GUIDANCE – In the Emergency Department

Background

Trauma is well recognised as the primary cause of mortality and morbidity in children, with an estimated pelvic fracture incidence of 1/100,000. These injuries are a surrogate marker for severe trauma; where a high index of suspicion should be maintained for associated injuries.1

Unfortunately this fracture pattern should always alert clinicians to the possibility of non-accidental injury or an underlying pathological process.

These guidelines have been designed for ED and Orthopaedic clinicians to aid with the management of pelvic fractures in children under the age of 16.

Injury Assessment

Use an ABCDE approach, to identify gross and occult injury, using primary and secondary surveys.2

All suspected pelvic fractures or children with blunt trauma and a significantly low systolic BP for their age, should have a pelvic binder applied as part of their initial resuscitation. DO NOT wait until the AP pelvis radiograph has been taken. Apply over the tip of the greater trochanters. In small children where a pelvic binder may not be available in the correct size, a sheet, towel or large BP cuff can be utilised.

Early senior support – ED Consultant, Urgent T&O Review and Pelvic Team referral.

Imaging & Treatment

As outlined in the following document.

Admission

Admission to an Orthopaedic ward or high dependency area, pending definitive management.

Please follow the algorithm on the following page
Primary Survey ATLS
Treat Life Threatening Injuries First

Resuscitation*

Refer to Major Trauma Activation Proforma

*Consider massive transfusion protocol and angiographic embolization if unstable

Bloods & Access
(FBC, U&ES, Clotting, XM)

Stabilisation
(Ensure pelvic binder in situ)

Analgesia & NV Assessment
(Motor, Sensation & Dopplers)

Is it an open or closed injury?
(Soft tissue assessment)

Radiological Imaging

Review Stabilisation
(See page 3)

Perineal Assessment
(See page 3)

Complete Secondary Survey
(Included further XRs if necessary)

Is it an open or closed injury?

Refer to BOA/BAPRAS guidelines
(http://www.bapras.org.uk/download.asp?id=141)*

AP Pelvis Radiograph
Stable # Configuration?

Repeat AP Pelvis with Binder off

If child remains haemodynamically stable, proceed to further pelvic imaging
(See page 3)
GUIDANCE – Further Information Supporting the Algorithm

Radiological imaging:

AP pelvis radiograph with binder, if stable configuration, repeat with binder off and proceed with the following:
- Acetabular # - Judet views
- Pelvic ring # - Inlet/outlet views
- Senior discussion regarding CT imaging

Consider mechanism early – is this a distracting injury, can the C-spine be cleared?

Perineal Assessment:

IMPORTANT: In order to minimise distress to the child, to be completed once by a senior team member.
- Rectal/vaginal/perineal examination – bleeding or palpable boney spikes
- Genito-urinary injury – consider even with innocuous appearing fracture. If urethral injury is suspected, catheterisation is contraindicated.

Open Fractures:

Open fractures – as per BOA/BAPRAS guidelines:
- Haemorrhage Control
- Tranexamic acid
- Minimal wound handling, saline soaked dressings
- Antibiotics (as per trust protocol)
- Anti-tetanus
- Photographic record of wounds (medical photography or departmental camera)
- Early plastics involvement
GUIDANCE – Beyond the Emergency Department

Mechanism

Pelvic fractures in NON-AMBULANT CHILDREN – necessity to exclude non-accidental injury.3

- Recommendation 66 Following Climbie Enquiry: ‘When a child has been examined by a doctor, and concerns about deliberate harm have been raised, no subsequent appraisal of these concerns should be considered complete until each of the concerns has been fully addressed, accounted for and documented. (Paragraph 9.60)’4

If you have concerns, please discuss with the Paediatric Medical Team in order to escalate accordingly and appropriately.

Classification

Multiple classifications are available; most commonly used is Young-Burgess5:

- Anterior Posterior Compression or ‘Open Book’ (APC I, II, III)
- Lateral Compression (LC I, II, III)
- Vertical Sheer (VS)

Or alternatively used is Tile6:

- TYPE A: Minor undisplaced ring # / avulsion #
- TYPE B: Vertically stable, rotationally unstable
- TYPE C: Vertically and rotationally unstable

It should be noted that children whose triiradiate cartilage remains open will have a different fracture pattern to those in whom it has closed. This is because the iliac wing is less strong than the pelvic ligaments; thus pubic rami and iliac wing fractures are more common.5

Management

The Orthopaedic Principles of Management are:

- Improve pain, function and mobility.
- Early detection of associated injuries or complications.
- To prevent limb length discrepancies.
- To prevent growth disturbances of the acetabulum; resulting in dysplasia/hip subluxation and incongruity.7

In conjunction with initial resuscitation, the early management of pelvic fractures is guided by the Young- Burgess classification:

- APC: Pelvic binder or sheeting applied in the ED
- LC: Rarely requires emergency stabilisation.
- VS: Skin or skeletal traction with additional pelvic binder.
Of note, there are no contraindications to applying a pelvic binder/sheet in a suspected LC pattern injury; however other sources of major haemorrhage should be sought. Once the diagnosis has been made, and the child is haemodynamically stable, this should be removed.

Management of pelvic fractures may be conservative or surgical according to the individual child and the severity of their injuries. The breadth of surgical options are beyond the scope of this guideline. However, the following checklist is a guide to the pre and post-operative management of this cohort of children.⁸
PELVIC FRACTURE CHECKLIST FOR CHILDREN

Date of injury:
Date of admission to BRHC:
Hospital admitted from:
Description of injury:
Planned procedure:
Date of planned procedure:

In addition to the initial history and examination, please ensure all the checklist points are documented in the notes, and their completion indicated below.

<table>
<thead>
<tr>
<th>PRE-OPERATIVE</th>
<th>COMPLETE</th>
<th>INITIAL &amp; DATE</th>
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<tbody>
<tr>
<td>Neurovascular examination</td>
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<tr>
<td>Rectal/vaginal/perineal examination</td>
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<tr>
<td>Genito-urinary injury (ascending urethrogram)</td>
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<tr>
<td>AP Pelvis Radiograph</td>
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<td>→ Acetabular # (Judet views)</td>
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<td>→ Pelvic ring # (Inlet/Outlet views)</td>
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<tr>
<td>CT Scan Pelvis/Acetabulae/Lumbar spine</td>
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<tr>
<td>Bloods (FBC, U&amp;Es, clotting, G&amp;S)</td>
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<tr>
<td>4 units RBC XM for theatre</td>
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<tr>
<td>Thromboprophylaxis (trust protocol)</td>
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<td>NSAIDS stopped</td>
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<tr>
<td>Duplex USS scan both legs</td>
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<td>MRSA swabs</td>
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<td>Consent &amp; Marked</td>
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<th>POST-OPERATIVE</th>
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<tr>
<td>Neurovascular examination</td>
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<tr>
<td>Bloods (FBC, U&amp;Es) in 24hrs</td>
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<tr>
<td>AP Pelvis Radiograph in 24hrs</td>
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<tr>
<td>Fine cut CT scan if indicated within 3/7</td>
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<tr>
<td>Weekly duplex USS scan both legs</td>
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<td>Thromboprophylaxis</td>
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<td>Weight bearing status</td>
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<td>Physiotherapy plan</td>
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<td>Repatriation to base hospital</td>
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<tr>
<td>Referral letter completed</td>
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<td>Follow up arranged (6/52 pelvic clinic)</td>
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<td>Tertiary survey</td>
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<tr>
<td>Planned treatment for associated injuries</td>
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In Summary:

- Remember that pelvic injuries are a marker of high energy trauma; with which there should be a high suspicion of other associated injuries.
- Early consultation with the Pelvic Team, in conjunction with image transfer to facilitate second opinion.
- Completion of the Pelvic Checklist as an aide memoir.

Abbreviations Used:

ED: Emergency Department
T&O: Trauma and Orthopaedics
FBC: Full blood count
U&Es: Urea and electrolytes
G&H: Group and hold
XM: Cross Match
ATLS: Advanced Trauma Life Support
MTC: Major Trauma Centre
#: Fracture
CT: Computed Tomography
USS: Ultrasound Scan
C-Spine: Cervical Spine
BOA: British Orthopaedic Association
BAPRAS: British Association of Plastic Reconstructive and Aesthetic Surgeons
NSAIDS: Non Steroidal Anti-Inflammatories
### REFERENCES


### RELATED DOCUMENTS AND PAGES

- Major Trauma Guidelines

### AUTHORISING BODY

- Children’s Emergency Department Governance Group

### SAFETY

- Awareness that femoral shaft fractures are a long bone injury commonly associated with high energy trauma.

### QUERIES AND CONTACT

- ED Consultant/Middle Grade or Orthopaedic Consultant/Middle Grade via switchboard