# Pelvic Fractures



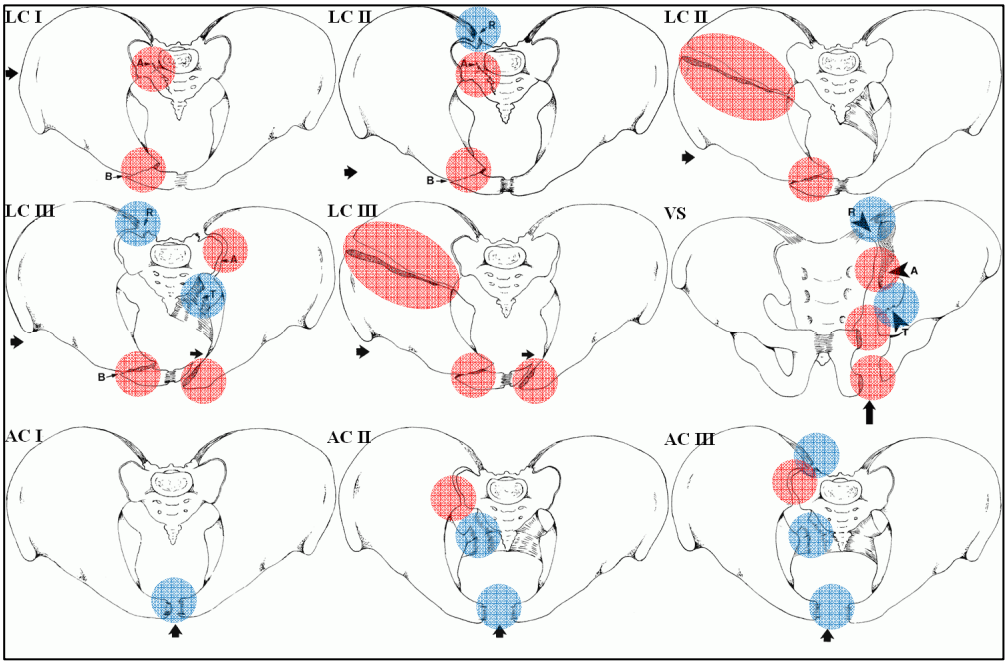
Major pelvic # result from very high energy trauma and have high mortality. However, minor, stable #s may only require a period of rest and analgesia followed by gradual mobilisation.

## Epidemiology

- ~1-3% of all skeletal injuries/
- Found in 30% of multiply injured patients.
- Most due to MVA or fall from height. Elderly may just have simple fall.

## Classification

*Young classification:*
(Mechanism-based)




Lat compression (LC):

- ± Acetabular fractures.
- side-on MVA/car vs Ped

Vertical shear (VS):

- Often a fall from height.

Ant-post compression (APC)

- "Open book" #'s
- Head-on MVA/car vs Ped

Combined mechanism (CM)

- Usually LC & APC

| Mechanism & Type | Characteristics | Hemipelvis Displacement | Stability |
|---|---|---|---|
| LC I | Ipsilateral sacral buckle fractures (A), ipsilateral horizontal pubic rami fractures (B)(or disruption of symphysis with overlapping pubic bones) | Internal rotation | Stable |
| LC II | Type I plus ipsilateral iliac wing fracture or posterior SI joint disruption (R) | Internal rotation | Rotationally unstable, vertically stable |
| LC III | Type I or Type II plus contralateral pubic rami fractures or disruption of the sacrotuberous and/or sacrospinous ligaments. Open book | Internal rotation+ contralateral ext rot | Rotationally unstable, vertically stable |
| VS | Vertical pubic rami fractures, SI joint disruption (R, A) +/- adjacent fractures (T) | Vertical (cranial) | Rotationally unstable, vertically unstable |
| APC I | Pubic diastasis <2.5 cm | External rotation | Stable |
| APC II | Pubic diastasis >2.5 cm, anterior SI joint disruption. Open book. | External rotation | Rotationally unstable, vertically stable |
| APC III | Type II plus posterior SI joint disruption | External rotation | Rotationally unstable, vertically unstable |

*Tile classification*

- Type A:
  - Stable or single ring #s: e.g. avulsion #, isolated pubic ramus #, iliac wing #
- Type B:
  - Rotationally unstable but vertically stable.
  - B1: 'open book' A-P compression #s →symphysis separation & widening 1 or 2 SIJs
  - B2: ipsilateral compression causing the pubic bones to fracture and override.
  - B3: contralateral compression injury resulting in pubic rami #s on one side and compression SIJ injury on the other side.
- Type C:
  - Rotationally and vertically unstable. Pelvic ring completely disrupted at ≥2 points.
  - Associated with massive blood loss and a very high mortality.
  - Subdivided into: C1: unilateral, C2: bilateral, C3: involving acetabular fracture

*Key & Cornwell or Kane classification:*

- Types similar to Tile with fourth type added for acetabular fractures.

## Presentation

- Tenderness, bruising, swelling and crepitus of pubis, iliac bones, hips and sacrum.
- A thorough assessment for associated wounds and other injuries is essential.
- Rectal examination: for anal tone, palpable fractures and to detect bleeding, rectal tears and urethral damage.
- Signs of urethral injury in males include a high-riding or boggy prostate on rectal exam, scrotal haematoma, or blood at the urethral meatus.
- A pelvic fracture in females is suggested by vaginal bleeding or a palpable fracture line on bimanual examination.
- Other signs of pelvic fracture include:
    - Haematuria or rectal bleeding
    - Large hematoma or palpable fracture line felt on rectal examination (Earle's sign)
    - Haematoma above inguinal lig, or over proximal thigh or perineum (Destot's sign)
    - Retroperitoneal bleeding leads to loin bruising (Grey-Turner's sign)
    - Neurological and vascular abnormalities in either or both legs
- Instability on hip adduction and pain on hip motion → fracture of the acetabulum.

## Investigations

*Urinalysis:* may show gross or microscopic haematuria.
*Bloods:* FBC, UEC, G&H/XM, β-hCG + other standard bloods for trauma
*Imaging:* XR (AP pelvis) detects >90% injuries. Angiography if haemodynamically unstable and FAST/CT/DPL excludes significant intraperitoneal bleeding. CT if haemodynamically stable and good for acetabular injuries, pelvic ring disruption & posterior element #s. May see contrast extravasation. Urethrography/cystography if ?urethral/bladder injury.

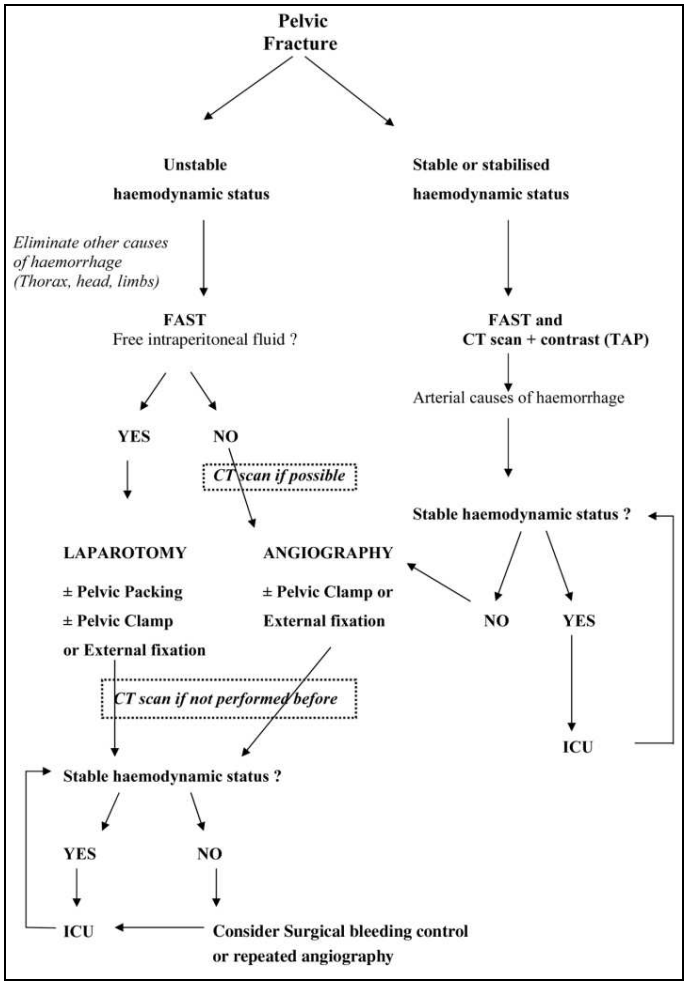
## Management Stable Fractures (Type A or LC I or APC I)

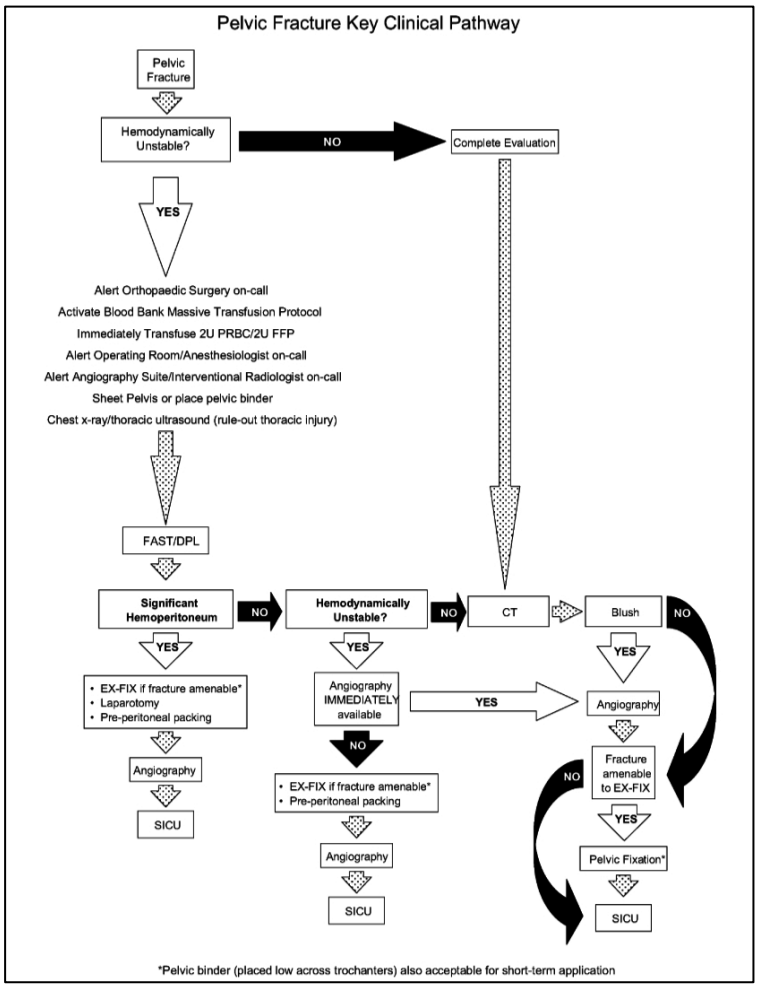
Refer to ortho for analgesia, initial bed rest and then mobilisation (usually after 3 to 6 weeks).
Avulsion fractures: usually only require rest and pain relief.
Larger avulsions, especially of the ischial tuberosity, may require ORIF

## Management Unstable Fractures (all others)

- Resuscitate as for any major injury. ABC, $O_2$, 2xIVC, crystalloid+blood, analgesia
- Seek & treat hypovolaemia, anticipate coagulopathy and ensure blood is rapidly available as a massive transfusion may be required (APC 15u, VS 9u, LC 3.5u req on ave)
- Avoid rolling the patient and instead perform a straight lift with a number of helpers.
- Stabilise #:
    - Pelvic sling if APC/open book # - not for LC or VS#. Other methods: C clamp.
    - External fixation (early if APC II, III or VS)
    - Extraperitoneal packing
    - Internal fixation (risks loss of tamponade, consider delayed ORIF in LC I & II).
    - Traction/ORIF for acetabular #s
- Pre-peritoneal packing, angiography & selective embolisation may be req for bleeding.
- Open surgery: if major visceral or vascular damage, ongoing blood loss, open fractures.
- Minimise movement and support an obviously unstable pelvis fracture associated with severe haemorrhage using e.g. using a MAST suit.
- Do not catheterise if urethral injury is suspected.

## Major Pelvic Trauma Algorithms




## Avulsion Fractures

- ASIS – Sartorius in athletes.
- AIIS – rectus femoris
- Ischial tuberosity – hamstrings
- Posterior spine by erector spinae
- Iliac crest by direct violence
- Symptomatic Rx. E.g. crutches

## Complications

- 50% require transfusion
- Neural – lumbar & sacral plexuses (~10%)
- Malunion or non-union, leg-length discrepancy, low back pain. Disabling in up to 50%.
- Increased incidence of thrombophlebitis.
- Intrapelvic compartment syndrome.
- Vascular – common iliac artery divides at SIJ, internal iliac remains intra-pelvic, superior gluteal artery at greater sciatic foramen
- Associated lower GIT, bladder, urethral prostate or vaginal damage is common.
- Associated thoracic and abdominal injuries occur in 10-20%; massive internal bleeding.
- Sexual dysfunction may be a long-term problem.

## Prognosis

- Prognosis varies depending on severity of fracture and associated injuries.
- 5-20% mortality overall, 30% if open fracture and 50% if hypotensive on arrival.

## Prevention

- Car safety (seat belts, air bags) and any safety procedure to reduce risk of high falls.