Pelvic Injury

- Although mortality following severe pelvic fractures has decreased dramatically with better methods of controlling haemorrhage, these patients still represent a significant challenge to every link of the treatment chain.
- Mortality rates exceeding 40% have recently been reported.
- Further, pelvic bleeding as one of the ‘hidden bleeding sources’ is still underestimated or missed, as retrospective chart analyses of potentially preventable deaths have revealed.

- The haemodynamically unstable patient with severe pelvic fracture has a 90% risk of associated injuries, and a 30% risk of intra-abdominal bleeding.
- To save these patients, three questions need to be addressed:
  - Is the patient at high risk of massive bleeding?
  - Where is the source of the bleeding?
  - How to stop the bleeding?

Classification

- Pelvic ring fractures can be classified into three types, using the Tile classification based on the severity of the fracture (and reflecting the energy required to cause it)
- However, no fracture pattern can exclude significant haemorrhage.

Type A

- Type A are the most common fractures and are completely stable.
- They result from lateral compression, which causes compression fractures of the pubic rami or compression fracture of the sacrum posteriorly.

Type B

- These fractures are partially stable, and there is disruption of the anterior pelvis and partial disruption of the posterior pelvis.
- The pelvis can open and close ‘like a book’, but because the sacroiliac ligaments remain intact, there is no vertical displacement.
- Internal or external stabilization is required.
- Blood loss can be significant.

Type C

- This fracture is completely unstable.
- Both anterior pelvis and the entire posterior pelvic complexes are disrupted and the disrupted pelvic bones are free to displace horizontally and vertically.

- In both type B and type C pelvic injuries, there is a high risk of associated abdominal injuries (bowel perforation or mesenteric laceration) and rupture of the diaphragm.

Clinical examination

- Pelvic fractures should be easily identified if ATLS guidelines are followed.
- Clinical examination may reveal instability.
- Any instability felt indicates the presence of major pelvic fracture, associated with life-threatening blood loss, and requires appropriate measures.
- The absence of clinical instability does not, however, preclude an unstable pelvic fracture.
- Inspection of the skin may reveal lacerations in the groin perineum or sacral area, indicating an open pelvic fracture, the result of gross deformation.

- Evidence of perineal injury or haematuria mandates radiological evaluation of the urinary tract from below upwards when the physiology allows.
- Inspection of the urethral meatus may reveal a drop of blood, indicating urethral damage.
- Inspection of the anus may reveal lacerations to the sphincter mechanism.
- Rectal examination may reveal blood in the rectum and/or discontinuity of the rectal wall, indicating a rectal laceration.
- In male patients, the prostate is palpated; a high-riding prostate indicates a complete urethral avulsion.
- A full neurological examination is performed of the perineal area, sphincter mechanism and femoral and sciatic nerves.

Diagnosis

- Examination of a plain radiograph of the pelvis requires an understanding of the mechanism of injury and a decision on the stability of the pelvic rim.
- FAST may be unreliable as it does not localize intraabdominal bleeding in these patients.
- CT is the diagnostic modality of choice in th haemodynamically stable patient, and CT angiography is particularly helpful to provide details of both the anatomy of the fracture, as well as details of the origin of the bleeding (venous or arterial).

Management

- **The treatment of bleeding is to stop the bleeding!**
- The priorities for resuscitating patients with pelvic fractures are no different from the standard.
- These injuries can produce a real threat to the circulation, and management is geared toward controlling this threat.
- Initial management requires the use of a compression binder or a sheet, applied around the true pelvis at the level of the greater trochanters (‘reduce the pelvic volume’), a potentially lifesaving procedure that has to be done in the emergency room.

- 85% of bleeding originating from the pelvis is of venous origin and can be controlled by non-operative means, including compression either by binding or external fixator, or b extraperitoneal packing to compress the pelvic veins.
- If other sources of bleeding have been ruled out, the extraperitoneal pelvic packing is done without entering the peritoneal cavity.
- This may be combined with external fixation.
- If the bleeding is of arterial origin, interventional angioembolisation is the next choice for bleeding control.

- Severe pelvic injuries require a multidisciplinary team approach.
- If adequate orthopaedic experience is unavailable, consideration should be given towards early transfer of this patient to an institution with the necessary expertise.
- If the source of the bleeding is in doubt or FAST/CT results are positive, showing a significant amount of blood in the peritoneal cavity, concurrent intra-abdominal injury cannot be excluded, and it is wise to perform an exploratory laparotomy to treat or rule out intra-abdominal bleeding.