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

1: Pipkin
2: Impaction
3: Abrasion
4: Prox. Femur
5: Fem 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 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
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
Why CT?
- To plan surgery
- Incarcerated Fragment
- Marginal impaction
- Head fractures

Patient must be square
< 3mm cuts
Bone windows
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
- Anterior wall
- Anterior column
- Transverse
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 + 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
Partial articular

B

C
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
Significant displacement or dislocation

Attempted closed reduction

Skeletal traction

Open reduction

Assess Stability and reduction

Congruous

Incongruous

Traction

Evaluate operability

ORIF, early motion
Secondary survey
Re-examine whole limb after stabilisation
Results

- Matta, 1988

Clinical Results of Anatomical and Incongruous fixation

64 fractures
Displacement
Matta, 1988
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