Pelvic Fractures
Management of patients with haemodynamically unstable pelvic fractures are a major challenge. Successful management is best accomplished by a multi-disciplinary team.

In the haemodynamically unstable patient the most difficult decision is to either proceed to theatre for laparotomy or to radiology for angiography and embolisation. Effective management relies on rapid screening for the source of blood loss and prompt definitive management.

Instability defined as 1,2
- BP ≤ SBP 90mmHg
- Base Excess ≤ -6 and / or Transfusion 4-6 units RBC’s

Pelvic fractures are relatively uncommon and account for only 3% of all skeletal injuries after blunt trauma, most result from high velocity injuries such as motor vehicles, pedestrians, motor bike, falls and crush injuries. They occur in 20% of multi-trauma cases and most commonly in 15 to 30 year olds and in the over 60’s, with 75% of all injuries occurring in men.2,4

Bleeding in pelvic fractures is from 3 sources; arterial, venous or from cancellous bones.1,3,5,9,10 Majority of bleeding in pelvic fractures will be venous; however 70% of unstable patients with a pelvic fracture have arterial bleeding.1,3,5,9,10

Mortality in patients with all types of pelvic fracture is approximately 16% 2, which is the highest mortality rate of any skeletal injury with haemorrhage being the major reversible factor in 42% of patients.2,4,8,10-12 Timely identification and control of pelvic bleeding is pivotal in decreasing pelvic fracture related mortality.

Assessment
Patients who present with or develop haemodynamic instability with a suspected or known pelvic fracture will require a primary and secondary survey.

Initial inspection should be for signs of external blood loss and for blood loss from long bone fractures. A chest x-ray will rule out a large haemothorax.

If a fracture is seen on pelvic x-ray there is a 32% probability of arterial bleeding in the pelvic retroperitoneum.11-13 Signs and symptoms of a significant pelvic fracture include: 2
- Deformity
- Bruising and swelling over bony prominences, pubis perineum, and/or scrotum
- Leg length discrepancy or rotation deformity of a lower limb
- Wounds over the pelvis or bleeding from rectum vagina or urethra
- Neurological abnormality.

Springing the pelvis is an unreliable test in detecting major pelvic disruption and is dangerous as it may dislodge a clot promoting further bleeding in the unstable patient.

Disruption of the pelvic ring requires a high energy decelerative force of approximately 50 km/hr.2,3,6,9 These forces cause multiple other organ injuries up to 90% of patients with an unstable pelvic fracture have other associates injuries and 50% have sources of haemorrhage other than the pelvic fracture.3,8,13,14 Including long bones (40%), intrathoracic (29%), spleen (32%), liver (20%), bladder (15%), bowel (10%), kidney (7%)11,13. Therefore it is crucial to exclude other causes of shock including tension pneumothorax, pericardial tamponade and neurogenic shock. Whilst continuing with fluid resuscitation a rapid systematic evaluation of the whole body is needed to manage patients with pelvic fractures.

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Management

Patient with a suspected pelvic fracture meet the trauma alert criteria, and those with haemodynamic instability (BP < 90mmHg) meet the trauma call criteria. All should receive trauma team activation. On admission they will be treated and managed by the multidisciplinary trauma team in the emergency department.

Pelvic Sling 3, 7, 8, 15, 16

The pelvic sling is a non-invasive external pelvic stabilisation device. It is easy to apply and readily available in the trauma bays in emergency department. The sling when applied to the greater trochanters will affect pressure and cause the legs to internally rotate, assist in decreasing pelvic volume, improving mechanical stability and prevent disruption of haemostatic clots. A pelvic sling should be considered as early as possible in patients with suspected pelvic fractures, the sling should not be removed until the patient is haemodynamically stable, normothermic and not coagulopathic (see the RMH Pelvic Sling Guidelines for full use instructions: http://intranet.mh.org.au/w2/i1013938)17.

X-ray

All patients should have an AP pelvis x-ray on arrival. A plain x-ray is sufficient to identify virtually all clinically important fracture dislocations. However there is no significant correlation between the need for embolisation and pelvic fracture pattern 2, 7-9.

FAST

FAST is an effective tool for identifying patients with intra abdominal injuries with a specificity of 87-100%. 5, 7. This should be completed on arrival. The FAST can be repeated if the patients remains unstable and the initial scan was negative 11-13. The presence of a pelvic fracture does reduce the specificity of FAST to 75% therefore patients may require a CT scan to more accurately diagnose there injuries 7.

Massive Blood Transfusion

Resuscitation should begin on arrival and if the patient has a BP < 90 mmHg, a BE < -6 or meets the Massive Transfusion Trigger (see ABC Tool in massive transfusion guidelines)18, the massive transfusion guideline should be activated and resuscitation from the massive exsanguination pack commenced. Resuscitation should be ongoing in attempt to correct and / or prevent coagulopathy, acidosis and hypothermia 1, 19, 20.

CT scan

CT scanning is a valuable asset in the acute management of the haemodynamically unstable patient with a pelvic fracture. CT has a 98% sensitivity in identifying the need for angiography1, it is useful for gauging the location and the amount of bleeding. Contrast blush on CT is very specific to arterial bleeding 7, 8. Evidence of extravasation of contrast or blush on CT requires angiography in the haemodynamically unstable patient. If the patient is in extremis and it will take > 45 minutes for angiography to become available, a CT scan us recommended to expedite embolisation by accurate identification of bleeding sites.

Angiography

Pelvic angiography is 85-97% effective in controlling bleeding 1, 10% of patient with a pelvic fracture require embolisation.

Decision Making

It is suggested that for every 3 minutes of haemodynamic instability without haemorrhage control in a severe blunt trauma patient in the emergency department mortality increases by 1%11.

Haemodynamically unstable patient should leave the resuscitation room within 45 mins.11

1. Pelvic haemorrhage without intraperitoneal bleeding requires immediate angiography and embolization.
2. Intraperitoneal bleeding requires immediate laparotomy and concomitant external pelvic stabilization in the operating theatre.

The Exsanguinating Patient

Exsanguination on arrival with BP <70 mmHg immediate operation is the best life saving option 11
Patient Admitted with a Suspected Pelvic Fracture

Apply Pelvic Binder
AP Chest/ Pelvis Xray

Haemodynamically unstable?
BP < 90 mmHg

Yes

Activate MEP pack and begin transfusion
Refer to Orthopaedics

No

Activate Trauma Team

Identify life threatening haemorrhage
Stop external blood loss
Commence fluid resuscitation

FAST Scan

Positive?

OR for Laparotomy

If BP <70 mmHg and unresponsive to resuscitation initiate Trauma OPSTAT

No

Remains haemodynamically unstable?
BP < 90 mmHg

Yes

CT Angiogram if able

No

CT scan (see abdominal trauma guidelines)

Refer to Orthopaedics or appropriate unit for ongoing management

Angiography
References

14. Heetveld M. The Management of Haemodynamically Unstable Patients with a Pelvic Fracture. The NSW Institute of Trauma and Injury Management in Conjunction with the Trauma Department, Liverpool Hospital 2006.