FRACTURE PELVIS

* Introduction :

• The pelvis is a stable rigid ring formed of :
  ▪ **Bones**: 2 hip bones, sacrum & coccyx.
  ▪ **Ligaments**: mainly anterior & posterior sacro-iliac, sacrospinous, sacrotuberous ligments and ligaments related to symphysis pubis.

• The **stability** of the pelvic ring depends mainly of the posterior arch (extends backwards & upwards from one acetabulum to the other acetabulum) (N.B: the anterior arch extends forwards from one acetabulum to the other acetabulum is weak).

Integrity and stability of pelvic ring are essential.
* **Incidence:**
  - A rare condition usually suspected with major (high energy) trauma as road traffic accidents.
  - Unstable fracture usually associated with other serious injuries & complications.
  - Mortality rate is 5-50% depends on the severity of the fracture and associated injuries.

* **Aetiology:**
  1. **Direct trauma:** Antero-posterior or lateral compression.
  2. **Indirect trauma:** Vertical shear due to vertical directed force as falling from a height on the lower limb.

* **Classifications:** according to

I) **Type of trauma:**
  a- **Antero-posterior compression:** due to force from front or back.
  b- **Lateral compression:** due to force from the side.
  c- **Vertical shear:** due to vertical directed force.
  d- **Combined injuries**.
II) Tile’s classification according to stability into:

- **Type A**: 
  - Stable in rotational & vertical direction because posterior arch is intact.
  - This type may be one of the followings:
    1) **A1**: fracture does **not involve the pelvic ring** as the followings:
       - Severe muscular contraction → Avulsion fractures of A.S.I.S, A.I.I.S., or ischial tuberosity etc.
    2) **A2 fracture involving the pelvic ring in one site:**
       - Displacement is slight or absent → no complications.
       - This include fracture iliac bone or anterior arch on one side.
  1) **Type A3**: is transverse sacral fracture.
- **Type B:**
  - **Rotationally unstable but vertically stable** fracture i.e. partially stable because posterior arch is partially disrupted with slight displacement.
  - This type may be one of the followings:
    1) **B1**: is open book fracture (external rotation). There is wide separation of symphysis pubis and partial disruption of sacroiliac joint.
    2) **B2**: is lateral compression fracture (internal rotation). There are fractures of anterior and posterior arches on the ipsilateral side.
    3) **B3**: is fracture lateral compression of anterior arch on one side and fracture of posterior arch on the contralateral side (bucket handle fracture)
- **Type C:**
  - *Rotationally but vertically unstable* fracture because posterior arch is completely disrupted.
  - *Displacement is marked* upwards by muscles of the trunk and external rotation by the weight of lower limb (open book): → severe complications and **highly fatal**.
  - This type may be one of the followings:
    1) **C1** : Unilateral injury.
    2) **C2** : Bilateral injury, type B on one side and type C on the other side.
    3) **C3** : Bilateral injury, type C on both sides or acetabular fracture.

![Diagrams of C1, C2, and C3 types](image)
Complications: As general rules of fractures especially the followings:

1. Shock, the main cause of death, in unstable fracture is due to injury of pelvic vessels & severe internal hemorrhage (2-3 liters of blood), renal failure and ARDS.

2. Visceral injury may lead to extraperitoneal rupture of bladder, intrapelvic rupture of urethra, rectum, anus & pelvic vessels.

3. General complications of fractures (as before in general rules of fractures)

4. Injury of pelvic nerves especially sciatic nerve injury.

5. Mal-union may lead to permanent shortening of L.L.

Clinical picture:

1. **General exam.** and primary assessment of the patient (ABSDE).

2. Massive flank or gluteal contusion and swelling are indicative of severe bleeding.

**Primary assessment**

- Assessment of circulation includes inspection and physical examination.

3. History of severe **trauma, pelvic pain & tenderness**.

4. The patient can **stand** in stable fracture and cannot stand in unstable fracture.

5. **Signs of pelvic instability**:
   - **Deformity** of lower limb.
   - Yielding pelvis by **manual stress examination**.
   - Palpable **displacement** in the posterior ring (always exam. the back).

6. **Picture of complications** (mention in short).

7. **Deformity**:
   - In unstable fractures, the pelvis is wide and flat (**open book** deformity).
• The lower limb is **externally rotated** due to opening up of the pelvis.

• The **lower limb is short** due to upwards displacement of the injured side of the pelvis in vertical unstable fractures.

**Investigations:**

1- **Plain X-ray**: AP, inlet and outlet views.

2- Investigation to detect complications and associated injuries.
* Treatment:

A. First aid:

1. After any major trauma, fracture pelvis and associated injuries are suspected.

2. Life threatening problem as airway obstruction, breathing and bleeding (ABC) deserve the priority in management.


4. Associated injuries usually take priority over the treatment of bone injuries.

B. Stable fracture:

- Rest in bed with analgesics and physiotherapy.

- After few days the patient start moving out of bed.

C. Unstable fracture:

- Initial stabilization of the fracture by pelvic binder or external pelvic fixator.

- If after initial stabilization, there is still vascular instability of the patient, angiography and embolization are performed.

- If all previous measures fails to control bleeding, urgent exploration, packing of pelvis and surgical haemostasis.

- Finally, treatment of pelvic fracture by open reduction and internal fixation.
Pelvic Binder

External skeletal fixation for pelvic fracture

Internal Fixation for pelvic fracture