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Management and Stabilization of Pelvic Fractures

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

Guidelines:

- A. Perform initial resuscitation, diagnostic evaluation, and management of the trauma patient with pelvic fractures following ATLS protocols
 - a. Pelvic fracture as the primary source of hemodynamic instability should be differentiated from other life-threatening injuries (i.e. hemopneumothorax, hemoperitoneum, or cardiac tamponade)
 - b. Initial workup in the trauma bay should include a chest x-ray, pelvic x-ray, and FAST exam in delineating the source of shock
 - i. Pelvic film may be omitted if the trauma patient is stable and/or going expeditiously to the CT scanner
 - c. CT scan is reserved for hemodynamically stable patients with inconclusive plain radiographs or to better define fracture patterns

- B. Pelvic ring disruption can be suggested by physical examination findings
 - a. Abnormal positioning of lower extremities (shortening, rotation)
 - b. Mechanical instability of hemipelvis
 - i. 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 pelvic
 - d. Flank ecchymosis or hematoma
 - e. Perineal trauma
 - i. Scrotal/labial hematoma or swelling
 - ii. Blood at urethral meatus
 - iii. Rectal lacerations or gross blood
 - iv. Abnormal prostate exam
 - v. Vaginal laceration or gross blood

- C. Stable Fracture Patterns
 - a. Minimally displaced pubic rami fracture(s)
 - b. Non/minimally displaced sacral ala fracture(s)
 - c. Isolated iliac wing fracture(s) not disrupting pelvic ring integrity
 - d. Avulsion fracture(s) at muscle insertions

D. Unstable Fracture Patterns

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

E. Management

- a. Pelvic bleeding often controlled with immediate reduction of pelvic volume, stabilization of pelvic hematoma, and apposition of cancellous surfaces
 - i. Rule of thumb is to “close the book” when open-book type pelvic disruption is present
 - ii. Vertical instability requires application of longitudinal traction in combination with pelvic volume reduction maneuvers
- b. Sheet tied around waist at greater trochanteric level
- c. Pelvic binder for initial emergency stabilization of pelvic fractures to help prevent blood loss during initial resuscitation and aid in pain control
 - i. The pelvic binder is a temporary measure until definitive treatment can be accomplished
 - ii. Must be applied by Trauma Surgeon, ED Physician, or Orthopedic Surgeon
 - iii. Application time and date should be documented on the binder and in EMR
 - iv. Stat portable x-ray will be obtained after placement
 - v. If pelvic binder becomes dislodged, RN must monitor BP and pulse every 15 minutes and contact the physician who placed the device
 - vi. RN can only remove the pelvic binder with an order from the Orthopedic Surgeon or the attending Trauma Surgeon
 1. Vital signs should be monitored closely after removal to monitor for signs/symptoms of bleeding
 - vii. The tightening/stabilizing is only done by the attending Trauma Surgeon or the Orthopedic Surgeon
 - viii. The pelvic binder should be removed within 24 hours

F. Emergent External Fixation

- a. Emergent external fixation has been shown to improve survival with unstable pelvic ring disruptions
- b. External fixators have no acute resuscitative effects with stable fracture patterns
- c. One or two pins in each iliac wing connected with simple frame is sufficient for temporary stabilization
 - i. Plan conversion to definitive stabilization when appropriate/indicated
- d. Frame should be kept low on pelvis so as not to impede laparotomy exposure
- e. Reduction achieved with lateral compression of hemipelvis
 - i. Internal rotation of hemipelvis may produce posterior pelvic widening

- G. FAST exam should be considered in any patient exposed to blunt abdominal trauma and should be performed on any patient who has transient or ongoing signs of shock
- H. External fixation of unstable pelvic disruptions should precede laparotomy in majority of cases
 - a. Exception: identified intra-abdominal exsanguination with patient in extremis
 - b. Laparotomy can cause relaxation of skin/fascia with loss of tamponade effect if performed prior to pelvic stabilization
 - c. Laparotomy in hemodynamically unstable patient should be directed towards life-saving measures (i.e. “damage control”)
 - i. Hemorrhage control to be achieved by organ resection (spleen, kidney) or packing, if resection not feasible (liver)
 - 1. Definitive organ repair to be performed at subsequent laparotomy if patient displays large/expansive retroperitoneal hematoma and/or hemodynamic instability
 - 2. If hemodynamic stability rapidly restored at laparotomy, definitive organ repair may be considered
- I. Angiography/Embolization
 - a. 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 hour, or 8 units/48 hours)
 - i. Angiography team should be notified as soon as possible in order to mobilize personnel
 - ii. 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
 - iii. The application of a pelvic compression device in tandem with preparation and execution of angiography and embolization should be considered our primary goal
 - 1. Current literature supports not only urgent skeletal fixation with an external fixator but also early emergent pelvic vascular embolization
 - b. See Vascular Emergency guideline
- J. 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

- K. Open pelvic wounds communicating with perineum, rectum, vagina, or buttocks (i.e. risk of fecal contamination) consider diverting colostomy within 48 hours
 - 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 health granulating surface is obtained
 - e. Penetrating wounds involving a hollow viscous injury and pelvic fracture do not benefit from irrigation and debridement

- L. 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

- M. Abdominal CT with IV contrast should be obtained if perirenal bleeding is likely

- N. Retrograde Cystogram
 - a. If CT abdomen with contrast is required, do cystogram after CT
 - b. Should be considered for all cases of gross hematuria, penetrating abdominal trauma, and pelvic fractures where bladder disruption is suspected
 - c. Allow 100mL (or one ampule) of contrast diluted to a volume of 300mL by normal saline in as aseptic syringe to flow by gravity into a Foley catheter and then clamp
 - d. Obtain two different x-ray views of the pelvis, remove the Foley clamp, and repeat the same two pelvic x-rays

- O. Retrograde Urethrogram
 - a. If CT abdomen with contrast is performed, do urethrogram after the CT
 - b. 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
 - 1. Perineal hematoma, open perineal injury, or scrotal hematoma

References:

- Practice Management Guidelines for Hemorrhage in Pelvic Fracture. Eastern Association for the Surgery of Trauma (EAST), 2001.
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