Endovascular Treatment for Pediatric Vascular Trauma: When is it Indicated?

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Disclosures:
• None

Pediatric Vascular Trauma

- Traumatic injuries—leading cause of death and disability children >1 yr
  - Vascular injuries are relatively uncommon 0.6-1.4%
- Anatomic location varies—
  - lower extremity
    - femur fracture with SFA injury
  - upper extremity
    - supracondylar humeral fracture with brachial artery injury

Pediatric vascular injuries: patterns of injury, mortality, and morbidity

- Retrospective review children’s trauma registry 1993-2005
- 103 patients (age <18 yr)
  - 74% male, average age 11.3 yr
  - 68% penetrating wounds
- Anatomic location
  - Extremities 67%
  - Head/neck 19.4%
  - Torso 13.5%

Pediatric vascular injuries: patterns of injury, mortality, and morbidity

- Nationwide Swedish Registry, 1987-2013
- 222 patients, age <15
  - 66% male, mean age 9.6 yr
  - 66% blunt trauma
- Extremity injuries predominated:
  - 78% of upper extremity injuries (<10 yr)
    - supracondylar fractures
  - 48% of lower extremity injuries (11-15 yr)
    - femur fracture, posterior knee dislocations
• 96.3% open surgical repair
  1) Interposition graft 24%
  2) Autogenous vein patches 19%
  3) Primary repair 9.5%
• 3.7% endovascular repair
  1) Stent and stent grafts (n=8)
  2) Embolization, 15% shunt, 8% stent graft
  3) No stents placed in patients <13 yr

Outcomes of Pediatric Vascular Trauma in the Endovascular Era

• Lajoie et al. (Brooklyn)
• Retrospective single center review
• 9 year period, 60 patients (<18 yr), 80 injuries
  1) Open surgical repair
  2) Endovascular intervention
  3) Average follow-up 6 weeks
• Significantly higher reintervention rates (38% vs. 7%, P<0.01)
• In properly selected patients endovascular and open treatment had similar early outcomes

Pediatric Vascular Trauma: Summary of Recent Series Management and Outcomes

• National Trauma Databank (2007-14)
• 35,771 patients
• Significant increase endovascular therapy
  1) Overall 2007-2014
  2) Blunt trauma
• Increased endovascular use
  1) Age >12.4 yr, large hospitals (>400 beds), level I trauma center, northeast
  2) Increased injury severity score (ISS)
• Most common endo procedures
  1) Embolization (n=88, 33.4%)
  2) TEVAR (n=60, 22.9%)
• Despite successful integration of endovascular therapy, in hospital survival failed to improve
**Blunt Thoracic Aortic Trauma**
(17 year old, fell from 7 story building)

Cook Zenith endograft

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**16 year old s/p gun shot wound to left thigh**
with large false aneurysm

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**Coil embolization of profunda femoris artery branch**
eliminating false aneurysm

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**13 year old popliteal artery trauma recanalization**
self expanding stent

bridging technique until other injuries have been addressed

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**12 year old with polytrauma**
iatrogenic orthopedic screw injury to SFA

SFA injury
Jomed stent
artery repaired

open repair performed a few days later with interposition graft

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**14 year old with polytrauma**
SES covered stent placed for axillary artery injury

planned bridging technique
Pediatric vascular injuries are uncommon, open repair remains the gold standard.

The use of endovascular therapy appears to be increasing, especially TEVAR and embolization.

Endovascular therapy in the extremities is an option as a bridge in older children (>12 yr) with high injury severity scores.

A nationwide pediatric database for arterial trauma is required to assess the appropriateness and durability of endovascular treatment.