

9. Severe pelvic fractures and urogenital injury

Pelvic fractures

Referral pathway

- Patients with suspected pelvic fractures with signs of haemodynamic instability should be transported directly to the Major Trauma Centre (MTC).
- If the patient presents to a Trauma Unit then resuscitation should be commenced followed by immediate transfer to the MTC for definitive treatment.
- The Major Trauma Networks have agreed an **immediate transfer** policy regarding patient referrals to the Major Trauma Centre (see [Section 3](#)).

Pelvic binders

- Apply a pelvic binder when there is a suspected active bleeding from a pelvic fracture. This should be applied pre-hospital.
- The pelvic binder should remain in-situ during surgery and this should not be removed for a post binder pelvic X-ray until the patient is haemodynamically stable.
- A well applied pelvic binder can mask a catastrophic pelvic ring injury even in the presence of a 'negative' CT scan. All polytrauma patients require a post-binder X-ray after resuscitation.
- Each trauma network must have a protocol for binder removal but, ideally, it should be removed within 24-hours of injury.

Management of massive haemorrhage – see also [Section 5](#)

- In the presence of haemodynamic instability, patients should be urgently resuscitated using blood products according to massive haemorrhage protocol.
- All patients require IV Tranexamic Acid as soon as possible and ideally within an hour of injury

Radiology – see also [Section 17](#)

- Patients with suspected pelvic fractures from high-energy trauma should have an urgent CT scan with contrast including head, chest, abdomen and pelvis.
- All patients with blunt polytrauma undergoing damage control laparotomy should have imaging of the pelvis before surgery (X-ray or CT).

Surgical and interventional management

- Major Trauma Centres must have a clear protocol in place for managing active bleeding from the pelvis in patients who do not respond to resuscitation. This may be managed by surgical packing of the pelvis or interventional radiology with selective embolization of active arterial bleeding vessels.
- External fixation should be considered for temporary mechanical stabilisation when early definitive surgery cannot be performed.

- In displaced vertical shear fractures, traction should be considered when early definitive surgery cannot be performed.
- Reconstruction of the pelvic ring should occur within 72 hours of the stabilisation of the patient's physiological state if associated injuries allow.

Open pelvic fractures

- Open pelvic fractures associated with wounds to the lower abdomen, groin, buttocks, perineum, anus (including sphincters) and rectum require urgent assessment by a consultant paediatric general or colorectal surgeon, and wound debridement.
- Clinically and/or radiologically proven or suspected injuries to the anus and/or rectum may require formation of a defunctioning stoma.
- Nursing care of wounds to the perineum or buttocks may also require a defunctioning stoma, although this is unlikely to be necessary for open pelvic fractures associated with wounds to the groin or lower abdomen alone.

Thromboprophylaxis

- The Major Trauma Unit should have a policy in place for thromboprophylaxis for patients with pelvic fractures.

Urogenital trauma

Urethral injuries in children tend to follow the same mechanism of injury as in adults. Straddle pelvic fractures are more common in children. Children with urogenital injury will need to be managed in a Paediatric Major Trauma Centre.

During the initial exploratory survey / secondary survey

- Examine the external urethral meatus for evidence of injury or the presence of blood.
- If a transurethral bladder catheter is in place, examine the tube for blood.
- Look at the flanks, abdomen, perineum and the external genitals for evidence of haematomas, ecchymosis and external injuries.

All patients with haematuria, blood discharge from the urethral meatus, dysuria or suspicious features in the history (local hematoma, concomitant injuries, mechanism of injury) have an increased risk of genitourinary injuries and should be given a focussed diagnostic work-up of the kidney and/or the efferent urinary tract. Insertion of a urethral catheter should only be attempted by a paediatric urologist or senior doctor.

Transurethral catheter insertion

A single gentle attempt of passing a standard transurethral bladder catheter can be attempted by an experienced doctor, even if the clinical or CT findings suggest a urethral injury.

- A 6- 8F soft silicone catheter and sterile technique should be used (the size should be adjusted appropriately for children). If the catheter has a stylet, this should be withdrawn approximately 1 inch proximal to the balloon.
- If the catheter passes and clear urine comes through, then inflate the balloon.
- If the catheter passes but blood-stained urine comes through, then again inflate the balloon.
- If the catheter will not pass or passes and frank blood is drained then DO NOT inflate the balloon, withdraw the catheter and perform retrograde urethrogram. Contact a paediatric urologist
- If the insertion of standard transurethral bladder catheter fails, a retrograde urethrogram and the insertion of a suprapubic catheter (SPC) should follow by a paediatric urologist.
- In the case of circulatory instability that does not permit initial diagnostic tests and if it is impossible to insert a transurethral bladder catheter, a suprapubic urinary diversion should be performed percutaneously (with ultrasound guidance if necessary) or by laparotomy (with simultaneous exploration) by a paediatric urologist.

Suprapubic Catheter (SPC)

If a urethral catheter cannot be passed, a suprapubic catheter is required. This can be inserted during emergency laparotomy, but otherwise percutaneous suprapubic catheter should be placed. The suprapubic catheter should be placed using a Seldinger technique under ultrasound control by a doctor experienced in the use of USS guided SPC techniques:

- The bladder must be significantly filled
- The skin insertion point MUST be in the midline (through the linea alba) and should be placed 2 finger breadths (4cm) above the pubic symphysis to prevent bowel injury – with variation following consideration of patient size
- An appropriate silicone catheter or vesicostomy button should be used. This is large enough to allow blood clots to pass and avoid clot retention
- A size Ch20 dilator should be used to allow easy passage of a Ch14 catheter or button.

If the bladder cannot be identified on USS and so a percutaneous suprapubic catheter cannot be placed, this is a very difficult situation. Consultants in paediatric urology and general paediatric surgery must be involved in decision making, and open placement of the catheter +/- laparotomy should be considered.

Imaging

Diagnostic imaging should be carried out on the efferent urinary tract if one or more of the following criteria apply:

- Haematuria /bleeding from the urethral meatus or vagina / dysuria / local hematoma

CT cystogram should be performed at the time of the initial trauma scan, when there is pelvic fracture or haematuria, if the patient is stable. If not stable, the delayed cystogram either fluoroscopic or CT should be performed.

CT with contrast should be performed in the case of suspected kidney injury.

Retrograde contrast urethrogram - cystogram

Other imaging such as retrograde urethrogram and cystogram (to look for possible urethral or bladder injury) should be dealt with at the Major Trauma Centre

- Always consult a consultant paediatric urologist prior to investigation
- Discuss with a Radiology Consultant
- Sterile technique must be used and the procedure performed by an experienced clinician
- Consider parenteral antibiotics (gentamicin)

If the urethrogram is positive, decision making needs to be at the most senior level by a consultant paediatric urologist. If a suprapubic catheter is needed, suggest discussion with the pelvic and acetabular surgeons, as this will have major implications for any internal fixation.

Infection prevention

- Urine becomes contaminated with bacteria within 5 hours of passage of a urinary catheter.
- If there is a urine leak from the bladder or urethra, the pelvic fracture should be treated like an open long-bone fracture with antibiotics (Co-Amoxiclav + Gentamicin for 72 hours – seek microbiological advice if penicillin allergy) and early fracture fixation if the patient's physiology allows.

Surgical management

It is expected that urogenital injuries will be managed at the Major Trauma Centre (MTC).

Bladder Injury

- Intra-peritoneal bladder rupture requires emergency laparotomy and direct repair. It carries up to 50% mortality and should be explored with urgency by a paediatric urologist. Immediate transfer to the MTC will be required.
- Extra-peritoneal bladder rupture without involvement of the neck of the bladder can usually be conservatively treated through urethral urinary diversion, providing that there is no concurrent urethral injury. In the presence of a pelvic fracture that requires fixation, primary repair of the bladder is recommended at the same time.
- Bladder injuries identified during pelvic fracture surgery should be repaired at the same time and bladder drainage (via urethral or suprapubic catheter, as appropriate) ensured.

Urethral injury

- Complete rupture of the urethra should be treated in the emergency surgery phase by suprapubic urinary diversion and either primary or delayed urethral reconstruction by a

paediatric urologist. Definitive management can be considered as soon as the patient is stabilised and life-threatening injuries have been treated.