ORTHOPAEDIC AND FRACTURE

Lower limb trauma (lec 1)

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Pelvic instability

If the pelvis can withstand weight bearing loads without displacement, it is stable; this situation exists only if the bony and key ligamentous structures are intact.

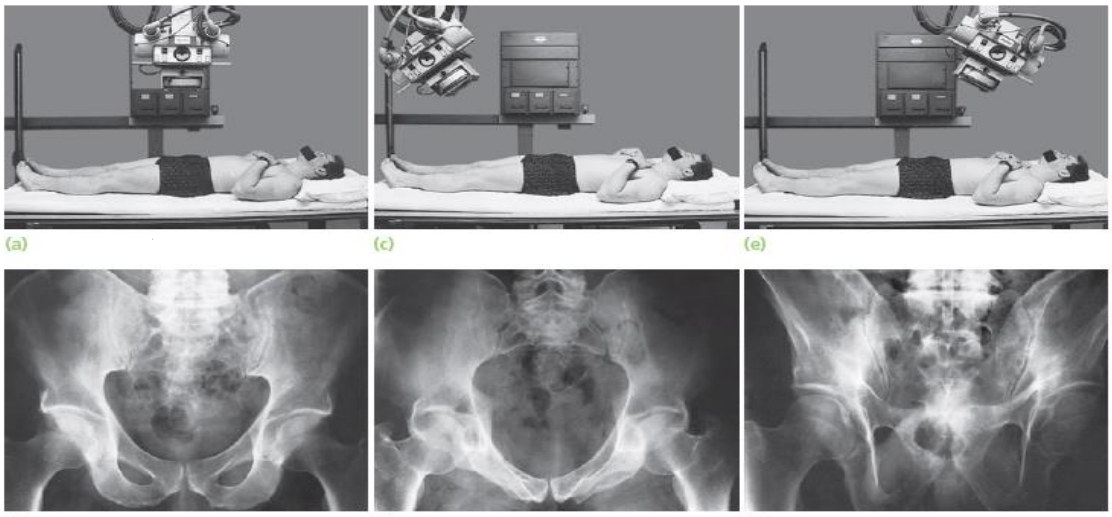
Clinical assessment

- Fracture pelvis should be suspected in every patient with serious abdominal or lower limb injuries.
- pain, and there may be swelling or bruising of the lower abdomen, the thighs, the perineum, the scrotum or the vulva. All these areas should be rapidly inspected, looking for evidence of extravasation of urine.
- *However, the first priority, always,* ***ABCDE***
- The pelvic ring can be gently compressed from side to side and back to front. Tenderness over the sacroiliac region is particularly important and may signify disruption of the posterior bridge.
- Cautions of urethral catheter

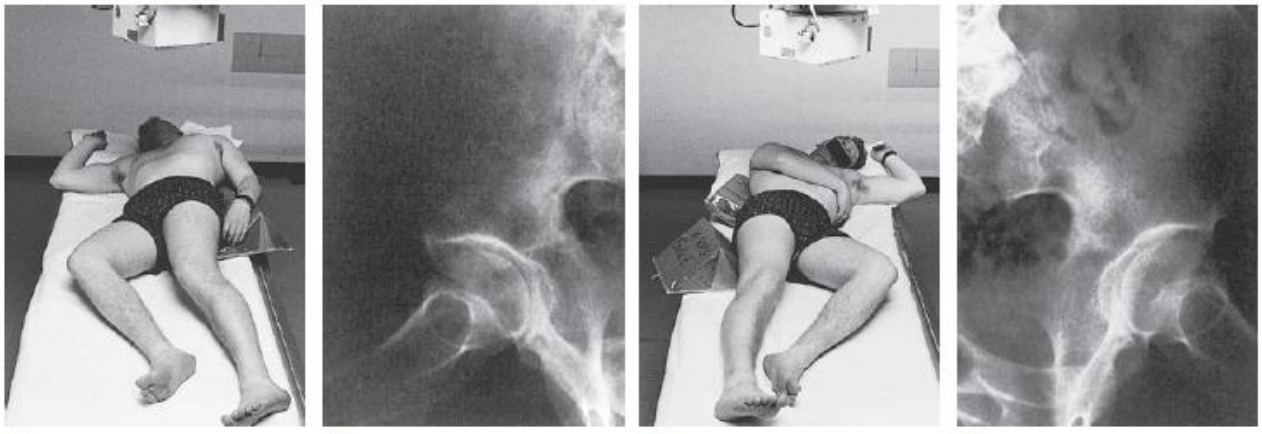
Imaging of the pelvis

1-standered AP -LAT radiographs

2. Judet views (inlet , outlet , iliac oblique , obturator oblique)



28.3 Pelvic fractures – x-ray diagnosis (1) **(a,b)** The anteroposterior view is usually taken during the initial assessment of the multiply-injured patient as part of a 'trauma series'. It is useful in quickly diagnosing gross disruptions or fractures. The x-ray should be read systematically: Is the picture well centred? Look for asymmetry in the pubic symphysis, the pubic rami, the iliac blades, the sacroiliac joints and the sacral foramina. If the patient's condition permits, at least two additional views should be obtained: **(c,d)** an *inlet* view with the tube titled 30° downwards and **(e,f)** an *outlet* view with the tube titled 40° upwards.



28.4 Pelvic fractures – x-ray diagnosis (2) Oblique views are helpful for defining the ilium and acetabulum on each side. **(a,b)** the *right oblique* view; and **(c,d)** the *left oblique* view. These can be omitted if facilities for CT are available.

Injuries of the pelvis

Types of injury

(1) Isolated fractures with an intact pelvic ring;

(2) Fractures with a broken ring – these may be stable or unstable;

(3) Fractures of the acetabulum

(4) Sacrococcygeal fractures.

ISOLATED FRACTURES

Avulsion fractures A piece of bone is pulled off by violent muscle contraction; All are essentially muscle injuries,

Treated by rest for a few days and reassurance.

Direct fractures A direct blow to the pelvis, usually after a fall from a height, may fracture the ischium or the iliac blade.

Treated by Bed rest until pain subsides .

Stress fractures Fractures of the pubic rami are fairly common (and often quite painless) in severely osteoporotic or osteomalacic patients.

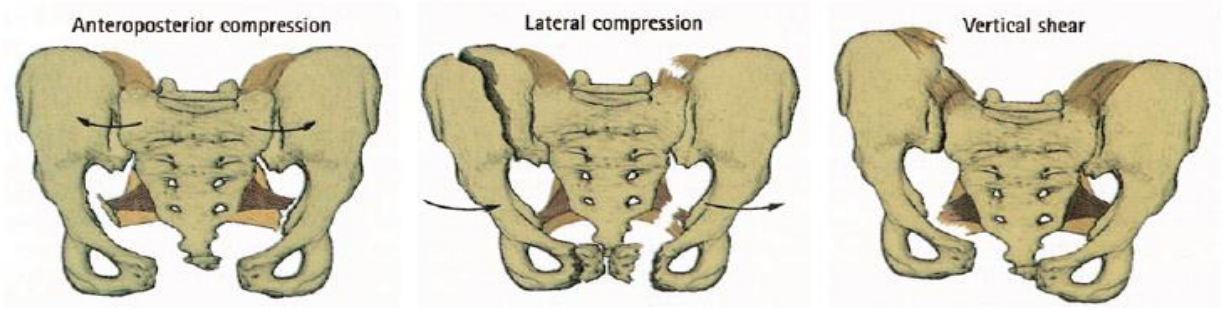
FRACTURES OF THE PELVIC RING

Mechanisms of injury

Anteroposterior compression The pubic rami are fractured and externally rotated so-called '**open book'** injury.

Vertical shear fracturing the pubic rami and disrupting the sacroiliac region on the same side.

Combination injuries In severe pelvic injuries there may be a combination of the above.



28.7 Types of pelvic ring fracture The three important types of injury are shown. (a) Anteroposterior compression with lateral rotation may cause the 'open book' injury, the hallmark of which is diastasis of the pubic symphysis. Widening of the anterior portion of the sacroiliac joint is best seen on an inlet view. (b) Lateral compression causing the ring to buckle and break; the pubic rami are fractured, sometimes on both sides. Posteriorly the iliac blade may break or the sacrum is crushed. (c) Vertical shear, with disruption of both the sacroiliac and symphyseal regions on one side.

Stable and unstable fractures

A stable injury defined as one that will (theoretically) allow full weight bearing without the risk of pelvic deformity.

Because the mechanisms which cause these injuries are fairly consistent, typical patterns and displacements are defined which make it possible to deduce the mechanism of injury, the type of ligament damage and the degree of pelvic instability.

Young and Burgess classification (1986; 1987).

ANTEROPOSTERIOR COMPRESSION (APC) INJURIES The 'open book' diastasis of the pubic Symphysis or fracture of the pubic rami; the posterior (sacroiliac) elements also are strained.

APC-I injuries there may be only slight (less than 2 cm) diastasis of the Symphysis; however, although invisible on x-ray, there will almost certainly be some strain of the anterior sacroiliac ligaments. The pelvic ring is stable.

APC-II injuries diastasis is more marked and the anterior sacroiliac ligaments (often also the sacrotuberous and sacrospinous ligaments) are torn. CT may show slight separation of the sacroiliac joint on one side. Nevertheless, the pelvic ring is still stable.

APC-III injuries the anterior and posterior sacroiliac ligaments are torn. CT shows a shift or separation of the sacroiliac joint; the one hemi-pelvis is effectively

disconnected from the other anteriorly and from the sacrum posteriorly. The ring is unstable.

LATERAL COMPRESSION (LC) INJURIES

The hallmark of this injury is a transverse fracture of the pubic ramus (or rami), often best seen on an inlet view x-ray. There may also be a compression fracture of the sacrum.

In its simplest form this would be classified as a ***LC-I injury***. The ring is stable.

LC-II injury is more severe; in addition to the anterior fracture, there may be a fracture of the iliac wing on the side of impact. However, the ring remains stable.

LC-III injury is worse still. As the victim is run over, the lateral compression force on one iliac wing results in an opening anteroposterior force on the opposite ilium, causing injury patterns typical for that mechanism.

VERTICAL SHEAR (VS) INJURIES

The hemi-pelvis is displaced in a cranial direction, and often posteriorly as well, producing a typically asymmetrical appearance of the pelvis. As with APC-III injuries, the hemi-pelvis is totally disconnected and the pelvic ring is unstable.

Management

EARLY MANAGEMENT

Six questions must be asked and the answers acted upon as they emerge:

• Is there a clear airway?

• Are the lungs adequately ventilated?

• Is the patient losing blood?

• Is there an intra-abdominal injury?

• Is there a bladder or urethral injury?

• Is the pelvic fracture stable or unstable?

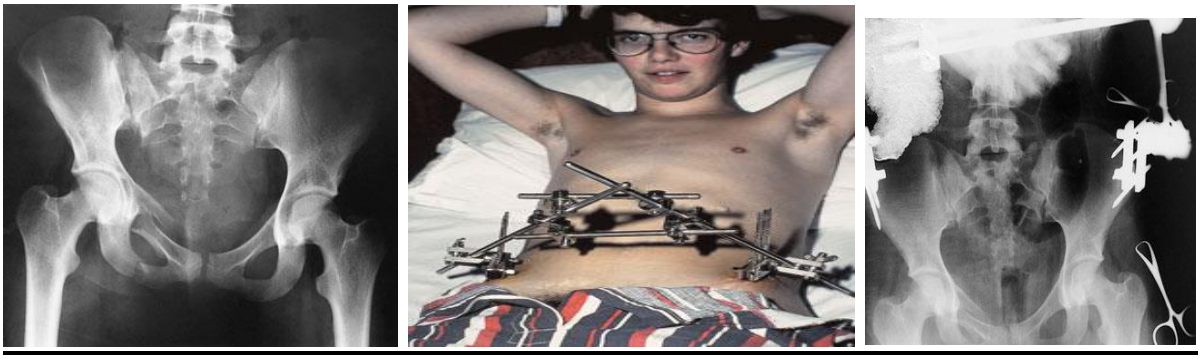
TREATMENT OF THE FRACTURE

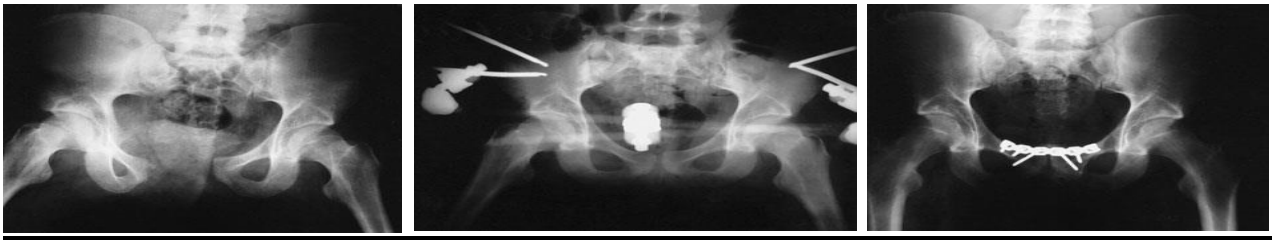
For patients with very severe injuries, early external fixation is one of the most effective ways of reducing hemorrhage and counteracting shock

Isolated fractures and minimally displaced fractures

These injuries need only bed rest, possibly combined with lower limb traction. Within 4–6 weeks the patient is usually comfortable and may then be allowed up using crutches.

Open-book injuries gap less than 2 cm there are no displaced or posterior disruptions treated satisfactorily by bed rest; a posterior sling or a pelvic binder helps to ‘close the book’. The most efficient way by external fixation with pins in both iliac blades connected by an anterior bar; ‘closing the book’





Complications

Thromboembolism deep vein thrombosis or pulmonary embolism

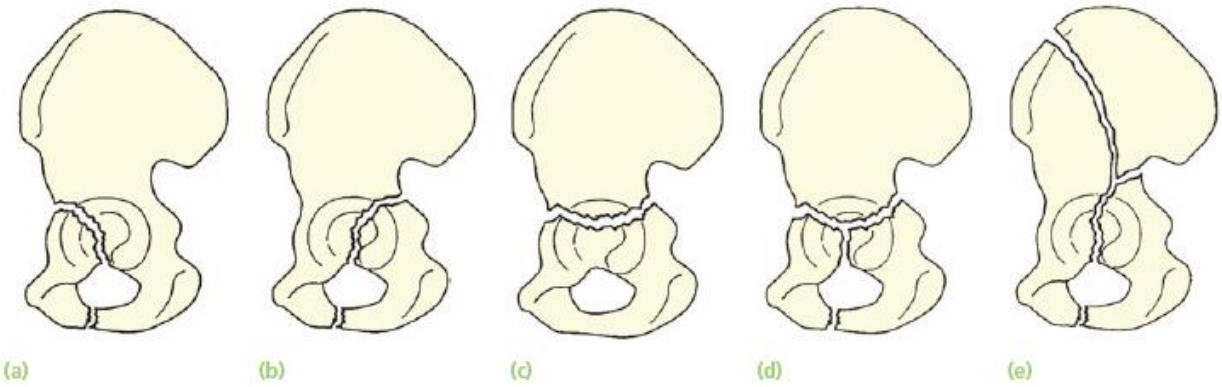
Sciatic nerve injury nerve is injured it is usually a neuropraxia and one can afford to wait several weeks for signs of recovery.

Urogenital problems Urethral injuries sometimes result in stricture, incontinence or impotence

Persistent sacroiliac pain due to partial or complete sacroiliac joint disruption arthrodesis of the sacroiliac joint is needed.

FRACTURES OF THE ACETABULUM

Fractures of the acetabulum occur when the head of the femur is driven into the pelvis.



28.11 The classification of acetabular fractures There are four types of injury: (a,b) a simple fracture involving either the anterior or the posterior wall or column; (c) a transverse or (d) a T-type fracture involving two columns; (e) the both-column fracture, resulting in a 'floating' acetabulum with no part of the socket attached to the ilium (compare this with the transverse or T-type fractures).

Treatment

EMERGENCY TREATMENT

The first priority is to counteract shock and reduce a dislocation. Skeletal traction is then applied to the distal femur (10 kg will suffice) and during the next3–4 days the patient's general condition is brought under control. Occasionally, additional lateral traction through the greater trochanter is needed for central hip dislocations. Definitive treatment of the fracture is delayed until the patient is fit and operation facilities are optimal.

Complications

- Iliofemoral venous thrombosis
- Sciatic nerve injury
- Hereterotopic bone formation
- Avascular necrosis
- Loss of joint movement and secondary osteoarthritis

INJURIES TO THE SACRUM AND COCCYX

A blow from behind, or a fall onto the ‘tail’ may fracture the sacrum or coccyx, or sprain the joint between them. Women seem to be affected more commonly than men.

X-rays may show

(1) a transverse fracture of the sacrum

(2) a fractured coccyx

(3) a normal appearance if the injury was merely a sprained sacrococcygeal joint.

Treatment

If the fracture is displaced The lower fragment may be pushed backwards by a finger in the rectum. use a rubber ring cushion when sitting. Excision in sever cases.