

# PELVIC FRACTURES - PAEDIATRIC - CHW

## PRACTICE GUIDELINE<sup>®</sup>

### DOCUMENT SUMMARY/KEY POINTS

- In children, pelvic fractures are rare, however can occur as the result of high-energy trauma, such as motor vehicle accidents, falls from a significant height and crush injuries.
- Pelvic fractures must be managed within a trauma system with a multidisciplinary team to facilitate expedited early management and optimise treatment interventions. Pelvic fractures can be associated with significant haemorrhage, genitourinary, bowel and other major abdominal, thoracic or head injuries.
- The Pelvic Pathway included in this document should be used in addition to standard protocols for trauma patients including timely primary and secondary surveys, EMST principles and appropriate imaging in the Emergency Department prior to transfer.

### CHANGE SUMMARY

- N/A – New document
- **14/10/22:** Minor review. Pelvic fracture pathway re-formatted.

### READ ACKNOWLEDGEMENT

- This document is aimed at Emergency Department, Trauma, Medical Imaging, Intensive care, Interventional radiology and Orthopaedic teams.
- All Emergency Department, Trauma, Medical Imaging, Intensive care, Interventional radiology and Orthopaedic staff are required to read and acknowledge they understand the contents of this document.

This document reflects what is currently regarded as safe practice. However, as in any clinical situation, there may be factors which cannot be covered by a single set of guidelines. This document does not replace the need for the application of clinical judgement to each individual presentation.

<b>Approved by:</b>	SCHN Policy, Procedure and Guideline Committee	
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<b>Team Leader:</b>	Staff Specialist	<b>Area/Dept:</b> Trauma CHW

# TABLE OF CONTENTS

<b>1</b>	<b>Background / Introduction.....</b>	<b>3</b>
1.1	Introduction.....	3
1.2	Definitions of terms.....	3
<b>2</b>	<b>Pelvic pathway.....</b>	<b>5</b>
	<b>Radiologic Classification of Fractures.....</b>	<b>6</b>
	Radiological Findings.....	7
	<i>a. Stable pelvic fractures.</i> .....	7
	<i>b. Unstable Pelvic Fractures</i> .....	7
<b>3</b>	<b>Consult Policy.....</b>	<b>7</b>
3.1	Orthopaedic Consult.....	7
3.2	Urology Consult.....	7
3.3	Vascular Consult.....	7
3.4	Interventional Radiology Consult.....	8
3.5	Infectious Diseases (ID) Consult.....	8
<b>4</b>	<b>Pelvic Binder &amp; Associated Complications.....</b>	<b>8</b>
4.1	How to apply pelvic binder.....	8
4.2	Deterioration post pelvic binder application in ED.....	10
4.3	Child arriving with an ill-positioned pelvic binder.....	10
4.4	Removing a pelvic binder.....	10
4.5	Deterioration post pelvic binder release/removal.....	11
<b>5</b>	<b>Pelvic fracture Complications.....</b>	<b>11</b>
5.1	Haemodynamic instability despite resuscitation.....	11
	5.1.1 <i>Damage control laparotomy</i> .....	11
5.2	Potential bladder or urethral injury.....	11
<b>6</b>	<b>Bibliography List.....</b>	<b>12</b>

# 1 Background / Introduction

## 1.1 Introduction

In children, pelvic fractures are rare, however can occur as the result of high-energy trauma, such as motor vehicle accidents, falls from a significant height and crush injuries.

Pelvic fractures must be managed within a trauma system with a multidisciplinary team to facilitate expedited early management and optimise treatment interventions. Pelvic fractures can be associated with significant haemorrhage, genitourinary, bowel and other major abdominal, thoracic or head injuries.

Assessment of the pelvis must first occur during the primary survey on arrival to the Emergency Department. If a fracture is suspected the pelvis should be stabilised with a binder or similar device to confirm good position as soon as possible. This approach ensures the best initial management of a possible pelvic fracture with occult bleeding whilst other sources of blood loss in the chest, abdomen, skin, long bones are excluded.

All patients with pelvic fracture require examination of the perineum, external genitalia & digital rectal examination. **Log roll** is required to perform a proper examination of the perineum. Pelvic fractures associated with wounds to the lower abdomen, groin, buttocks, perineum, anus and rectum (**compound pelvic fractures**) require urgent assessment by trauma team surgical registrar on-call.

All patients with suspicion of bleeding require IV Tranexamic Acid as soon as possible and ideally within an hour of injury but not later than three hours from time of injury. In the presence of haemodynamic instability, patients should be urgently resuscitated using blood products according to [Massive Transfusion Protocol](#).

The Pelvic Pathway included in this document should be used in addition to standard Early Management of Severe Trauma (EMST) protocols for trauma patients including timely primary and secondary surveys and appropriate imaging in the Emergency Department prior to transfer to PICU/COU or the ward.

## 1.2 Definitions of terms

### High Risk features for presence of Pelvic Fracture:

- High Risk MOI (MVC unrestrained, rollover, ejection, pedestrian vs. car, bicycle vs. car)
- Abnormal pelvic exam
- Lower limb deformity or discrepancy
- Intubated or GCS <13
- Haemodynamically unstable (tachycardia, fluid resus required inc blood products)

**eFAST:** Extended Focused abdominal sonography in trauma

**EPP** = Extra-peritoneal Pelvic Packing

**IR** = Interventional Radiology

**Abnormal pelvic examination:**

- Swelling, tenderness, instability on exam of the bony pelvis
- Bruising in the buttocks, perineal, or scrotal region
- Inability to bear weight
- Deformity that includes leg shortening or rotation
- Obvious pelvis asymmetry
- Open wound in the pelvic area

## 2 Pelvic pathway



## Radiologic Classification of Fractures

There are many classifications of pelvic fractures. A common classification is based on impact and pattern of fracture /disruption –Lateral compression (LC), anterior posterior compression (APC), and vertical shear (VC). The figure below is an easy guideline to identify fracture patterns on plain radiography.

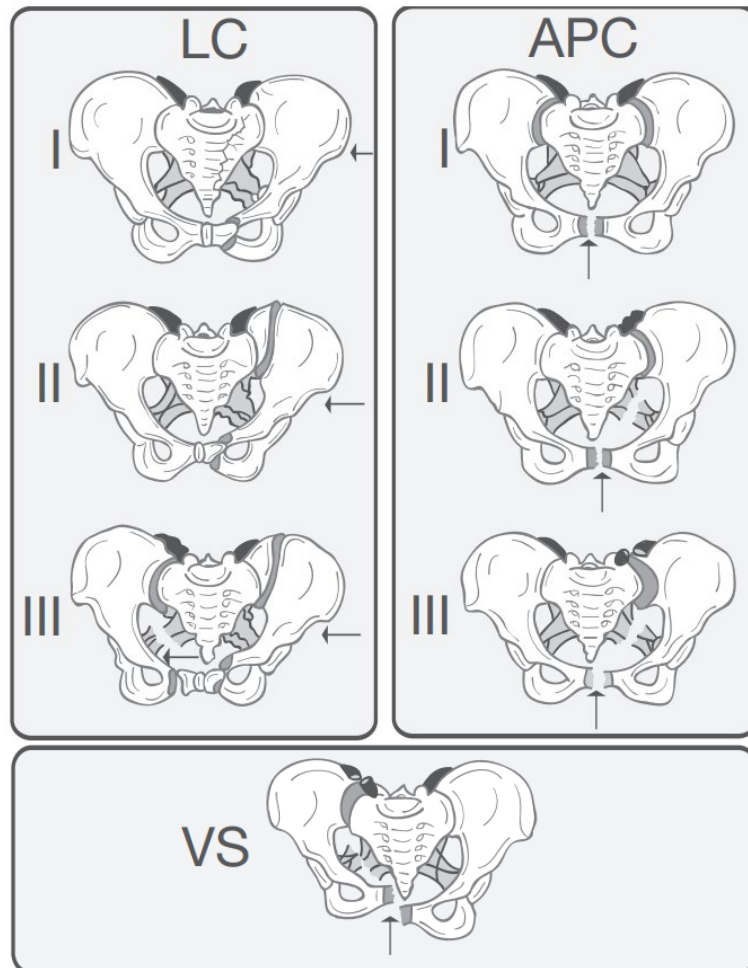


Image: Heetveld, M. 2007

[https://www.aci.health.nsw.gov.au/\\_data/assets/pdf\\_file/0011/195176/Management\\_of\\_Haemodynamically\\_Unstable\\_Patients\\_with\\_a\\_Pelvic\\_Fracture\\_Full\\_Report.pdf](https://www.aci.health.nsw.gov.au/_data/assets/pdf_file/0011/195176/Management_of_Haemodynamically_Unstable_Patients_with_a_Pelvic_Fracture_Full_Report.pdf)

## Radiological Findings

Fractures can be mechanically stable or unstable based on fracture pattern.

### **a. Stable pelvic fractures.**

- Avulsion or iliac wing fracture
- Single break in pelvic ring
- Pubic rami fractures
- Ischial fractures
- Sacral alar fractures

### **b. Unstable Pelvic Fractures**

- Two or more breaks in the pelvic ring with associated displacement and/or pubic diastasis. Unstable fractures are more likely to be associated with bleeding and injuries to pelvic organs.

## 3 Consult Policy

### 3.1 Orthopaedic Consult

Orthopaedic registrar on call should be consulted if:

- PXR or CT scan report a pelvic fracture

### 3.2 Urology Consult

Urology registrar on call should be consulted if any of the following occur:

- Frank blood in urine
- Blood in urethral meatus/vagina
- Perineal /penile haematoma
- Diastasis of pubic symphysis
- Fracture involving obturator foramen with more than 1cm displacement.
- Unable to void
- Inability to freely pass urinary catheter after x1 attempt

### 3.3 Vascular Consult

Vascular registrar on call at Westmead hospital should be consulted if:

- If there is injury to iliac vessels on imaging or compromise to lower limb blood flow

### 3.4 Interventional Radiology Consult

Interventional radiology should be consulted if:

- Hemodynamically unstable patient undergoing CT angiogram in the presence of a pelvic fracture
- Stable patient with a large pelvic haematoma or blush on CT angiogram

### 3.5 Infectious Diseases (ID) Consult

For compound pelvic fracture, early antibiotics should be commenced.

- If open to skin, administer IV Cephazolin
- If open to skin, *including* perineum *or* involvement of internal organs (bladder, bowel) *or* heavily contaminated wound e.g. farm injury, early consultation with ID services for recommendation on antimicrobial cover

## 4 Pelvic Binder & Associated Complications

### 4.1 How to apply pelvic binder

For the child who arrives to the ED without a pelvic binder insitu, with high risk mechanism and/or is haemodynamically UNSTABLE:

- Place patient supine.
- Place top of binder at the level of the greater trochanters (NOT iliac crests).
- Cut the T-POD to create a 15-20cm central gap.
- Apply the pulley system to each side of the T-POD with the Velcro.
- Use the pull tab on the pulley system and slowly apply tension until snug and anatomical alignment normalises. NOTE: edges should not meet.
- Secure the pulley string around tabs and secure with Velcro.
- Ensure that two fingers can fit between the device and the patient and a gap remain.

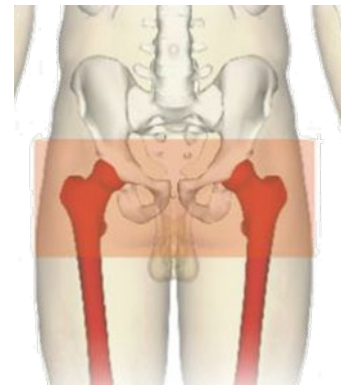


Image: St John WA 2013, <https://clinical.stjohnwa.com.au/clinical-skills/trauma/pelvic-splints>



- **NOTE:** Tying feet together helps maintain anatomical position of the pelvis via internal rotation of the femurs. If patient deteriorates on applying binder refer to section 5.2



Image: St John WA 2013, <https://clinical.stjohnwa.com.au/clinical-skills/trauma/pelvic-splints>

- Circumferential pelvic sheeting is an option for all children, but is especially recommended for younger children <23kg as the T-POD binder may be too large.
  - A folded sheet should be placed underneath the patient – between the iliac crests and greater trochanters.
  - Two team members should cross the sheet across the pubic symphysis and pull the sheet firmly.
  - Twist the ends together and secure with a plastic clamp, where possible (metal can obscure imaging).
  - Large size tubigrip slipped from the feet, folded and doubled can be an alternative to binders in young children.



Image: Heetveld, M. 2007

[https://www.aci.health.nsw.gov.au/\\_data/assets/pdf\\_file/0011/195176/Management\\_of\\_Haemodynamically\\_Unstable\\_Patients\\_with\\_a\\_Pelvic\\_Fracture\\_Full\\_Report.pdf](https://www.aci.health.nsw.gov.au/_data/assets/pdf_file/0011/195176/Management_of_Haemodynamically_Unstable_Patients_with_a_Pelvic_Fracture_Full_Report.pdf)

## 4.2 Deterioration post pelvic binder application in ED

Binder application has been found mostly beneficial in patients with **AP compression injuries**. There is some evidence to suggest the application of a pelvic binder for certain pelvic fractures can increase the risk of haemodynamic instability.

- If a **lateral compression injury** is confirmed or highly suspected, a pelvic binder may NOT benefit the child's condition and may cause further deterioration. Consult orthopaedics if in doubt.
- Evidence is mixed for binder application in **vertical shear injuries**. Caution should be exercised during binder application if this injury is confirmed or highly suspected. Ensure limb is pulled to length, and skin traction applied, prior to applying binder. MAP should be closely monitored when the binder is applied in unstable patients.

If deterioration occurs post pelvic binder application in ED, loosen the binder, in consultation with the Orthopaedic and/or General surgical team.

## 4.3 Child arriving with an ill-positioned pelvic binder

- If child remains haemodynamically stable, follow pathway in Section 2.0.
- If child arrives haemodynamically unstable, reposition binder correctly and follow pathway in Section 2.0.

## 4.4 Removing a pelvic binder

For those at risk of pelvic bleeding, despite negative radiological imaging:

- In a monitored room, with continual blood pressure, nursing staff present, two ED staff with mobile X-Ray on standby.
- Two large bore working cannulae in place. Ensure blood products are available for resuscitation if required.
- Slow release of binder in a conscious patient, assessing for tachycardia, BP alterations, pain and altered sensation.
- Ensure that BP is maintained within normal limits, not just maintained hypotensive.
- Allow at least five minutes after binder is released before considering patient stable and binder is removed.
- Attend X-Ray and continue with fluids and other trauma management as required.

## 4.5 Deterioration post pelvic binder release/removal

If the patient becomes haemodynamically unstable post binder release or removal:

- Binder should be reapplied and commence volume resuscitation
- If patient remains unstable, consider IR+/- EPP +/- External Fixation
- If patient stabilises consider performing a CT pelvis with angiogram with subsequent review and consideration of IR or External Fixation in consultation with Orthopaedic team.

## 5 Pelvic fracture Complications

### 5.1 Haemodynamic instability despite resuscitation

Active bleeding from the pelvis in patients who do not respond to resuscitation should be managed by interventional radiology with selective embolisation of active arterial bleeding vessels or transfer to theatre and surgical packing of the pelvis if the on-call general surgery, vascular and orthopaedic consultants agree. Child should be mobilised to theatres or IR suite within 45 minutes of arrival.

#### 5.1.1 Damage control laparotomy

All patients with blunt poly-trauma undergoing damage control laparotomy should have imaging of the pelvis before surgery (X-ray or CT). All patients with pelvic fracture should have a pelvic binder in-situ during surgery and this should not be removed for a post binder pelvic X-ray until the patient is haemodynamically stable.

If binder is interfering with laparotomy, ensure Orthopaedic surgeon present, with iliac crests in the operative field for pelvic Ex-Fix application. If taking off binder, tie knees and feet in internal rotation with bed sheets.

### 5.2 Potential bladder or urethral injury

Potential injury to the bladder or urethra should be suspected, diagnosed and managed accordingly. All patients with traumatic pelvic fractures must have a documented examination of the perineum and external genitalia and a digital rectal examination.

## 6 Bibliography List

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