Slings, belts & corsets for emergency pelvic stabilisation: what works and what doesn’t?

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Introduction

- A significant proportion of deaths from pelvic fracture are due to exanguination

- Bleeding occurs from cancellous bone surfaces, the presacral venous plexus and iliac vessels

- The sooner bleeding is controlled, the greater the chance of avoiding the “lethal triad”
Introduction

- The pelvic binder is established in resuscitation protocols.

- Much as the cervical collar is used to protect from further injury, the pelvic binder is used where injury is suspected before definitive imaging.

- Widely adapted as the initial stabilization of choice for the immediate management of pelvic ring injuries.

- Promoted to maintain or restore mechanical and haemodynamic stability prior to definitive care.
Pelvic compression has long been advocated to control haemorrhage in pelvic injury:

- Reduction and stabilisation of the pelvic ring is thought to decrease fracture site bleeding.
- Protects any initial blood clot from disruption.
- In theory decreases the pelvic volume to create a tamponade effect thereby reducing venous bleeding.
Pelvic compression has long been advocated to control haemorrhage in pelvic injury:

- But 3D modelling using CT demonstrated the pelvis is a hemi-elliptical sphere and absolute volume does not increase dramatically with changes in diameter

- Pelvic haemorrhage spreads through disrupted tissues planes into the retroperitoneum. “Closing the pelvis” does not prevent this

- The binder splints the bony pelvis by compressing and stabilizing fractures, reducing low-pressure bleeding from bone ends and disrupted veins
The binder is not used to:

- Reduce the volume of the pelvis
- Achieve perfect anatomical alignment
  - Excessive force may exacerbate certain injuries
- Control arterial bleeding
  - If there is no improvement haemodynamically following the application of the binder, urgent angio–embolisation or operative intervention considered
Functions of the pelvic binder

- To splint the bony pelvis
- To reduce pain and movement during transfers
- To provide some integrity to the pelvis during operative packing
- To provide stabilisation to the pelvis until definitive stabilisation
History

- Early improvisations for pelvic wrapping - bed sheets. Readily available but not easy to apply effectively.

- MAST mid 1970s – cumbersome and restricted access.

- Pelvic external fixation – surgical expertise and time consuming. No benefit over the binder.
  - Reduced transfusion requirements with the binder compared with EPF may be attributable to ease and speed of application of binder.
The ideal pelvic binder

- Suitable for use pre-hospital and ED
- Lightweight and easily applied
- Soft and comfortable
- Washable or cheap enough to be disposable
- One size fits all
- Allow access to abdomen and groins
Binder options

- Several commercial versions on the market
  - A simple velcro belt
  - The pelvigrip – differential attachments allows access by releasing individual straps
  - The SAM splint – difficult access to the groin without removing. Controlled tension avoids risk of over-reduction
  - The T-POD – complex, excessive force and difficult access
There is no evidence to suggest that any one is superior.
The Christchurch binder

- Innovative
- A simple home-made design
- Soft fabric and velcro
- Satisfies the characteristics of the ideal binder
- Effective
The Christchurch binder
Pre- & post-Christchurch binder
Correct positioning

- Application at the level of the greater trochanters is most effective
- Training
- 38.9% ED Regs and 79.1% Ortho Regs identified the correct position
Complications

- Pressure areas – uncertain how long a pelvic binder can be safely used and how often it should be released for the skin to be inspected

- Theoretical risk of missing radiological signs of diastasis if adequately reduced with a binder

- Overcorrection in lateral compression injuries – no reports in the literature to suggest harm.
  - Over-reduction is avoided without using extreme force, but using as a splint will provide temporary stabilisation and pain relief
Pelvic binder is a practical adjunct to the immediate resuscitation of the hypovolaemic trauma patient

Little study of clinical outcome measures. Some data to support improved haemodynamic status

No clear consensus on which binder is superior
References


3. Eastern Association for the Surgery of Trauma Practice management guidelines for hemorrhage in pelvic fracture – update and systematic review


5. A national survey of United Kingdom trauma units on the use of pelvic binders. Jain et al. International Orthopaedics (on line)