Pseudoaneurysm (False aneurysm)

Prepared by A. Floh (08/04/02)

Vascular injury is a well known complication of cardiac catheterization. In the pediatric population a retrospective study from the Hospital for Sick Children demonstrated that vascular injuries comprised approximately 34% of all catheter associated complications with an arterial complication rate of 3.7% (7.3% in those below 1 year). (1)

Pseudoaneurysm formation is an uncommon occurrence associated with arterial perforation (traumatic or iatrogenic). It is defined as a pulsatile hematoma caused by leakage of blood through a defect in the arterial wall and contained by surrounding adventitial and perivascular tissue. This is usually attributed to poor hemostasis during procedure. Patients are usually on anticoagulation therapy. Overall incidence has been noted at 1-8% in adults. (2) (Cochrane) Studies into incidence in pediatric population are lacking, but thought to be much more rare. An analysis at the Children’s Hospital of Philadelphia has shown of incidence of <0.01% based on discharge diagnoses from 2001 through June 2004. (3)

Clinical presentation varies from an asymptomatic bulge, to painful pulsatile mass or compression of surrounding structures leading to ischemia or neuropathy.

Historically, all patients required surgical correction. However in attempts to limit operative exposure, external compression and thrombin injection techniques have been validated as safe and effective first-line alternatives.

Proposed treatment algorithm:
1) Ultrasound guided compression
   - Initially described by Fellmeth et al in 1991 (4)
   - aiming to impede flow into the false aneurysm and promote thrombosis.
   - compress at 20-30 minute intervals up to 60 minutes (as tolerated)
   - success rates do not vary significantly between ultrasound guided or blind compression
   - success rate 40-75% (5,6)

Complications:
Lengthy procedure
Poorly tolerated Pain/discomfort
Recurrence

2) Sonographic Guided thrombin injection (3,7) – may be fluoro-guided (8)

Performed by the interventional radiologists at SickKids Hospital

- Effective even in anticoagulated patients
- May be more difficult following attempts at compression repair (9)
- Guided by real-time US using 2D gray-scale and color Doppler
- bovine thrombin (1000 U/ml) through 22 guage needle, volume approximately 0.1ml, sufficient to impede inflow through pseudoaneurysm neck
- Usual time to thrombosis <5 seconds
- success rates of 63-98% in adults(9)

- Ultrasound follow-up following injection, 1day and 1 week post injection

Complications:
Rates 0-4%(6)
Embolization to native circulation
Pseudoaneurysm recurrence
Allergic reaction to bovine thrombin including generalized urticaria and anaphylaxis
Abscess/cellulites at injection site

3) Surgical repair
- primary treatment if ischemia, infection, or compression of femoral nerve and resultant neuropathy

Complication:
General anaesthesia
Incision
Infection

Others treatment strategies that are not practical or widely used in pediatric population:
Coil embolization
Covered stent

References: