Major Pelvic Trauma – New guidance

1. INTRODUCTION

Major pelvic injuries are predominantly observed when there is a high-energy transfer to the patient such as might occur following road traffic collision,[1 2] pedestrian accident, fall from height, or crush injury.[3-11]

Less serious pelvic injuries may also occur following low-energy transfer events, particularly in the elderly[4 12 13] (such as a simple fall), amongst patients with degenerative bone disease or receiving radiotherapy, and rarely as a direct consequence of seizure activity.[14 15]

The majority of pelvic injuries do not result in major disruption of the pelvic ring, but rather involve fractures of the pubic ramus or acetabulum.[16] Presentation of these injuries is very similar to neck of femur fractures therefore please refer to the limb trauma guideline for management of these less serious pelvic injuries.

Mechanism of injury
- High energy transfer
- Fall from height
- Crush injury

Risk Factors
- Advancing age
- Degenerative bone disease
- Radiotherapy
- Obesity

2. INCIDENCE

Pelvic fractures represent 3% to 6% of all fractures in adults and occur in up to 20% of all polytrauma cases.[17-20] They display a bimodal distribution of age with most injuries occurring in the age ranges 15 to 30 and over 60 years[7]; up to 75% of all pelvic injuries occur in men.[5 6 17 21 22]

Unstable pelvic fracture is estimated to occur in up to 20% of pelvic fractures; a further 22% of pelvic fractures will remain stable despite significant damage to the pelvic ring. The remaining 58% of pelvic fractures are less serious retaining both haemodynamic and structural stability.[16]

The incidence of pelvic fracture resulting from blunt trauma ranges from 5 - 11.9%;[23-32] with obese patients more likely to sustain a pelvic fracture from blunt trauma than non-obese patients.[33] Pelvic fracture associated with penetrating trauma is far less frequent.[34-36] Open pelvic fractures are rare and account for only 2.7 - 4% of all pelvic fractures.[5 21]

3. SEVERITY AND OUTCOME

Major pelvic injuries can be devastating and are often associated with a number of complications that may require extensive rehabilitation. Pelvic trauma deaths frequently occur as a result of associated injuries and complications rather than the pelvic injury itself.[17 37]

Haemorrhage is the cause of death in 40% of all pelvic trauma victims and the leading cause of death (60% of fatal cases) in unstable pelvic fracture.[18 38-42] Bleeding is usually retroperitoneal, the volume of blood loss correlates with the degree and type of pelvic disruption.[43-47]

Reported mortality rates range from 6.4% to 30% depending on the type of pelvic fracture, haemodynamic status, and the nature of concomitant injuries and their complications.[48 49] The mortality rate among haemodynamically stable patients is around 10%,[6 40 41 50] whereas the mortality rate amongst haemodynamically unstable patients approaches 20-30% but has been reported to be as high as 50% in cases of unstable open fracture;[24 40 41 51 52] combined mortality approaches 16%.[41]

4. PATHOPHYSIOLOGY

4.1 Skeletal anatomy

Increasing pelvic volume allows for increased haemorrhage; conversely, reducing pelvic volume reduces potential for bleeding by realignment of broken bone ends.[53]

4.2 Classification of injury

As with other fractures, pelvic fractures may be classified as open or closed, and benefit from being further described as either haemodynamically stable or unstable. Patients who are haemodynamically unstable are at

greater risk of death and would benefit greatly from a suitable pre-hospital alert message.

Pelvic ring disruptions (as identified by in-hospital imaging) can be subdivided into four classes by mechanism of injury: antero-posterior compression (APC), lateral compression (LC), vertical shear (VS), and combined mechanical injury (CMI), a combination of the aforementioned classes.[54]

4.3 Vascular injury

The arteries most frequently injured are the iliolumbar arteries, the superior gluteal, and the internal pudendal because of their proximity to the bone, the sacro-iliac joint and the inferior ligaments of the pelvis.[55] Bleeding from the venous network after a pelvic fracture is more frequent than arterial bleeding because the walls of the veins are more fragile than arteries. Blood may pool in the retroperitoneal space and haemostasis may occur spontaneously in closed fractures, especially if there is no concomitant arterial haemorrhage.[56 57]

4.4 Other injuries

The incidence of urogenital injury ranges from 23% to 57%.[5 35 58-60] Urethral and vaginal injuries are the most common injuries.[61-62] Vaginal lacerations result from either penetration of a bony fragment or from indirect forces from diastasis of the symphysis pubis. Injuries to the cervix, uterus and ovaries are rare.[59 63] Bladder rupture occurs in up to 10% of pelvic fractures.[64]

The incidence of rectal injury ranges from 17% to 64% dependent upon type of fracture.[5 35 58-60] Bowel entrapment is rare.[65]

Pelvic injury is commonly associated with concomitant intra-thoracic and or intra-abdominal injury.[66]

5. ASSESSMENT

Assess:

- **A**IRWAY
- **B**REATHING
- **C**IRCULATION
- **D**ISABILITY (mini neurological examination).

Evaluate whether patient is **TIME CRITICAL** or **NON-TIME CRITICAL** following criteria as per trauma emergencies guideline. If patient is **TIME CRITICAL, correct A and B problems, stabilise the pelvis on scene, and rapidly transport to nearest suitable receiving hospital**. Send a **Hospital Alert Message**. En-route, continue patient management of pelvic trauma (***see below***).

In **NON-TIME CRITICAL** patients perform a more thorough patient assessment with a brief Secondary Survey.

5.1 Specifically consider

Pelvic fracture should be considered based upon the mechanism of injury.[67]

Clinical assessment of the pelvis includes observation for physical injury such as bruising, bleeding, deformity or swelling to the pelvis. Shortening of a lower limb may be present (see also limb trauma guideline).[68]

Assessment by compression or distraction (e.g. springing) of the pelvis is unreliable and may both dislodge clots and exacerbate any injury and should not be performed.[69-71]

Any patient with a relevant mechanism of injury and concomitant hypotension **MUST** be managed as having a **time critical pelvic injury** until proven otherwise.

Reduction and stabilisation of the pelvic ring should occur as soon as is practicable whilst still on scene, as stabilisation helps to reduce blood loss by realigning fracture surfaces, thereby limiting active bleeding and additionally helping to stabilise clots.[67 72] Reduction of the pelvis may have a tamponade affect, particularly for venous bleeding; however there is little evidence to support this belief.[73]

Log rolling of the patient with possible pelvic fracture should be avoided as this may exacerbate any pelvic injury;[67] where possible utilise an orthopaedic scoop stretcher to lift patients off the ground and limit movement to a 15º tilt.

6. MANAGEMENT

6.1 Oxygen Therapy

Major pelvic injury falls into the category of critical illness and requires high levels of supplemental oxygen regardless of initial oxygen saturation reading (SpO_2). Maintain high flow oxygen (15 litres per minute) until vital signs are normal; thereafter reduce flow rate, titrating to maintain oxygen saturations (SpO_2) in the 94-98% range (**refer** to oxygen guideline).

6.2 Pelvic Stabilisation

There is currently no evidence to suggest that any particular pelvic immobilisation device or approach is superior in terms of outcome in pelvic trauma and a number of methods have been reported.[32 74-86] Effective stabilisation of the pelvic ring should be instigated at the earliest possible opportunity, preferably before moving the patient, and may be achieved by:

- use of an appropriate pelvic splint [32 74-78]
- application of circumferential support, however care must be taken to ensure that over-compression does not occur.[79-82]

Expert consensus suggests the use of an appropriate pelvic splint is preferable to improvised immobilisation techniques. In all methods, circumferential pressure is applied over the greater trochanters[87] and not the iliac crests. Care must be exercised so as to ensure that the pelvis is not reduced beyond its normal anatomical position.

Pressure sores and soft tissue injuries may occur when immobilisation devices are incorrectly fitted.[88]

6.3 Fluid Therapy

There is little evidence to support the routine use of IV fluids in adult trauma patients; please refer to the fluid therapy guideline for specific guidance.

6.4 Pain Management

Patients' pain should be managed appropriately (**refer to pain management guidelines**); analgesia in the form of Entonox (**refer to Entonox drug protocol for administration and information**) or morphine sulphate may be appropriate (**refer to morphine drug protocol for dosages and information**).

7. REFERRAL PATHWAY

7.1 The following cases should ALWAYS be transferred to further care:

- any patient with hypotension and potential pelvic injury **MUST** be treated as a **TIME CRITICAL** pelvic injury until proven otherwise
- any patient with sufficient mechanism of injury to cause a pelvic injury.

7.2 The following cases MAY be considered suitable/safe to be left at home:

- none.

8. SPECIAL CONSIDERATIONS FOR CHILDREN (see also paediatric trauma guideline)

- Pelvic fractures represent 1%-3% of all fractures in children, thus there is a lower incidence compared with adults.[89 90]
- In children, pelvic injuries have a lower mortality accounting for 3.6% – 5.7% of trauma deaths, with fewer deaths occurring as a direct result of pelvic haemorrhage;[89 91] blood loss is more likely to be from solid visceral injury than the pelvis.[89]
- Different injury patterns – multi-system injuries in 60%,[91] greater incidence of diaphragmatic injury.[90-91]
- Principles of management are the same, with the exception of fluid and oxygen therapy (**refer to fluid and oxygen therapy guidelines**).
- Clinical examination of children less than four years of age is unreliable.[92]

9. AUDIT INFORMATION

- Incidence of suspected/actual pelvic fracture.
- Incidence of concomitant hypotension.

- Frequency of pelvic immobilisation when pelvic fracture suspected.
- Method of pelvic immobilisation.

Key Points - Pelvic Trauma

- Pelvic fracture should be considered based upon mechanism of injury.
- The majority of pelvic fractures are stable pubic ramus or acetablar fractures.
- Any patient with hypotension and potentially relevant mechanism of injury **MUST** be considered to have a **TIME CRITICAL** pelvic injury.
- 'Springing' or distraction of the pelvis must not be undertaken.
- Pelvic stabilisation should be implemented as soon as is practicable whilst still on scene.
- Consider appropriate pain management.

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METHODOLOGY

Refer to methodology section:
http://www2.warwick.ac.uk/fac/med/research/hsri/emergencycare/prehospitalcare/jrcalcstakeholderwebsite/a-z/trauma/pelvic