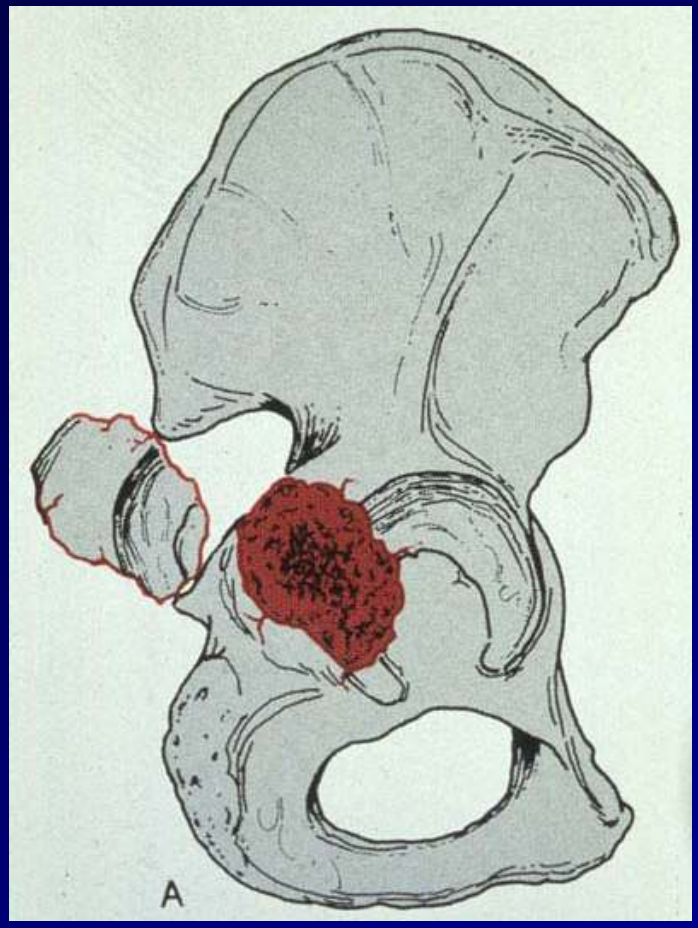


anterior wall

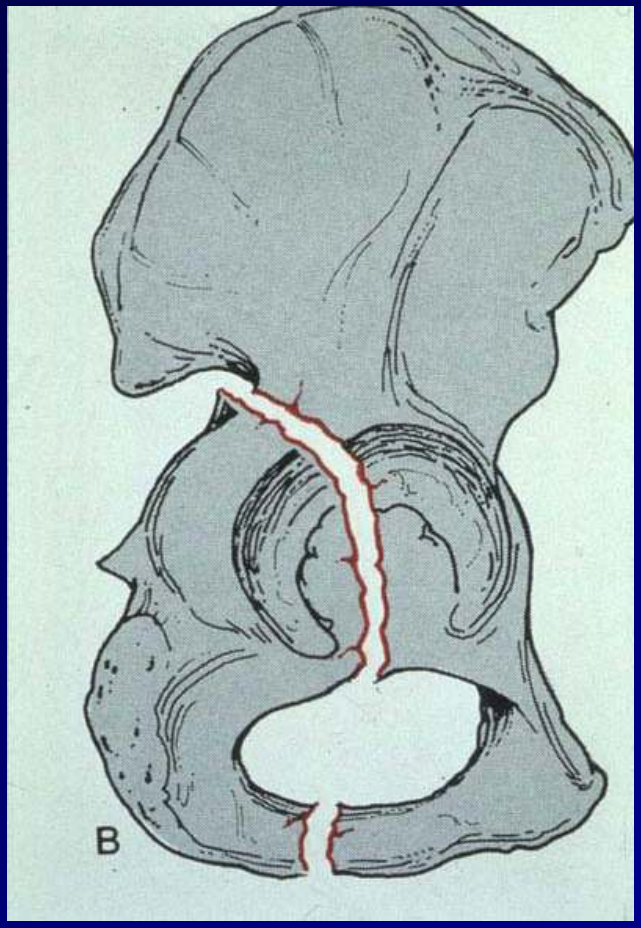


anterior column

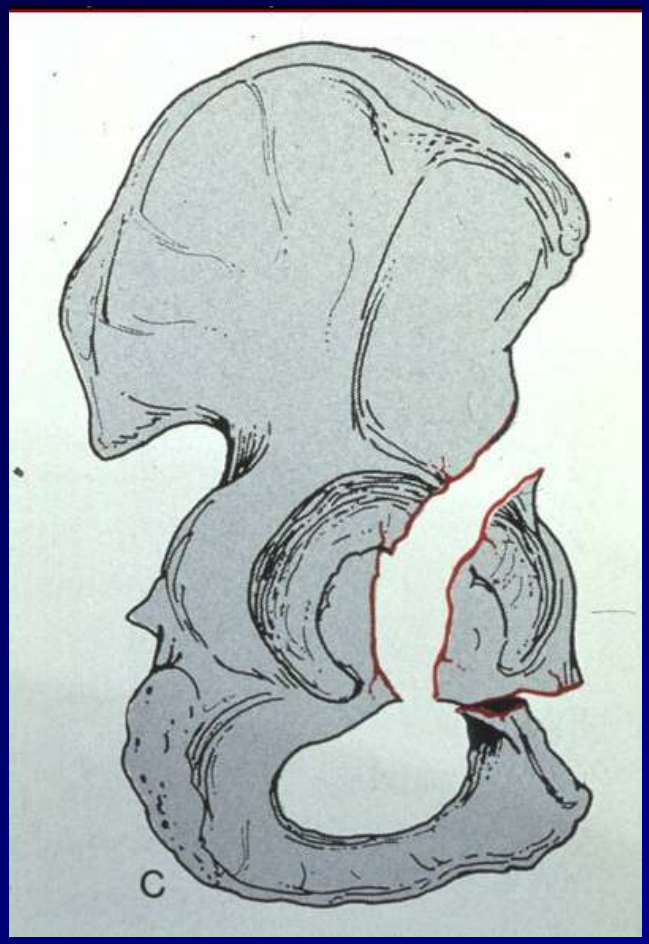
Posterior wall fracture



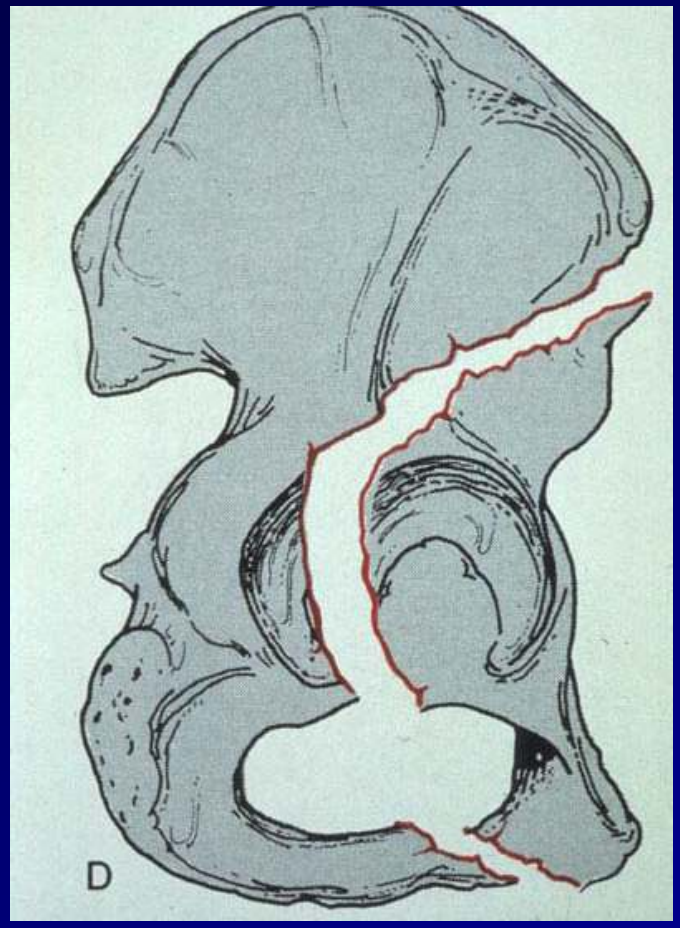
Posterior column fracture



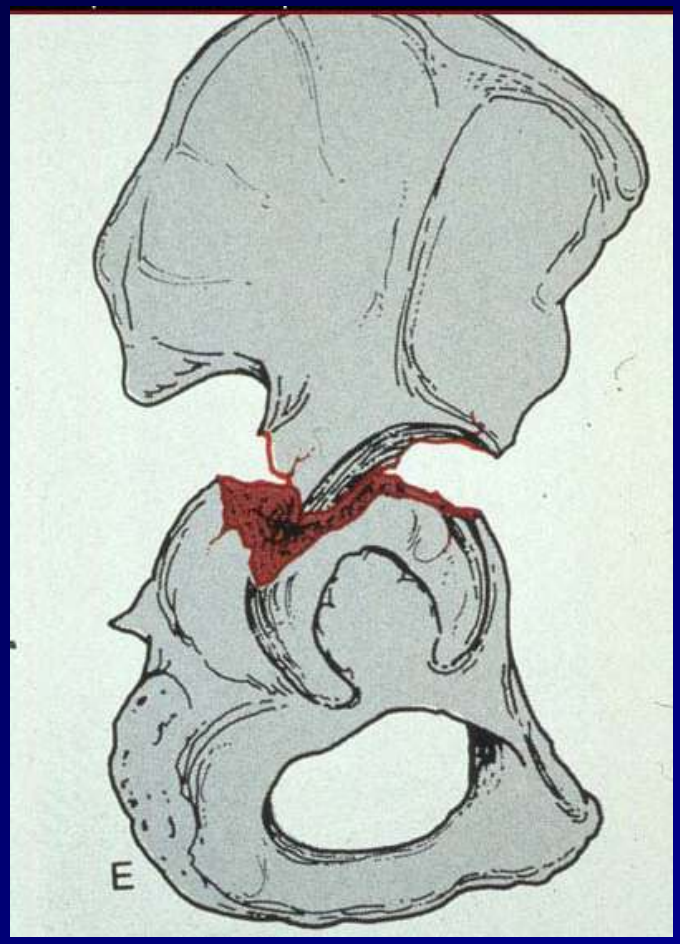
Anterior wall fracture



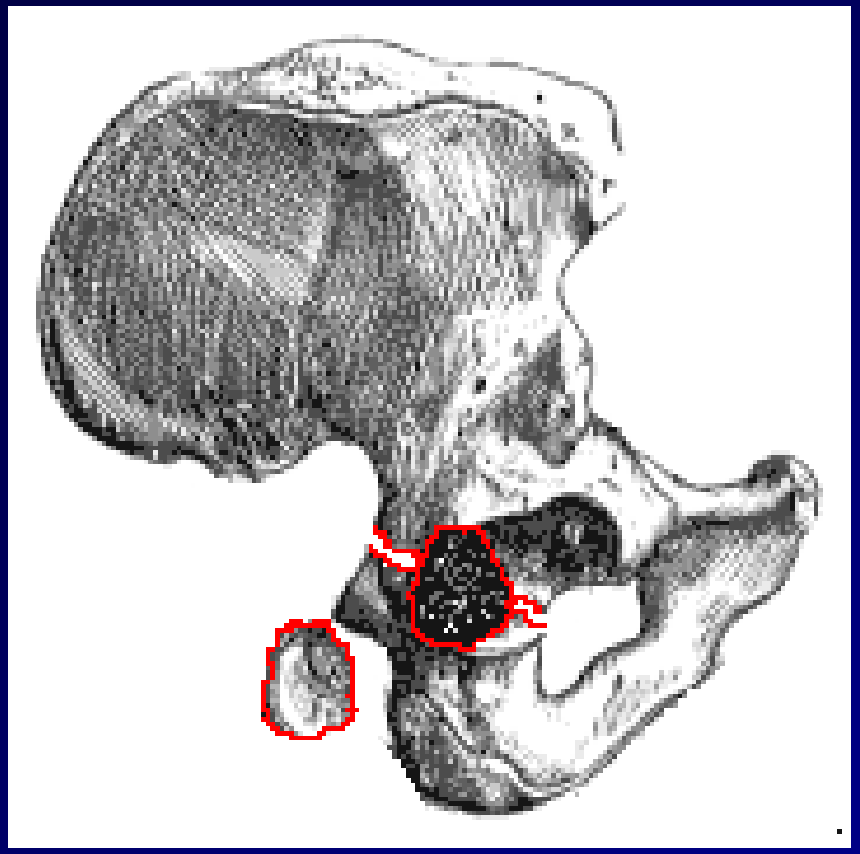
Anterior column fracture



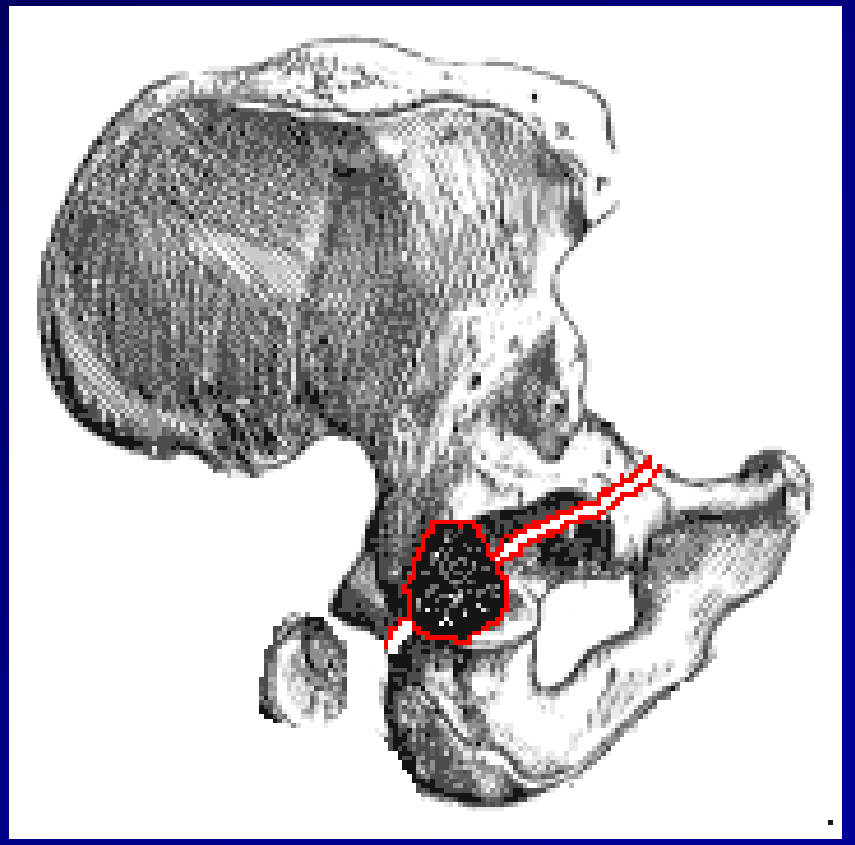
Transverse Fracture



Letournel: complex fractures

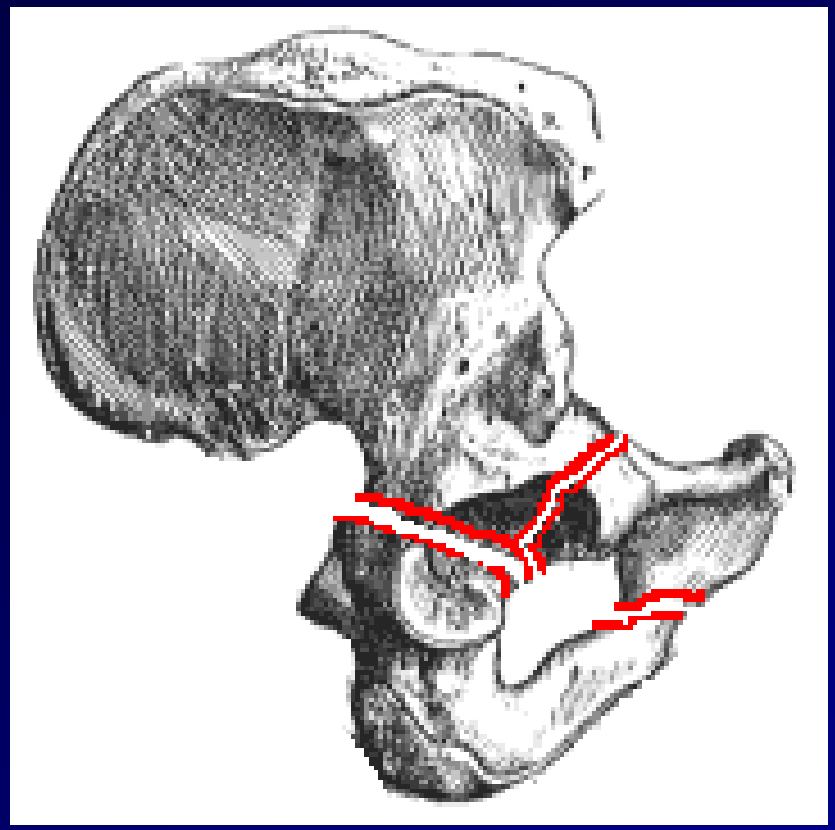


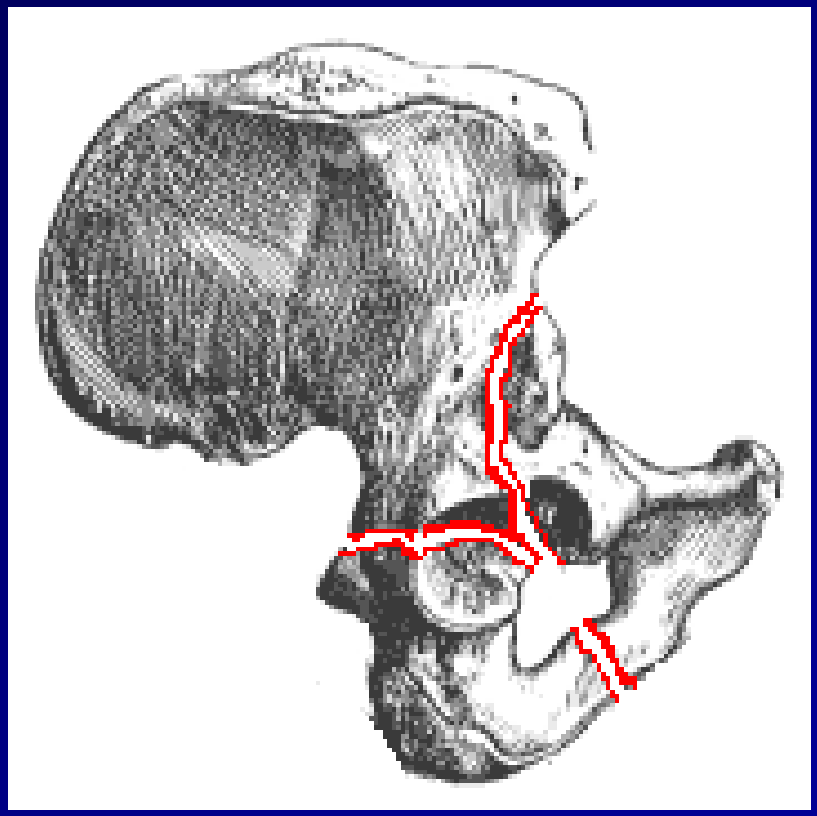
posterior column
+ posterior wall



transverse
+ posterior wall

Letournel: complex fractures

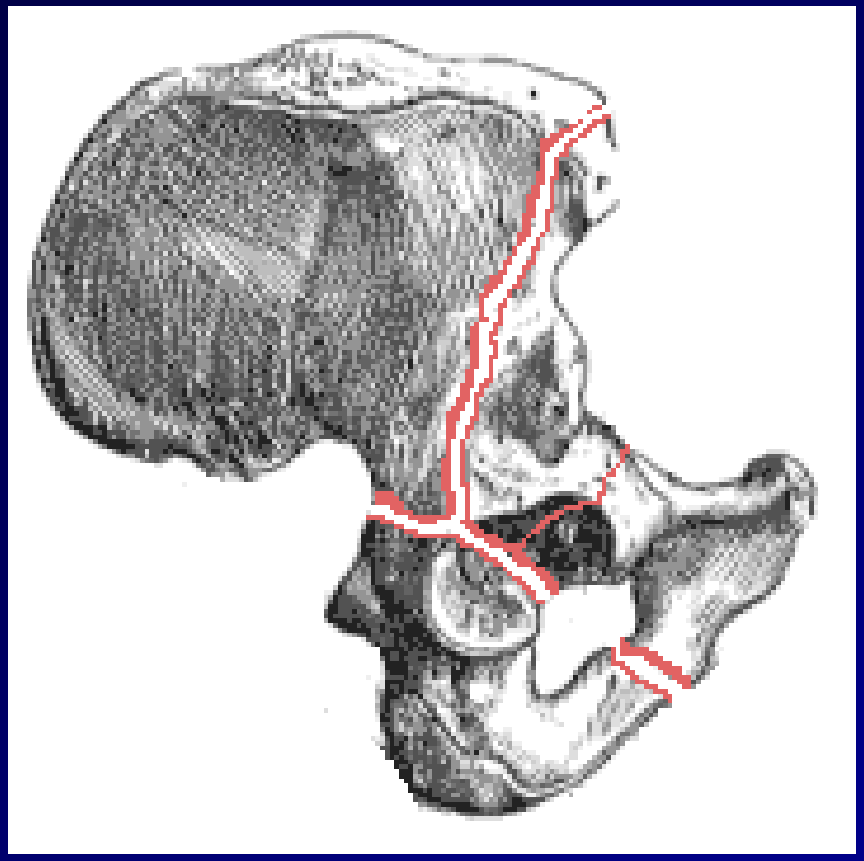




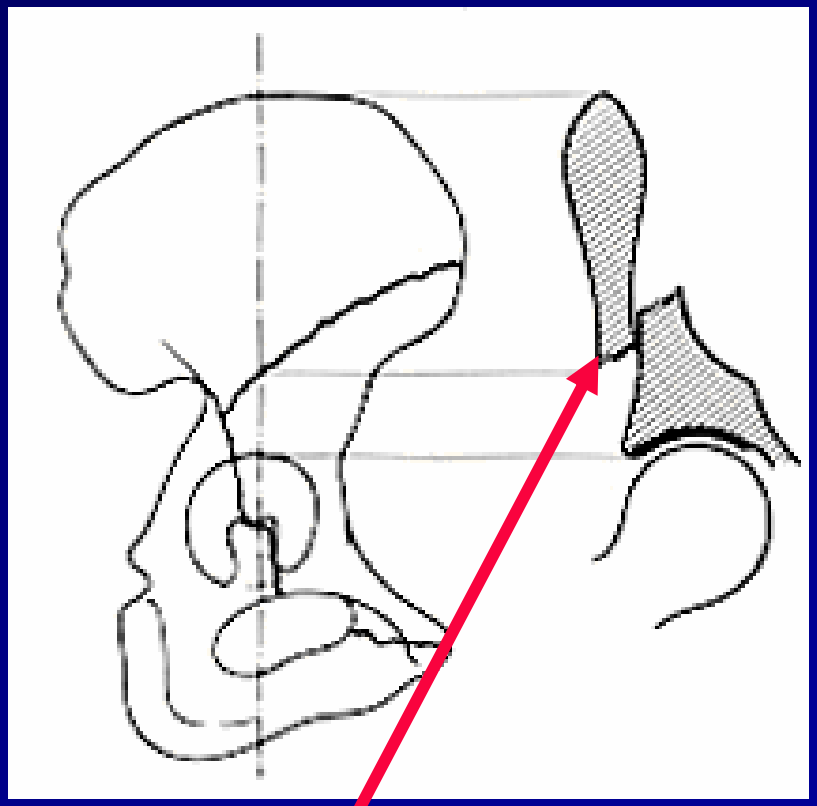
T-shaped

anterior column
+ posterior hemitransverse

Letournel: complex fractures

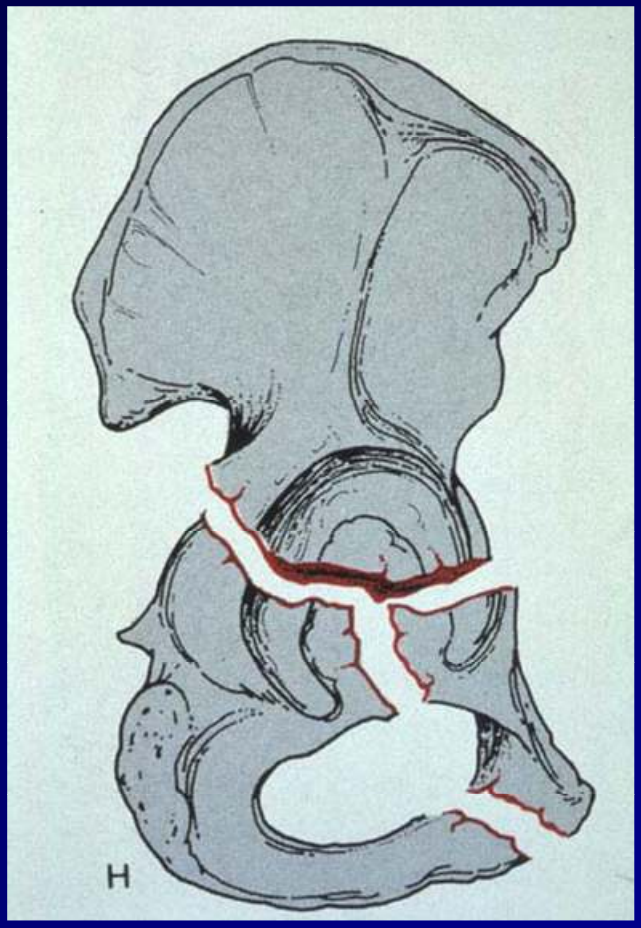


both columns

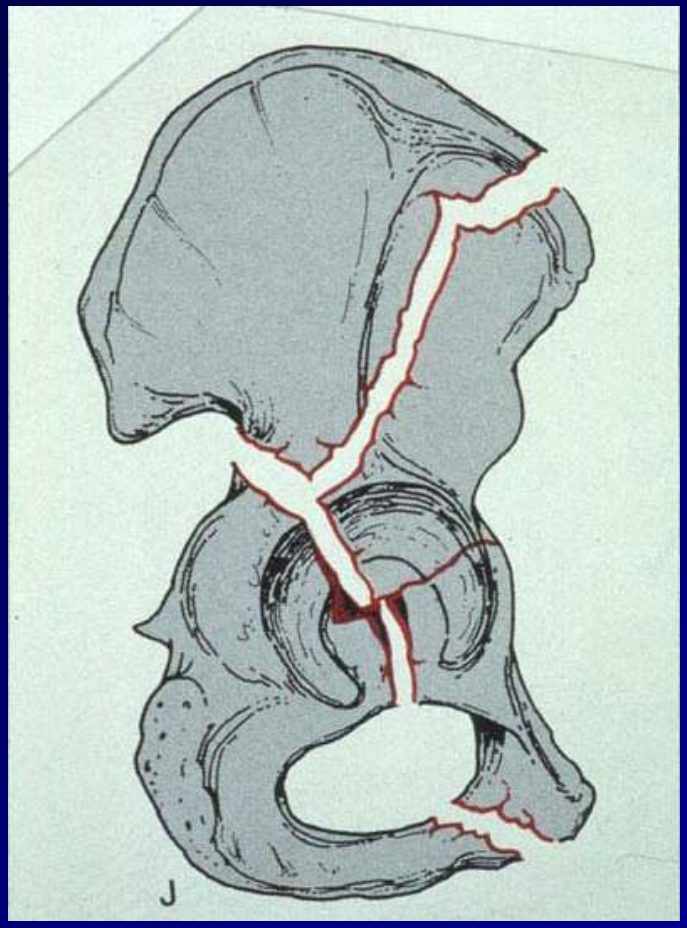


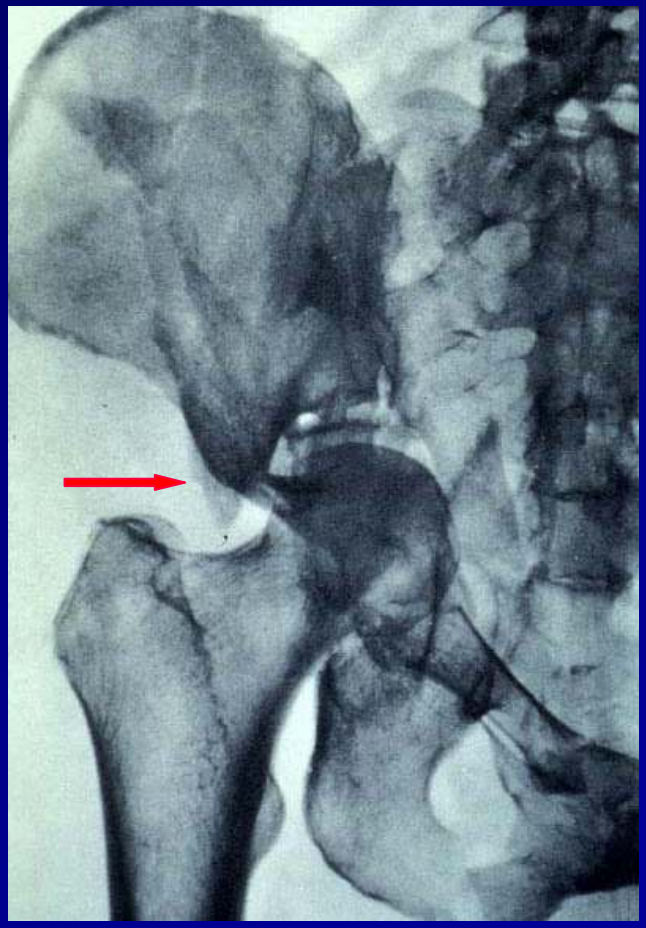
Spur sign in obturator oblique

T Type fracture



Both Column Fracture

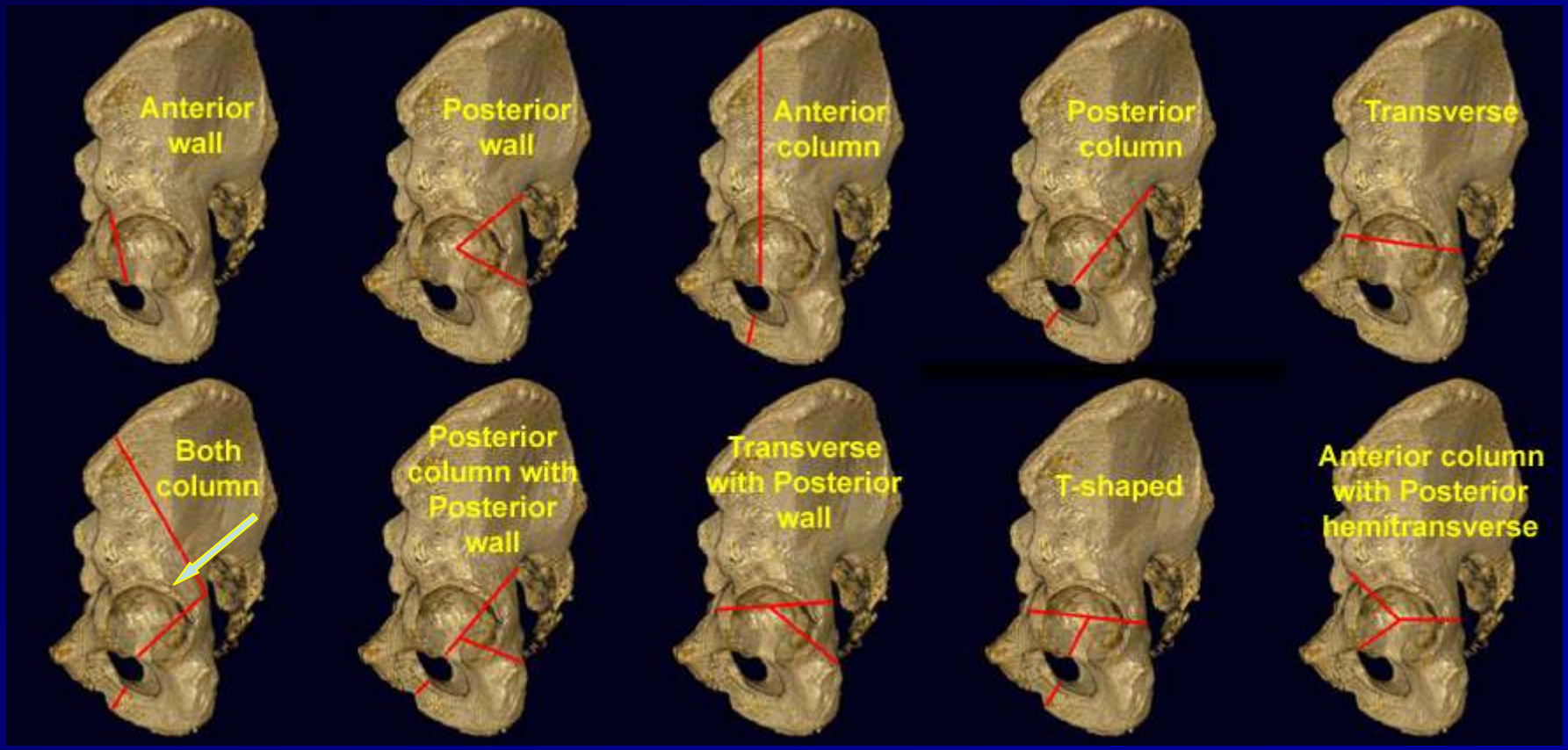




Spur sign

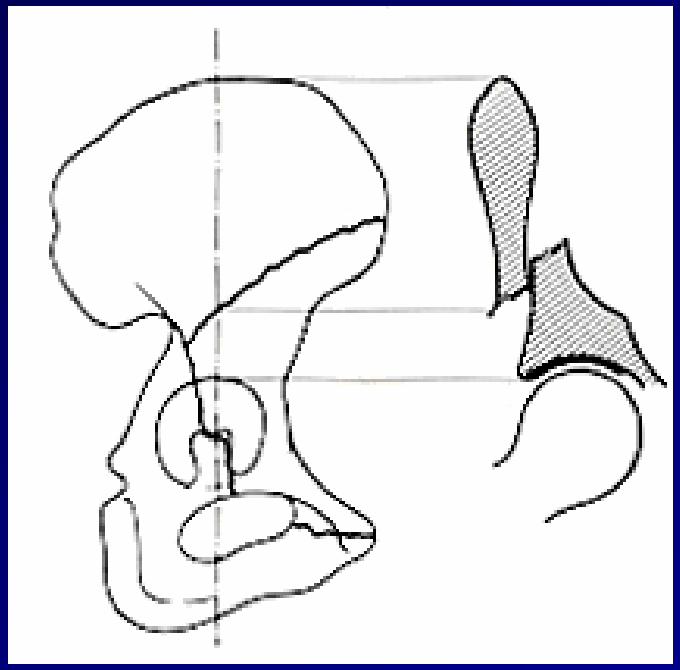
- Both column fracture Vs other fractures involving both columns

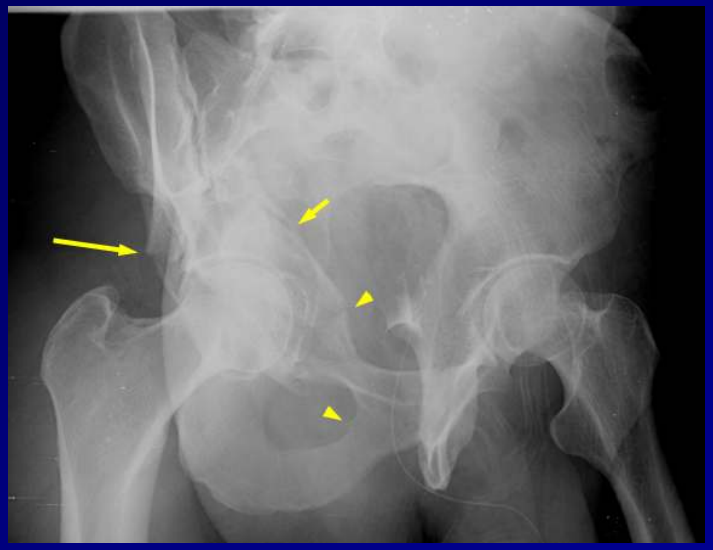
- In a both-column fracture, the articular surface of the acetabulum is completely disconnected from the axial skeleton.

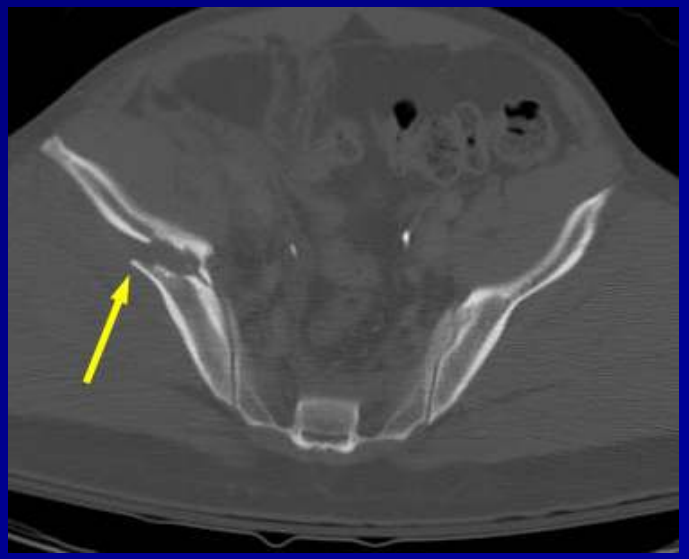


Spur sign

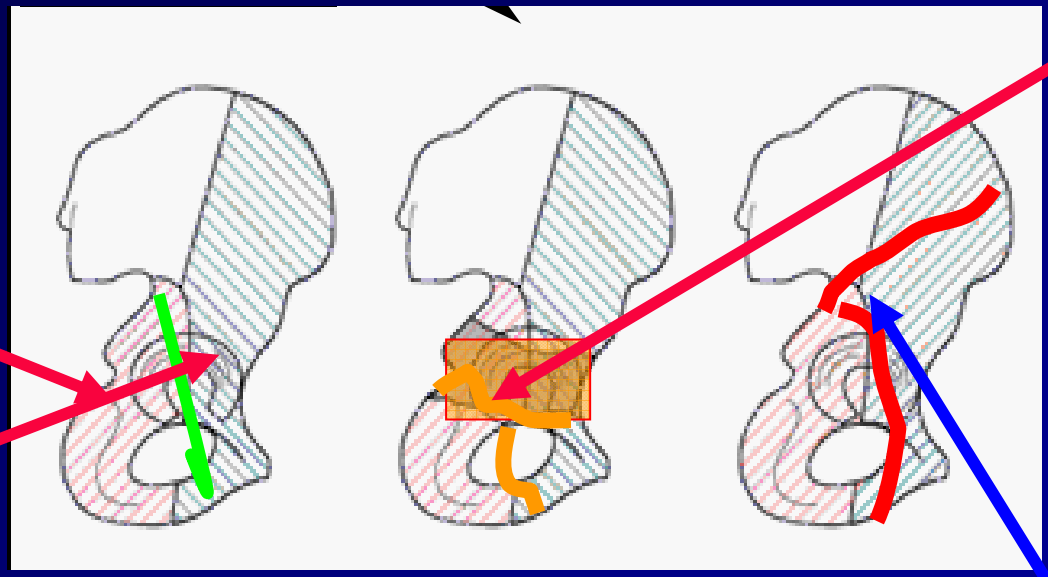
- The spur represents a strut of bone extending from the sacroiliac joint.
- Both column fracture







AO classification – 62-



A1/2

A3

B types
Transverse
and T

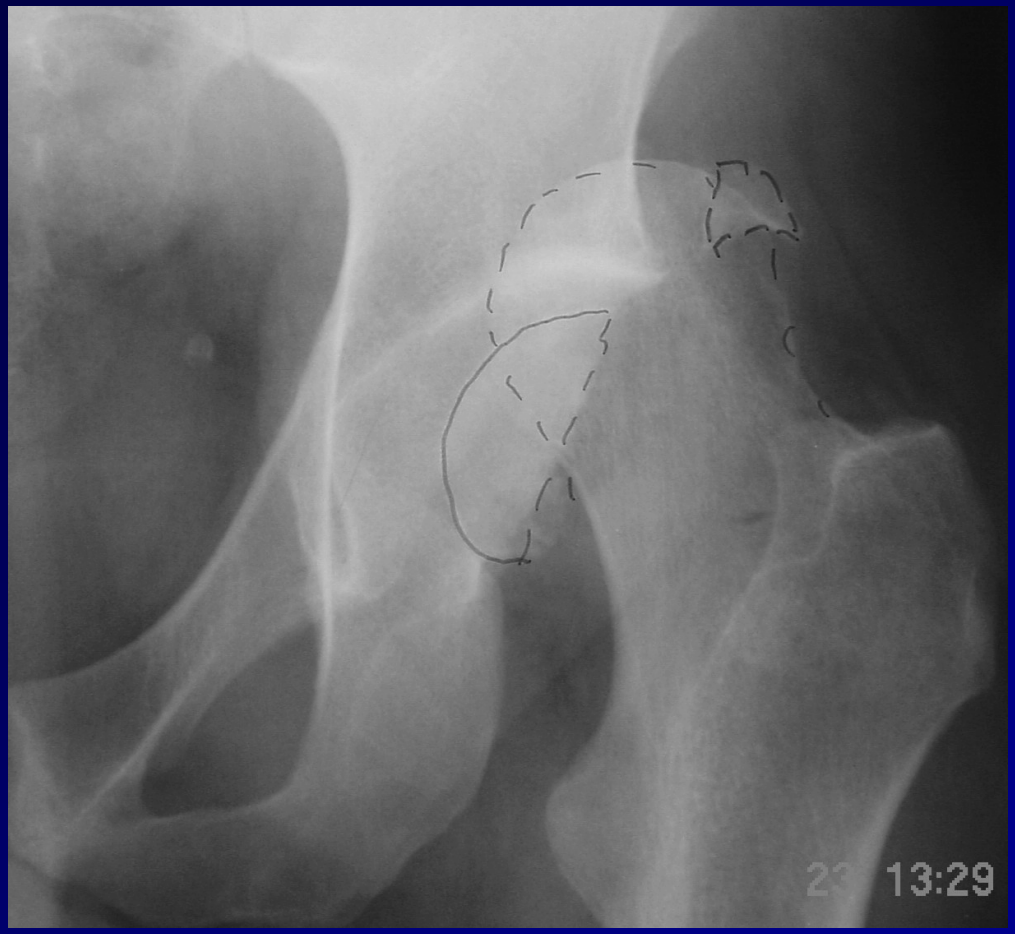
C type

Both
column

A B C

Partial articular Complete

Head fracture



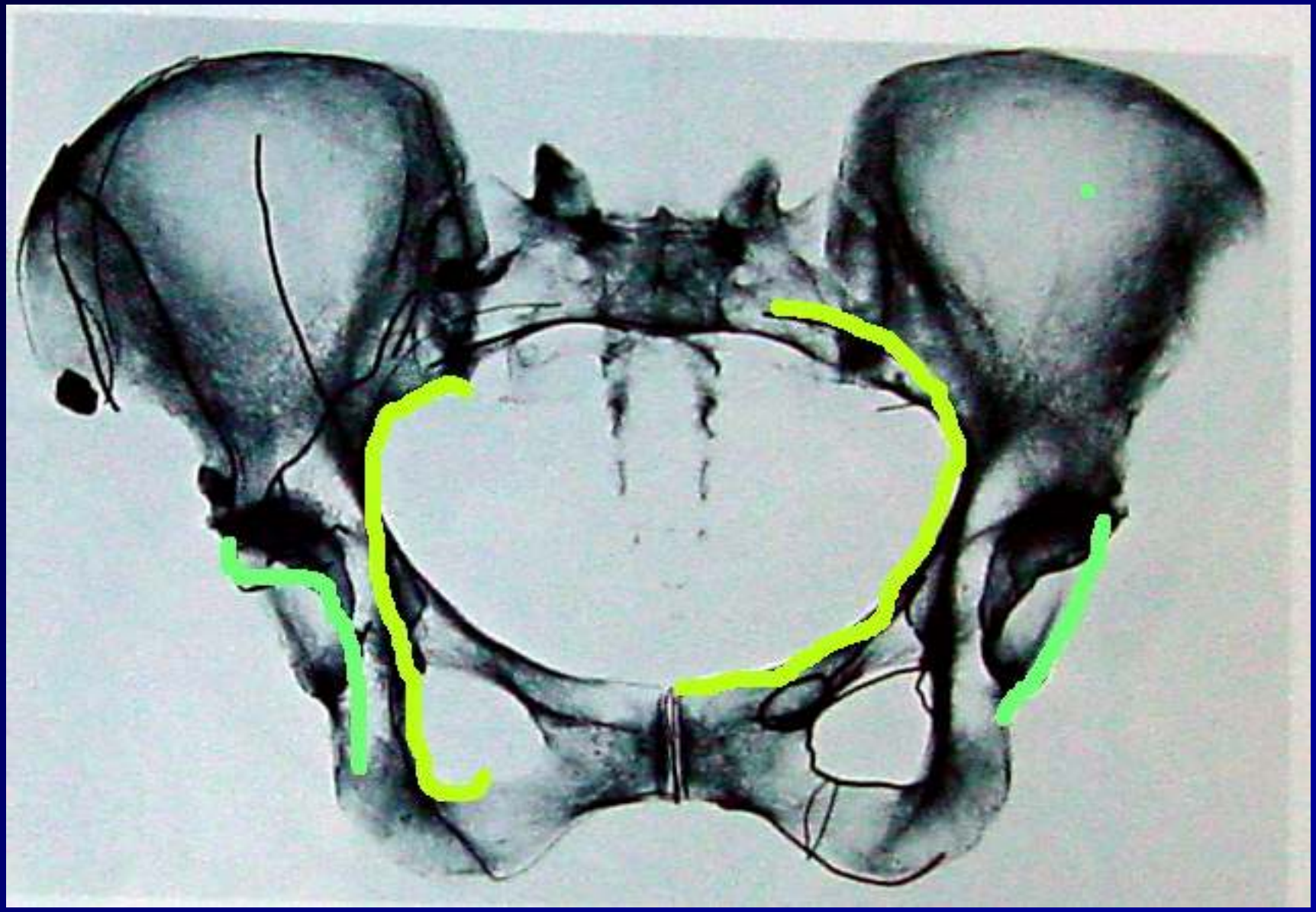
Pipkin fractures

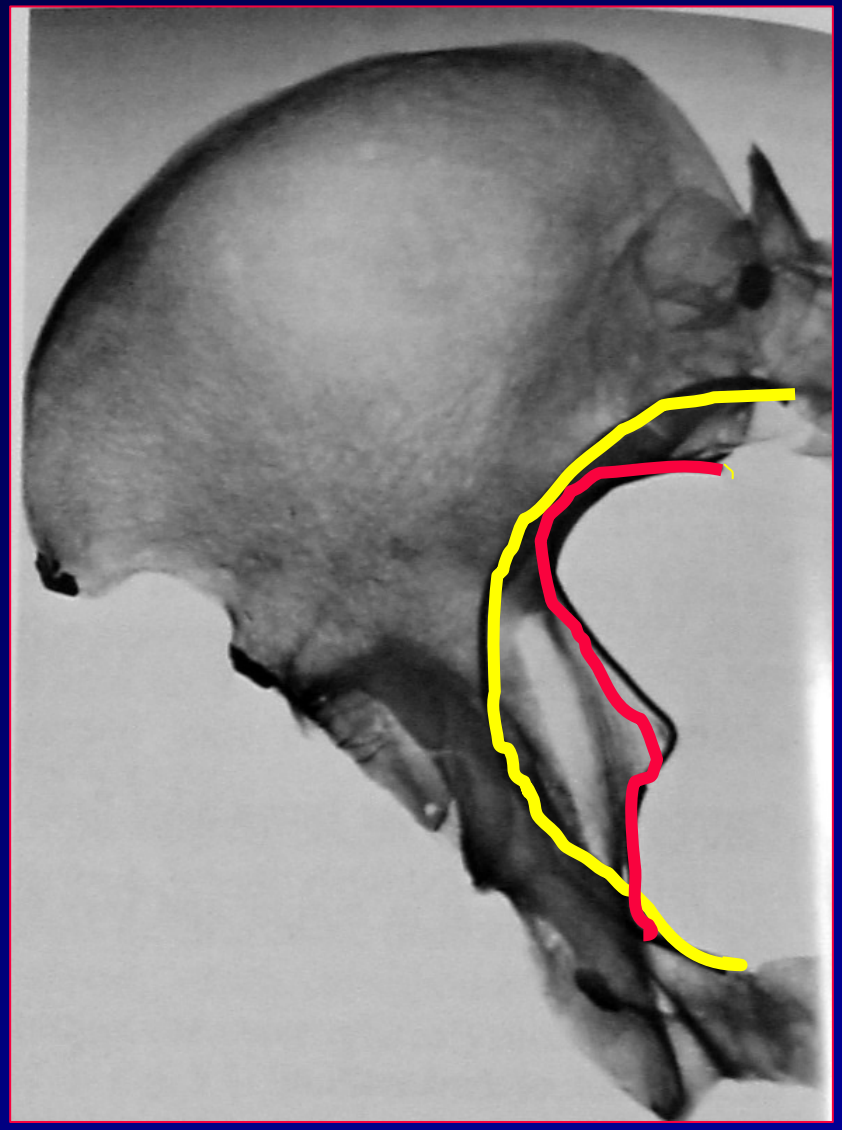
Always assoc. with dislocation/post wall

Urgent relocation of hip and ORIF

Pre op planning

Line drawing on a pelvic model





Acute complications

ATLS:

- Life threatening conditions
- Limb threatening conditions
- Stabilise associated fractures

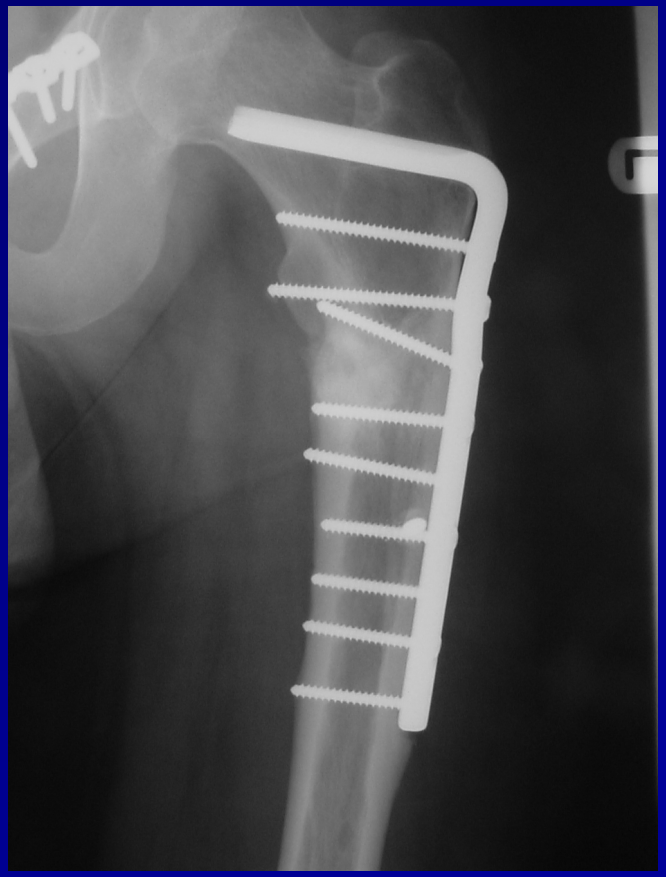
Treatment options

Cardinal rules:

- Save life → Haemodynamics
- Save limb → vascular status, limb stabilisation.
- Acetabular fractures generally not a major source of blood loss.
- Discuss proposed treatment with local P & A unit.

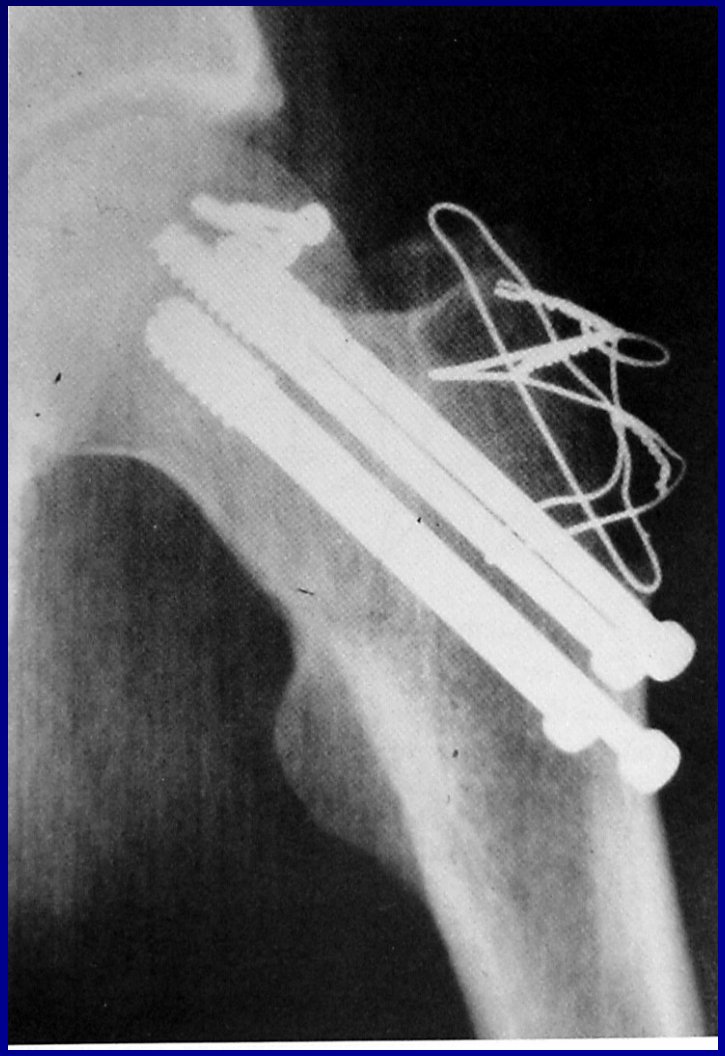
Management

- Assess capabilities of unit
- Get early imaging -
- Get advice, & refer early.
- Thromboprophylaxis
- Indomethicin/ GIT cover.
- Avoid violating pelvis or trochanteric regions in managing associated fractures.



Acute associated injuries

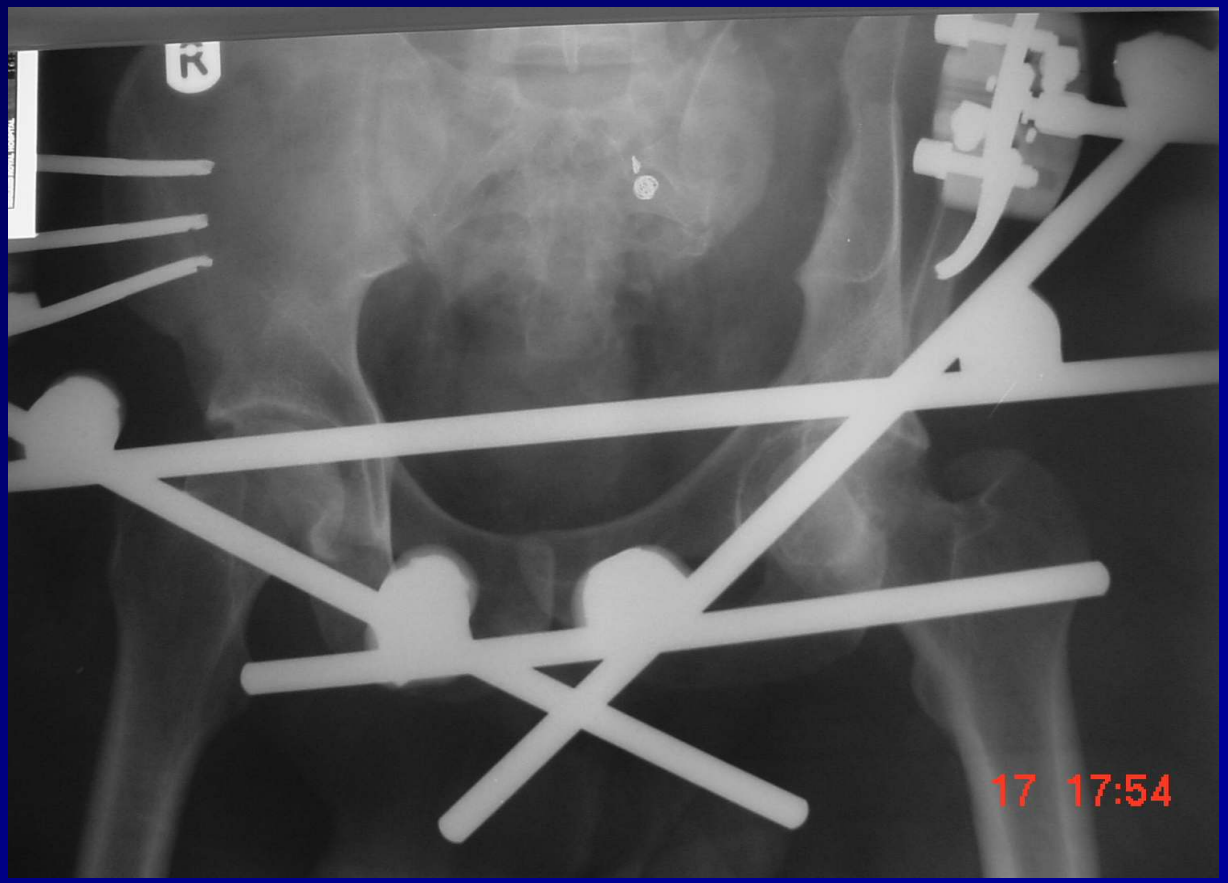
- Local
  - Associated pelvic instability.
  - Dislocation
  - Sciatic nerve injury (20%)
  - Head & neck fractures
  - Loose fragments within hip joint
  - Irreducible hip
- Remote
  - Femoral shaft fracture
  - Tibial shaft fracture



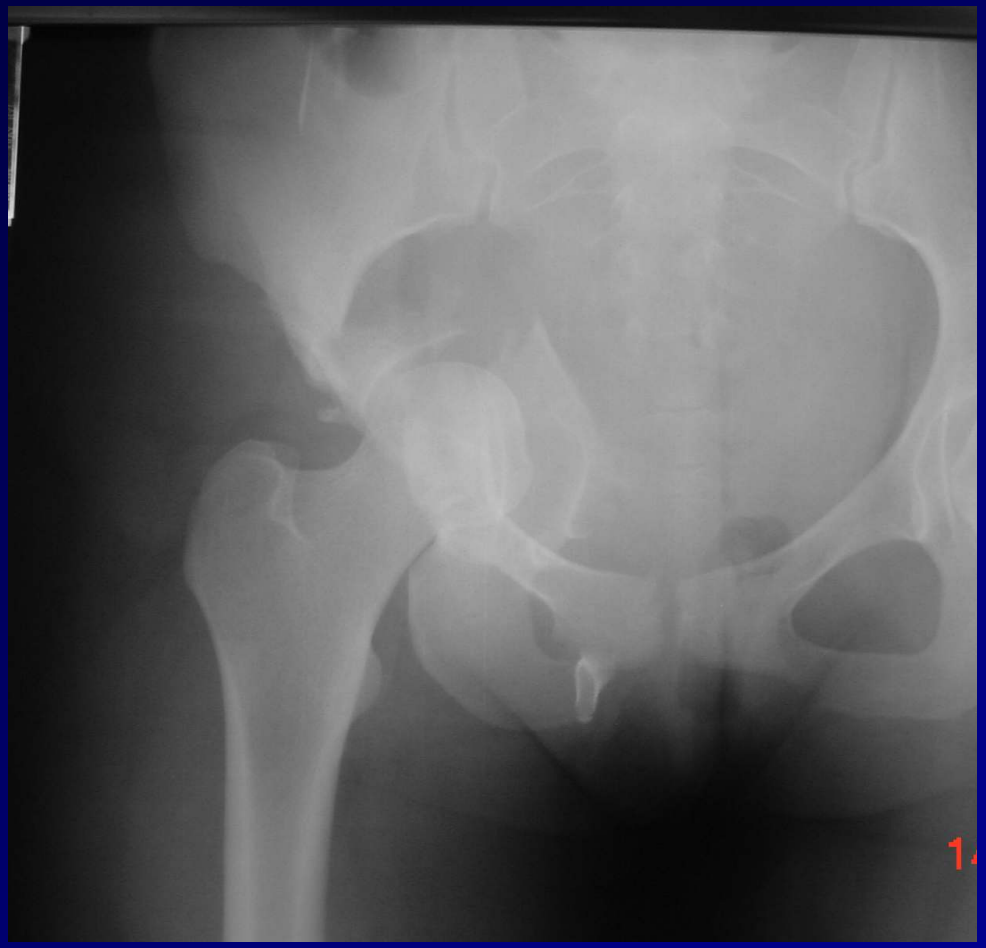
Pelvic instability

If stable, discuss!

?ex-fix



Dislocation



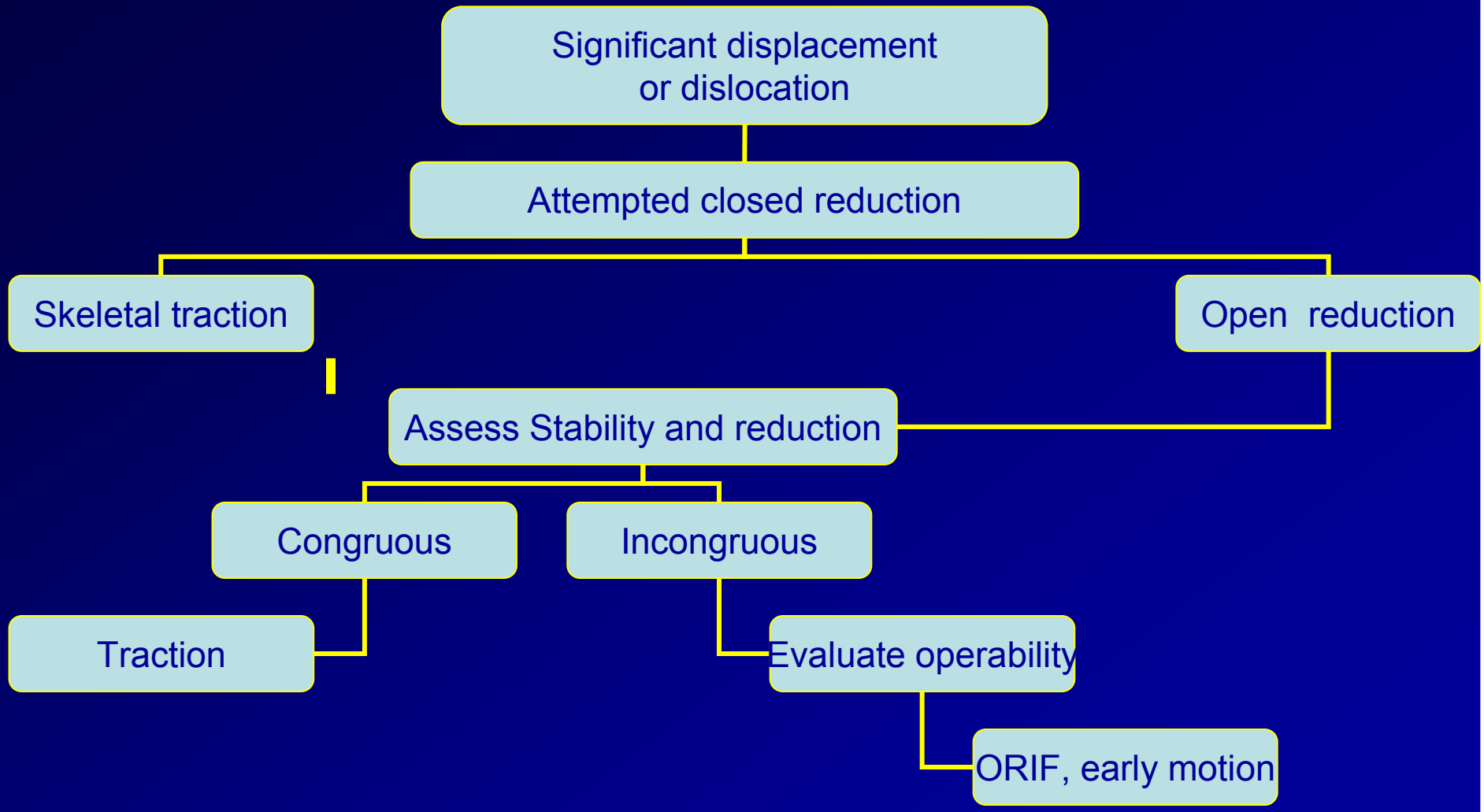
The incarcerated fragment

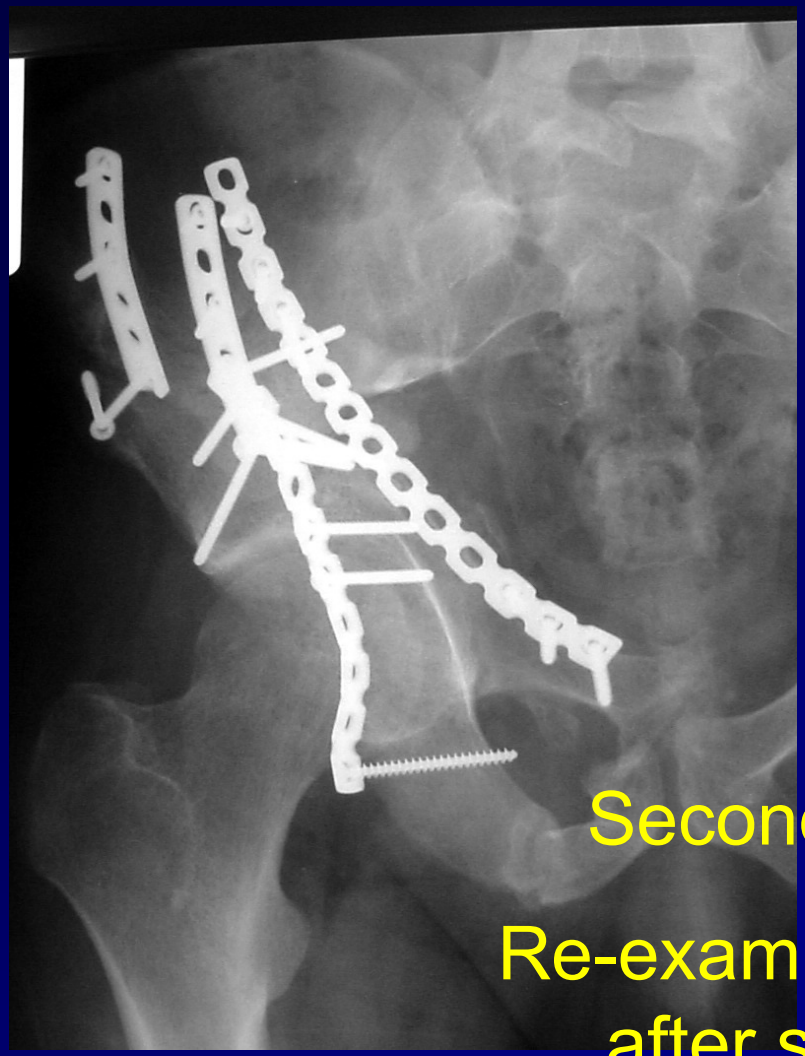
- Fragments either from head or hip joint
- Assoc. with hip dislocation
- May result in an irreducible hip
- CT mandatory

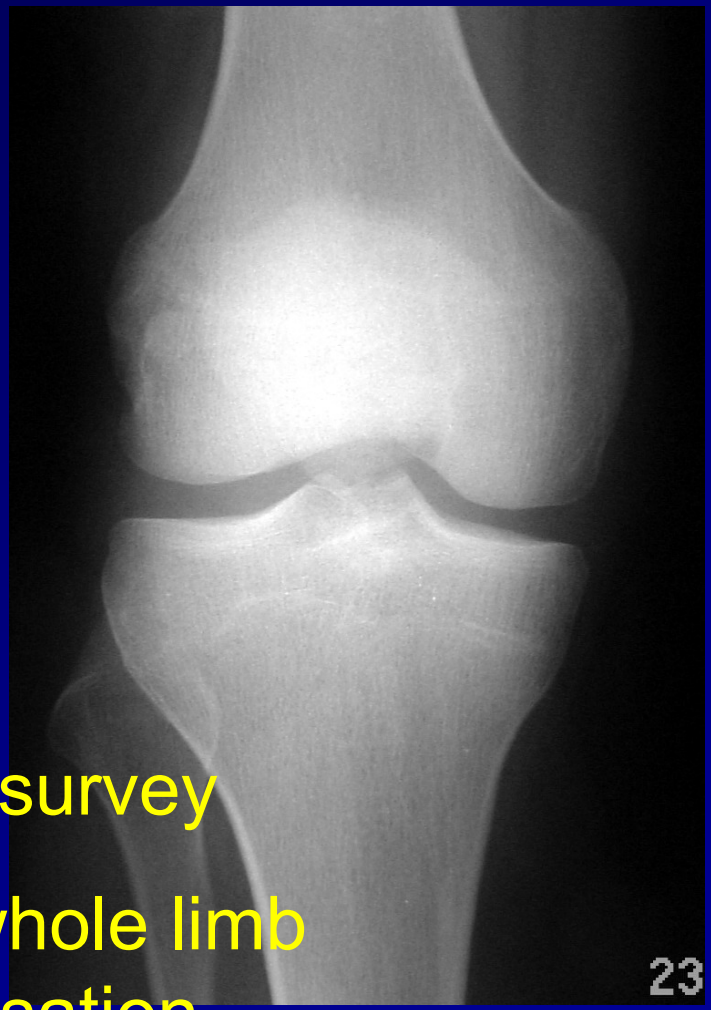
The irreducible hip

- Bony
  - Pipkin #
  - Posterior/dome fragment
- Soft Tissue
  - Beware sciatic nerve
  - Capsule or piriformis

Management Algorithm, (Tile)







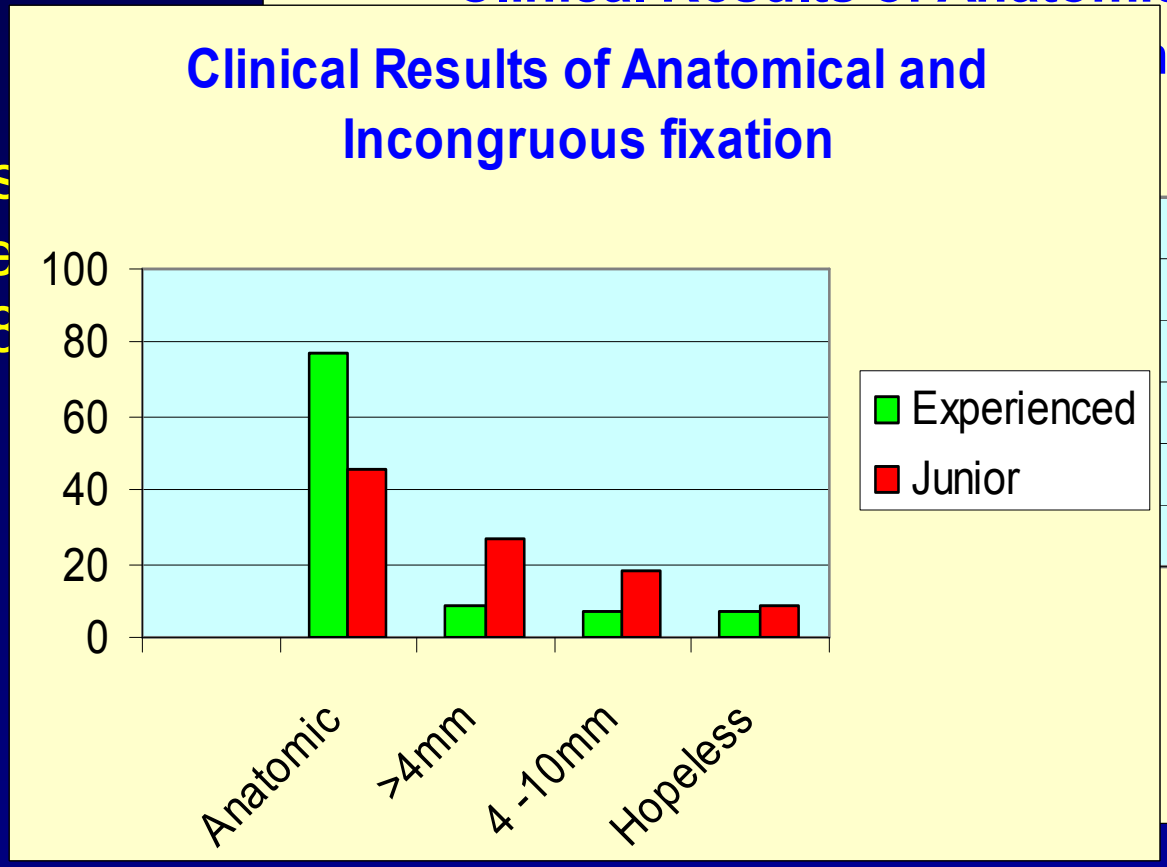
Secondary survey

Re-examine whole limb after stabilisation

Results

- Matta, 1988

64 fractures
Displaceme
Matta, 1988



Clinical Results of Anatomical and

Anatomic
Incongruous

Letournel, 1993

- Early complications
  - Mortality: 2.3%
  - Post op infection 4.2%
  - Sciatic nerve problems: 6.3%
- Late complications
  - Psuedarthrosis 0.8%
  - Osteoarthritis 20%
  - Ectopic bone 24%

75% good or excellent

- Matta, 2003: Acetabular fractures
  - 71% anatomical reduction
  - Radiological and clinical correlation
  - The worse the # the worse the result
  - Associated injuries reduced result
- Moed, 2002 & 3: posterior wall #
  - Delay in reducing dislocation > 12hrs – poor result
  - Correlation of clinical result with anatomical reduction
  - CT more accurate in detecting incongruity

- Mears, 2002 (JBJS) Acute THR.
  - Selected cases
  - Harris hip score average 89 points.
- Moed, 2003, (JBJS) Functional results
  - Complete return to pre-injury level is uncommon.
  - Limited usefulness of Merle D'Aubigné score

Summary

- Anatomy and radiological interpretation
  - Judet views
  - CT
- Acute management plan
  - Medical
  - reduction
- Awareness of outcome parameters


Thankyou