Management of Pelvis Fracture with Hemodynamic Instability

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Management of Pelvic Fracture

- How NOT to do it
- The basics
- Evaluation for abdominal hemorrhage
- External pelvic stabilization
- Angiography with embolization
- Pelvic packing
- Western Trauma Association Algorithm
Case: Pelvic Fracture
Hemodynamic Instability

- 49 yo woman, MCC versus car
  - Arrival 0030 hrs
- Field hypotension, A, A OR x 3
- BP on arrival: 80/50
- FAST: Negative x 3
- Resuscitation
  - 7 liters crystalloid
  - 6 units PRBC

Case: Pelvic Fracture, Unstable

- AP Pelvis
- CXR:
  - RUL contusion
- Repeat FAST
  - NEGATIVE
- To Angio at 0230
Case: Pelvic Fracture, still unstable

- In angio, BP 120/56 to 80/49
- Ongoing IV, PRBC
- Angio: NEGATIVE
- Bilateral internal iliac arteries embolized
- Back to Trauma Bay

Pelvic Fracture: still really unstable

- IN Trauma Bay:
  - Hypotensive
  - FAST: now positive
- Urgently to OR
  - In extremis, near code on arrival
  - Ex lap: 300-500 mL, thin blood
  - Pelvic hematoma moderate non-expanding
  - Empiric chest tubes
Pelvic Fracture: in OR

- Right Chest Tube
  - 1700 over ~ 30 minutes
  - Right thoracotomy: bleeding from rib fractures, no definable vessel
- Chest: temporary closure
- Abdomen: temporary closure
- PACU: on levo, epi, death at 0730
- PRBC 26, FFP 10, cryo 10, Plates 10

Unstable Pelvic Fracture: Lessons Learned

- ATLS: ABC’s
  - Not intubated until in extremis in OR
  - BEFORE angio far more prudent
- Negative Angio
  - To OR for exploration
  - Consider pelvic packing
- Early use of Massive Transfusion Protocol to avoid “lethal triad”
Pelvic Fracture with Instability

- Management of patients with hemodynamic instability from pelvis fracture is challenging and controversial.
- Mortality rates have ranged from 18-40 %
- Death within the first 24 hours of injury was most often a result of acute blood loss
- Significant decreases in mortality rates have been shown with adoption of algorithms for management of these injuries
- The key issues in management are identifying the site(s) of hemorrhage and then controlling the bleeding.

Pelvic Fracture Management

The Basics

- ATLS resuscitation principles
  - CXR
  - AP pelvis
    - Fracture type
- Evaluation for abdominal bleeding
  - FAST
  - Diagnostic Peritoneal Aspiration (DPA)
Pelvic Fracture and Intra-abdominal Injury

- Force severe enough to fracture the pelvic ring can cause abdominal injuries.
- Frequency of abdominal injury ranges from 16-55%
- Appropriate evaluation of the abdomen for associated intra-abdominal injuries cannot be over-stressed.

Management of Pelvic Fracture: External Stabilization

- “pelvic binder”
- Decreases pelvic volume, in right fracture type (Class II)
  - Widened symphysis
  - Vertical shear
  - Not useful for lateral compression, rami fx
- Improves hemodynamics (Class III)
Use of External Pelvic Stabilization

36 year old Male, Auto vs Pedestrian at Freeway speed

Pelvic Fracture Bleeding

- **3 major sources;**
  - arterial,
  - venous
  - cancellous bone.

- **Autopsy study (1973):**
  - extravasation of contrast from the hypogastric arteries in 85%.
  - Bleeding sources were bilateral in 63%.
  - 61% had more than one bleeding site identified.
  - Careful dissection revealed lesions to main arteries in only 3 specimens,
  - bleeding from bone and adjacent soft tissue hampered identification stressed the significance of hemorrhage from the fracture sites

- **A more recent study reported that over 70% of unstable patients with pelvic fractures will have arterial bleeding**
Pelvic Blush on CT Scan

Pelvic Fracture: Angio-embolization

- Selective angiography of both iliacs
- Gelfoam or coils for extravasation
- Reported as 87%-95% effective
- Re-angiography and embolization as salvage procedure in selected patients
- Complications of gluteal necrosis, death from sepsis RARE but do occur.
Pelvic Angio with Extravasation

Pelvic Fracture:
Pre-Peritoneal Pelvic Packing

- Initially described in Europe
- Experience in USA mixed
  - Denver: “100% successful”
  - Mass Gen: 66% mortality (not published)
  - Other centers: 50% mortality (not published)

- Caveats:
  - Appropriate knowledge and experience
  - Institutional capabilities
**Pelvic Fracture: Pelvic Packing**

- Unstable patient, expanding hematoma
- Open hematoma, evacuate clot
- Retract bladder, 3 lap pads on each side
  - Below the SI joint, posteriorly
  - Middle pelvic brim
  - Deep in retro-pubic space
- Continued hemorrhage; to angiography
- Removal or exchange of packs in 24-48 hours

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**WTA Pelvic Fracture Algorithm**

1. Trauma Evaluation
   - AP Pelvis
   - FAST or DPA?
     - No
       - Massive Transfusion Protocol
       - Hemodynamically Stable?
         - Yes
           - Pelvic blush?
             - Yes
               - Positive Abd/Pelvic CTS?
                 - Yes
                   - OR for Exploration, + ex fix
                 - No
                   - Angio / Embolization
                 - No
                   - ICU, finish evaluation & resuscitation
             - No
               - Pelvic blush?
                 - Yes
                   - Positive Abd/Pelvic CTS?
                     - No
                       - Unstable
                     - Yes
                       - Negative
                         - Preperitoneal Packing
                         - Pelvic stabilization
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