Embolization of Bleeding in Pelvic Fractures

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Bleeding In Pelvic Fractures

• A significant challenge for the trauma surgeons
• Mortality of 5%-10%
  – Up to ~60% in hemodynamic unstable pts
  – Up to ~70% in open pelvic fxs
• Management of hemorrhage:
  – Pelvic packing – most effective in venous bleeds & fx site (~90% of pelvic bleeds)
  – Embolization – most effective for arterial bleeds
• Establishment of standard practice guidelines difficult due to the nature of the problem
Bleeding In Pelvic Fractures

When is angiography needed?

• Hemodynamic instability after fluid resuscitation & mechanical stabilization of pelvis (arterial bleed more common)
• CT evidence of contrast extravasation (arterial bleed)
  – Accuracy of 98% for identifying the need for embolization
• Open book fx, duration of hypotension, recurrence of hypotension

Embolization in Pelvic Fx & Hemorrhage

• Cessation of arterial bleed
  – 95% - 100% ¹⁻³

• Patient survival
  – With early TAE (< 3hr) 75%; delayed TAE 14% ¹
  – Efficacy 95% ²
  – Clinical efficacy 85.7% ³

• Complications ??

2. Velmahos GC et al. J Trauma 2002;53
Embolization v. Pelvic Packing

• Difficult to ascertain from published data due to variable severity & complexity of pts
• These approaches are mostly complementary
• Embo or packing 1st is controversial – local expertise, experience & availability determine the sequence
• Pts with continued signs/symptoms of blood loss after pelvic packing should go to angiography
Drawbacks of Angiography (According to the Trauma Literature)

- Time consuming procedure precluding other dx or tx measures simultaneously
- Immediate availability of “skilled IRs”
- Delay of procedure (1-5.5 hrs)
  - Only 14.7% of angios performed within 90 min (Verbeek D World J Surg 2008;32)
- Transportation of unstable pt to angio suite
  - 20% required CPR unsuccessfully (Niwa et al Br J Radiol 2000;73)
Potential Complications

• Gluteal muscle necrosis
• AVN of femur
• Sciatic palsy (beware of non-selective embo in endoleak)
• Bowel infarction
• Bladder necrosis

7 days post TAE
49 YO male with unstable pelvic fx and urethral injury & hematuria underwent bilateral coil embo of ant division and its branches

Bladder necrosis 4 wks following coil embolization of bilat IIA

Predisposing Factors to Necrosis of Pelvic Structures

- Non-selective embolization
- Traumatic muscle contusion
- Initial hemodynamic shock (physiologic shunting of blood away from muscles)
- Anemia,
History

- 28 year-old male s/p MVA
- Open book pelvic fx
- In CT trauma team took off pelvic belt to eliminate metallic streak artifact. Immediately hypotensive.
- Tied sheet around pelvis for CT
- IR Team called immediately
CT: Bone Window Contd.
Pelvic Angio: Initial and Delayed
• Multiple areas of bleeding seen on CT
• Angio shows several vessels with spasm & irregular contour
• How should this be treated?
• Identified pinpoint bleeders can be embolized
Contralateral side
Conclusion

• Traumatic pelvic hemorrhage due to arterial injury is best managed by selective embolization when possible

• Venous bleeds and bleeding at the site of fracture respond better to pelvic packing