

PRACTICE GUIDELINE

Effective Date: **7-16-04**

Manual Reference: **Deaconess Trauma Services**

TITLE: MANAGEMENT & STABILITY OF PELVIC FRACTURES

PURPOSE: To provide a guideline for establishing early pelvic stability, diagnosis and management of injuries.

GUIDELINES:

1. Any fracture or disruption of the pelvic ring requires significant force. Must suspect intra-peritoneal, retro-peritoneal, neurovascular injuries in conjunction with pelvic trauma.
2. ATLS must be followed in all trauma patients. Pelvic ring disruption can be suggested by physical examination findings:
 - a. Abnormal positioning of lower extremities (shortening, rotation)
 - b. Mechanical instability of hemipelvis (Testing to be performed by one person only as repeated exams may dislodge pelvic clot resulting in further hemorrhage.)
 - c. Tenderness or palpable gaps of sacrum, symphysis, or posterior pelvis
 - d. Flank ecchymosis or hematoma
 - e. Perineal trauma
 - i. Scrotal/labial hematoma or swelling
 - ii. Blood at urethral meatus
 - iii. Rectal laceration or gross blood
 - iv. Abnormal prostate exam
 - v. Vaginal laceration or gross blood
3. Initial work-up to include AP pelvis radiograph as an adjunct to the primary survey. Adequate radiograph to include entire iliac wings, hip joints, ischial tuberosities, lumbosacral junction. CT scan reserved for hemodynamically stable patients with inconclusive plain radiographs or to better define fracture patterns.
4. Obtain AP Pelvis:
 - a. Obtain on all obtunded patients with a possible mechanism suggesting a pelvic injury
 - b. If the patient is alert and cooperative, obtain portable pelvis X-ray when there are signs and symptoms of pelvic injury
 - c. A pelvis film does not need to be ordered on every patient
 - d. Pelvis film may be omitted if the trauma patient is stable &/or going expeditiously to the CT scanner.
5. **Stable** fracture patterns:
 - a. Minimally displaced pubic rami fracture(s)
 - b. Non / minimally displaced sacral ala fracture(s)
 - c. Isolated iliac wing fractures not disrupting pelvic ring integrity
 - d. Avulsion fractures at muscle insertions

6. **Unstable** fracture patterns:
 - a. > 2.5 cm symphysis diastasis
 - b. Displaced pubic rami fractures
 - c. >1 cm SI joint widening
 - d. >1 cm displacement sacral fracture
 - e. Fracture-dislocation SI joint complex
 - f. Hemipelvis migration (Sciatic notch usually level with 2nd neural foramen)

7. Life-threatening hemorrhage *rarely* due to pelvic arterial injury. More commonly due to low-pressure venous plexus disruption or bleeding cancellous bone surfaces. Other causes of hemorrhagic shock must be excluded. Patients may lose blood into five areas/ compartments:
 - a. External blood loss
 - b. Internal blood loss
 - i. Chest
 - ii. Abdomen
 - iii. Retroperitoneum
 - iv. Extremities

8. Pelvic bleeding often controlled with immediate reduction of pelvic volume, stabilization of pelvic hematoma, and apposition of cancellous surfaces. (Rule of thumb is to “Close the Book” when open-book type pelvic disruptions is present). Vertical instability requires application of longitudinal traction in combination with pelvic volume reduction maneuvers.
 - a. Sheet (tied around waist at Greater Trochanteric level)
 - b. Pelvic Binder-for initial emergency stabilization of pelvic fractures to help prevent blood loss during initial resuscitation and aid in pain control. The pelvic binder is a temporary measure until definitive treatment can be accomplished.
 - i. Must be applied by trauma surgeon or orthopedic surgeon
 - ii. Stat portable x-ray will be obtained after placement
 - iii. If pelvic binder becomes dislodged, RN must monitor BP and pulse every 15 minutes and contact the surgeon who placed the device.
 - iv. RN is not allowed to place pelvic binder device, must be performed by trauma surgeon or orthopedic surgeon.
 - v. RN can only remove the pelvic binder **with an order from the orthopaedic surgeon or trauma attending**. Vital signs should be monitored closely after removal to monitor for signs/symptoms of bleeding.
 - vi. Person applying the pelvic binder should write the date/time on the device when it was applied.
 - vii. Slide the binder under the patient and center it vertically over the greater trochanters. Note that the Pelvic Binder will fit a patient as large as 66 inches (167 cm) around; two Pelvic Binders may be connected for a larger patient.

- viii. Cut the end of the binder to leave a 6- to 8-in (15- to 20-cm) gap in the front of the abdomen.
 - ix. Attach the hook-and-loop straps and plate to the cut end of the binder.
 - x. Use the shoelace mechanism to tighten the binder. Close the fastener on the laces to maintain the tension.
 - xi. The nurse should be able to put two fingers between binder and patient—the binder should be snug but not too tight.
 - xii. The Pelvic Binder is radiolucent and MRI-compatible
 - xiii. The tightening/stabilizing is only done by the Trauma Surgeon or the Orthopedic Surgeon.
 - xiv. In male patients, make certain that the genitalia are elevated out of the groin.
- c. Pelvic reduction clamps/“C” clamps
 - i. Invasive/potential for severe complications
 - d. MAST (Military Anti-shock Trousers)/PASG (Pneumatic Anti-shock Garments)
 - i. Compartment syndromes
 - ii. Limited access for patient examination
9. *Emergent* External Fixation has been shown to improve survival with unstable pelvic ring disruptions. External fixators have no acute resuscitative effects with stable fracture patterns.
- a. One or two pins in each iliac wing connected with simple frame is sufficient for temporary stabilization. Plan conversion to definitive stabilization when appropriate/indicated.
 - b. Frame should be kept low on pelvis so as not to impede laparotomy exposure.
 - c. Reduction achieved with *lateral compression* of hemipelvis. Internal rotation of hemipelvis may produce posterior pelvic widening.
10. FAST exam should be considered in any patient exposed to blunt abdominal trauma and should be performed in any patient who has transient or ongoing signs of shock.
11. External fixation of unstable pelvic disruptions should precede laparotomy in majority of cases (exception: identified intra-abdominal exsanguination with patient *in extremis*).
- a. Laparotomy can cause relaxation of skin / fascia with loss of tamponade effect if performed prior to pelvic stabilization.
 - b. Laparotomy in hemodynamically unstable patient should be directed towards life-saving measures (i.e. “Damage Control”). Hemorrhage control to be achieved by organ resection (spleen, kidney) or packing, if resection not feasible (liver).
 - i. Definitive organ repair to be performed at subsequent laparotomy if patient displays large / expansive retroperitoneal hematoma and / or hemodynamic instability.

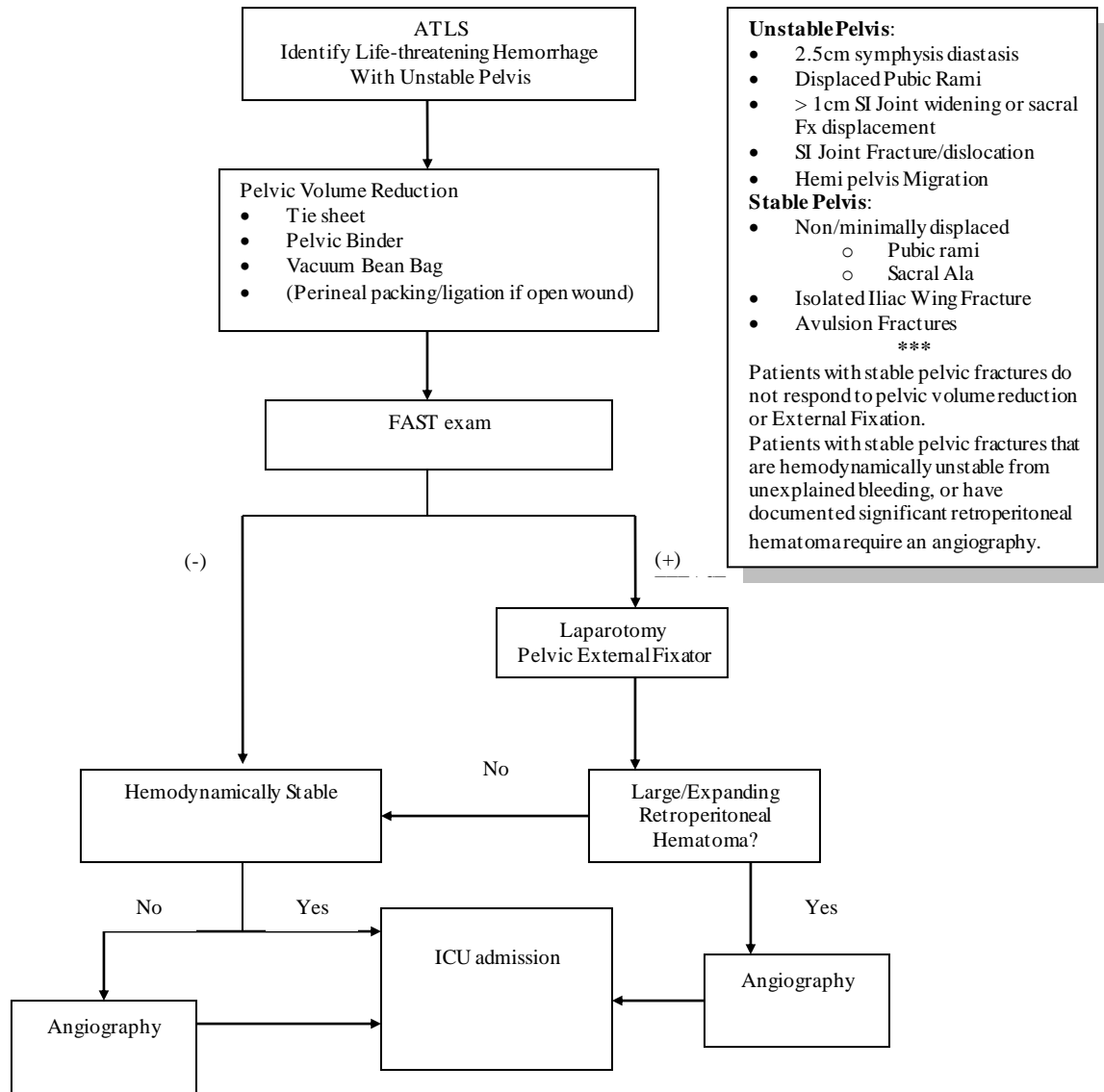
- ii. If hemodynamic stability rapidly restored at laparotomy, definitive organ repair may be considered.
12. Angiography/Embolization required for patients with large/expanding retroperitoneal hematomas (regardless of hemodynamic status), continued blood loss despite fracture reduction and pelvic compression, *or* in patients with stable fracture patterns and unexplained blood loss (transfusion 5 units blood /24 hrs, or 8 units/48 hrs). Angiography should be performed after intra-abdominal bleeding is ruled out by FAST.
- a. Angiography team should be notified as soon as possible in order to mobilize personnel.
 - b. When possible, embolization of pelvic vessels for hemorrhage control should be selective rather than proximal due to high risk of gluteal necrosis and wound complications for posterior pelvic surgical approaches.
 - c. The application of a pelvic compression device in tandem with preparation and execution of angiography and embolization should be considered our primary goal. Current literature supports not only urgent skeletal fixation with an external fixator but also early emergent pelvic vascular embolization.
13. Routine retroperitoneal exploration and packing is to be condemned.
- a. Poor success rates with increased complications and mortality due to lack of visibility and limited surgical access.
 - b. Pelvic angiography and embolization better tool for diagnosis and treatment of pelvic vascular disruption
 - c. Retroperitoneal vessel ligation or aortic cross-clamping reserved for patient *in extremis* with obvious identifiable retroperitoneal source.
14. Open pelvic wounds communicating with perineum, rectum, vagina, or buttocks (i.e. risk of fecal contamination) consider diverting colostomy within 48 hrs.
- a. Open wounds communicating with flanks or anterior abdominal wall do not require diverting colostomy.
 - b. If hemodynamic stability achieved at time of laparotomy, immediate diverting colostomy may be considered.
 - c. Colostomy site should be kept in upper abdominal quadrants so as not to interfere with planned approaches for definitive pelvic fixation.
 - d. Open wounds require standard serial irrigation and debridements until healthy granulating surface is obtained.
 - e. Penetrating wounds involving a hollow viscous injury and pelvic fracture do not benefit from irrigation and debridement.

15. Definitive pelvic fixation may be delayed until patient is hemodynamically stable, pelvic-related hemorrhage has been controlled, and extent of pelvic injury pattern is fully understood.
 - a. Percutaneous Iliosacral screw placement immediately following pelvic external fixation may be considered in hemodynamically stabilized patients.
 - i. Post-traumatic ileus and contrast agents obscuring radiographic landmarks preclude percutaneous iliosacral screw placement techniques.
 - b. Symphysis pubis plating, via extension of laparotomy incision, may be considered in hemodynamically stable patients.
 - i. Pfannensteil approach opens retroperitoneal space and, theoretically, may diminish pelvic tamponade effect.
16. Abdominal CT with IV contrast should be obtained if perirenal bleeding is likely
17. Retrograde cystogram (if CT abdomen with contrast is required do cystogram after the CT):
 - a. Should be considered for all cases of gross hematuria, penetrating abdominal trauma and pelvic fractures where bladder disruption is suspected
 - b. Allow 100 mL (or one ampule) of contrast agent diluted to a volume of 300mL by normal saline in an aseptic syringe to flow by gravity into a Foley catheter and then clamp.
 - c. Obtain two different X-ray views the pelvis, remove the Foley clamp, and repeat the same two pelvic X-rays
18. Retrograde urethrogram (if CT abdomen with contrast is performed, do urethrogram after the CT):
 - a. Should be considered for all cases of gross hematuria, penetrating abdominal trauma and pelvic fractures where disruption of the urethra is suspected.
 - i. Blood at the urethral meatus.
 - ii. Displaced or non-palpable prostate.
 - iii. Obvious perineal injury (perineal hematoma or open perineal injury or scrotal hematoma).

REFERENCES:

- ❖ Practice Management Guidelines for Hemorrhage in Pelvic Fracture. Eastern Association for the Surgery of Trauma (EAST), 2001.
- ❖ Initial Management of Pelvic Fractures: Pelvic Fracture Management Algorithm. American College of Surgeons, Subcommittee on Publications / Committee on Trauma, 1997.
- ❖ Orthopaedic Knowledge Update: Trauma 2. American Academy of Orthopaedic Surgeons / Orthopaedic Trauma Association, 2000.
- ❖ Mosby's Nursing Skills: Splinting: Pelvic, 2009.
- ❖ Pelvic Injury Symposium. Orthopaedic Trauma Association, 2000.

REVIEWED DATE	REVISED DATE
JAN 05	JAN 08
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AUG 14	February 17
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APRIL 20	
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- For open pelvic wound communicating with perineum/buttocks, perform irrigation and debridement, consider diverting colostomy
- For continuing concern for blood loss, consider repeat FAST (if laparotomy not previously done) or repeat angiography
- Definitive pelvic fixation should be performed after the patient is hemodynamically stable