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Hemodynamically Unstable Pelvic Ring Injuires

1. Guideline Statement

To provide a systematic approach to the care of injured patients with pelvic ring injuries who present with hemodynamic instability

2. Scope

Emergency Department Attendings, Emergency Department Residents, Orthopedic Attendings, Orthopedic Residents, Trauma Attendings, Trauma Residents

Introduction

- Pelvic ring injuries occur in up to 25% of polytrauma patients
- Mortality rates for pelvic ring injury patients in Class III/IV shock is 15-30%
- 85% of life-threatening bleeding from pelvic ring injuries is venous in origin
- For every 3 minutes of hemodynamic instability, mortality rates increase by 1%
- Majority of fatalities from pelvic ring associated hemodynamic instability occur within 3 hours of hospital arrival
- Rapid treatment to control blood loss reduces mortality

Initial Evaluation:

1. History: Pre-hospital history including any of the following should alert providers to anticipate and prepare for possible unstable pelvic ring injuries:

A. Fall from significant height

B. Pedestrian/cyclist struck by vehicle

C. MVC with ejection

D. High speed MVC/MCC

2. Exam

A. Skin

1. Inguinal, proximal thigh, flank, sacral or perineal lacerations may communicate with open pelvic fractures
2. Rapid but thorough assessment for any other potential sources of hemorrhage

B. Pelvic Ring

1. Compress iliac wings internally to assess for gross instability

C. Urogenital

1. Males: blood at urethral meatus or scrotal ecchymosis
2. Females: non-menstrual bleeding at vaginal introitus, palpable sharp bone in vaginal vault

D. Gastrointestinal

1. Rectal exam: lacerations or sharp bone in rectal vault

3. Imaging

A. All patients: Trauma Series to include AP pelvis

1. Fractures potentially contributing to hemodynamic instability
    a. Volume expanding pelvic ring injuries (APC/open book pelvis)
    b. Displaced acetabular fractures involving the posterior column into the greater sciatic notch (superior gluteal vessel lacerations)
    c. Obtain AP pelvic film before binder if feasible

B. Persistently unstable patients: E-FAST scan

1. Identify or exclude hemoperitoneum

C. Stabilized patients: Contrasted CT scan C/A/P

1. Identify or exclude pelvic hematoma(s)/ blush
2. Identify or exclude other sources of intra/extraperitoneal bleeding

D. Retrograde Urethrogram/Cystogram

1. When patient presents with blood at urethral meatus
2. Assess urethra and bladder for traumatic disruptions

Hemorrhage Control

1. Stabilize bony pelvis/resuscitation: Venous bleeding is low-pressure and fills whatever space is provided until local tamponade occurs. Thus, reduction of pelvic volume decreases potential venous blood losses and can minimize further soft-tissue injuries.

A. Temporary Pelvic Binder (T-POD, sheet, etc.)
    1. Indication: **volume expanding** pelvic ring injuries
    2. Method: apply over femoral greater trochanter
        a. 40% of pelvic binders are applied too cephalad, failing to reduce pelvic volume, compressing abdominal compartment
    3. Duration: ≤ 24 hours (mitigate iatrogenic skin necrosis)
    4. Exception: open book pelvic ring injury combined with protrusion acetabular fracture (skeletal traction and iliac crest level binder applied in conjunction may help restore hip joint position and reduce potential pelvic volume)

B. Volume Resuscitation
    1. 1 L intravenous fluids then proceed with blood product administration
    2. Early activation of Massive Transfusion protocol should be strongly considered without hemodynamic improvement with IVF alone
    3. TEG-driven protocol to optimize hemostasis

C. Pelvic External Fixation
    1. Should be considered in all hemodynamically unstable pelvic patients taken urgently for exploratory laparotomy (for APC, VS, LC type III [windswept pelvis] fracture patients)
    2. Goals
        a. Reduce pelvic volume
        b. Reduce bleeding from fracture-site movement
        c. Reduce motion to stabilize pelvic hematoma

2. Identify associated hemorrhagic injuries
    A. Chest hemorrhage: CXR, FAST, CT chest
    B. Abdominal hemorrhage: FAST, CT abdomen/pelvis

3. Control pelvic arterial, venous and soft tissue bleeding sources
    A. Angiogembolization (AE)
        1. Indication
            a. Contrast blush on CT of pelvis
            b. Significant hemorrhage or ongoing hemodynamic instability despite reducing pelvic volume with binder
        2. Considerations
            a. Source of hemodynamic instability in patients with pelvic ring disruptions is venous 80-90% of the time, not correctable with AE
            b. When arterial bleeding is identified, AE effectively controls hemorrhage 85-95% of the time. However, since the likelihood of

concomitant venous bleeding is nearly 100%, bleeding may continue

c. Large hematomas (> 500 cc) may have increased risk of arterial injury requiring AE

d. Selective AE is preferred over non-selective embolization, to minimize complications

B. Preperitoneal pelvic packing

1. Consider when interventional radiologist not readily available
2. Consider with positive FAST in patient who remains too unstable for CT/IR
3. If time allows, pelvic external fixation prior to packing improves the efficacy of local hemorrhage tamponade

C. REBOA

1. Consider placing an 18 gauge femoral A-line from the REBOA accessory kit in any patient with hypotension and APC/LC pelvic fracture or positive FAST exam.
2. This a-line catheter will accomodate the wire from the 7 introducer sheath becomes encessary for deployment of the REBOA.
3. REBOA may be placed in zone 3 for any patient with an ongoing transfusion requirement believed to be from a pelvic fracture as a temporizing measure until AE or pelvis packing can be achieved. REBOA should be placed in zone 1 for any other source of abdominal bleeding.

References:

A. American Association for the Surgery of Trauma multi-institutional trial. J Trauma Acute Care Surg. 2016;80:717–723.

B. Kleweno, Conor P. MDa; Maier, Ronald V. MD, FACS, FRCS Ed (Hon), FCSHK (Hon), FCCS (Hon)b,c,d. Pelvic Ring Resuscitation Pathways. Journal of Orthopaedic Trauma: July 2022 - Volume 36 - Issue 7 - p 294-297. doi: 10.1097/BOT.0000000000002107

C. ACS TQIP Best Practices in the Management of Orthopaedic Trauma. 2015 https://www.facs.org/media/mkbnhqtw/ortho_guidelines.pdf

Approval Signatures

Step Description	Approver	Date
COO	John Winks: Executive Vice President-COO	09/2024
Trauma Services Committee Approval	Stephanie Spain: Trauma Prgm Mgr Adult	09/2024
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Applicability

Erlanger Health - Baroness