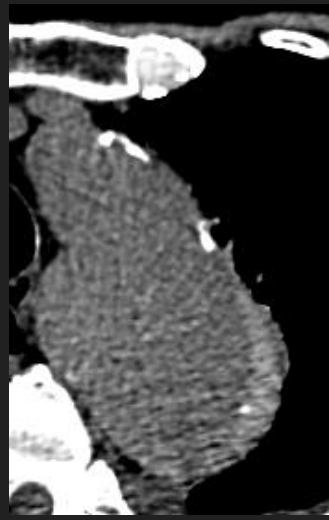
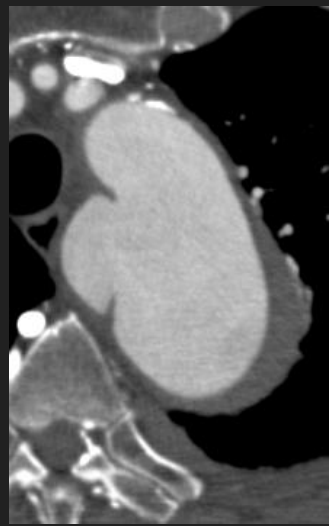
CAIR Case of the Week

Case courtesy of Drs. J. Addas, S. Mafeld, J. Kwan, A. Jaberi and T. Lindsey
University of Toronto

Clinical info

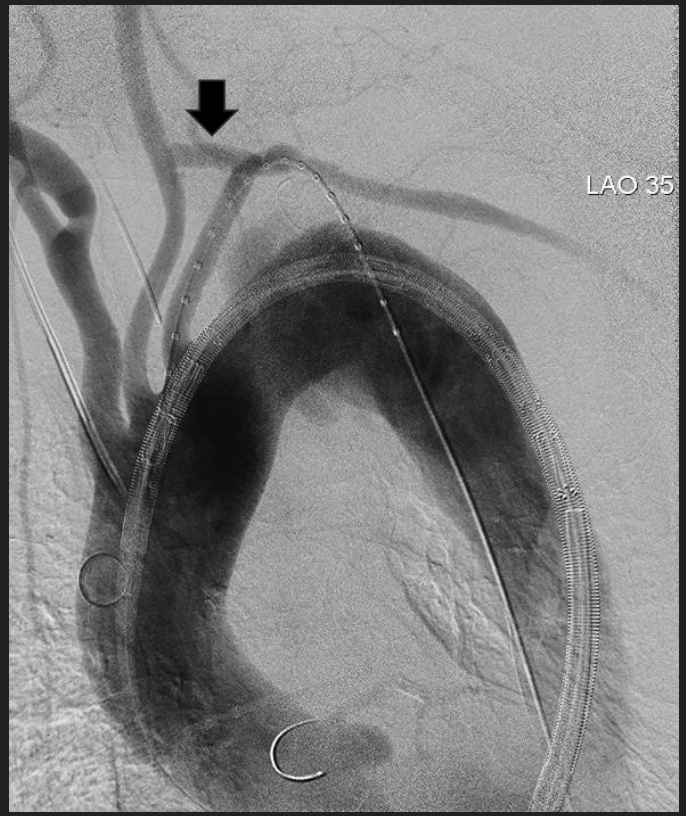
- 89 year old male with sudden non-radiating severe retrosternal chest pain
- Dx:
  - Type B IMH (starting distal to the left SCA origin)
  - Proximal descending aortic PAU
- PMHx:
  - Hypertension, GERD, PUD, BPH
- Meds:
  - ASA, Amlodipine, Metoprolol, Tamsulosin

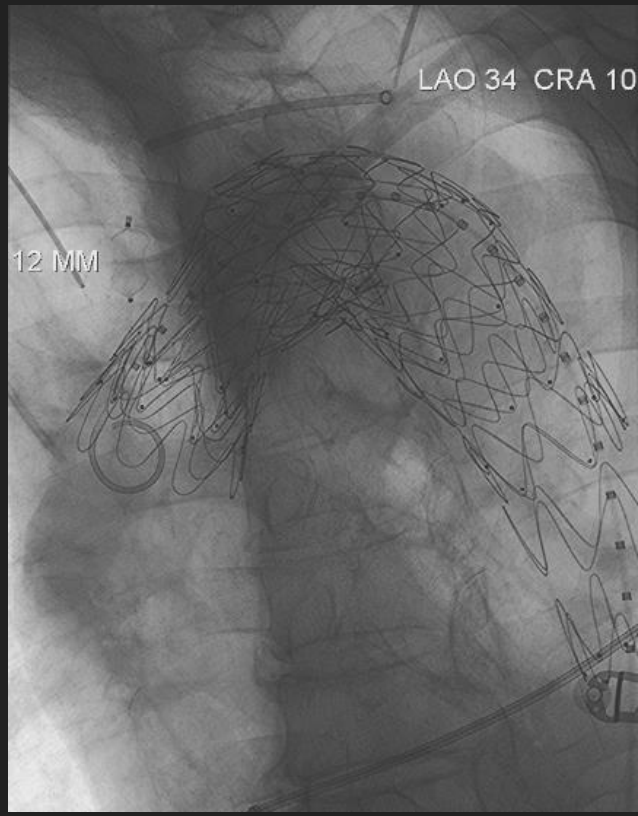




Procedure 1: TEVAR and vascular plug of SCA

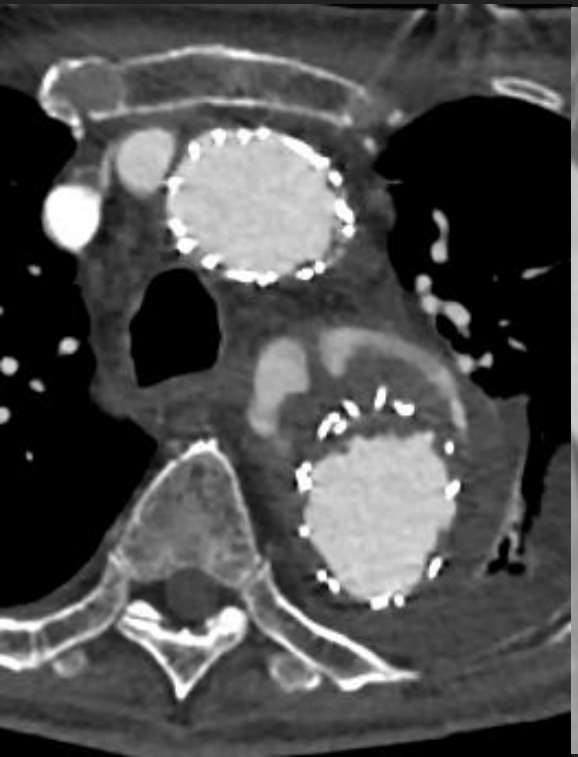
- Surgical left carotid-subclavian bypass graft (Black arrow)
- Left SCA access
  - Used to assist in procedure, deployment of a 12 Fr Amplatzer plug
  - Surgical closure of puncture site at the end of the procedure
- Femoral access used to deploy the thoracic stent graft

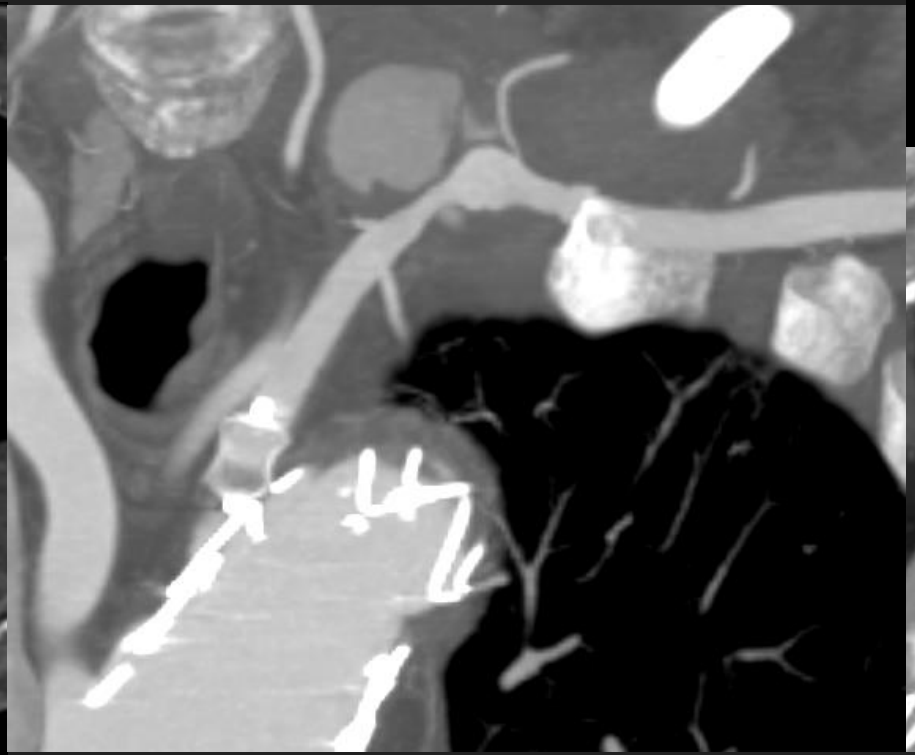


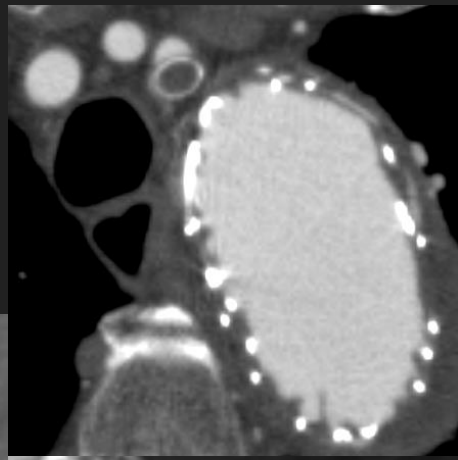


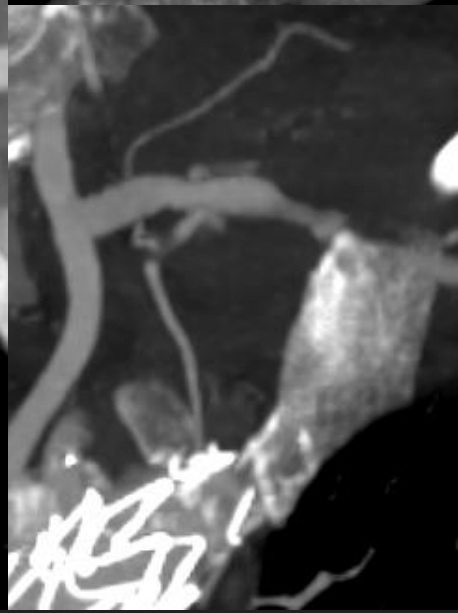
Follow-up CT scan

- Type 2 endoleak, left SCA dissection, plug in false lumen, persistent flow across the proximal left SCA
- Stenosis of left distal SCA near the CCA-SCA graft
- Patent surgical bypass graft
- Pseudoaneurysm near the distal graft anastomosis

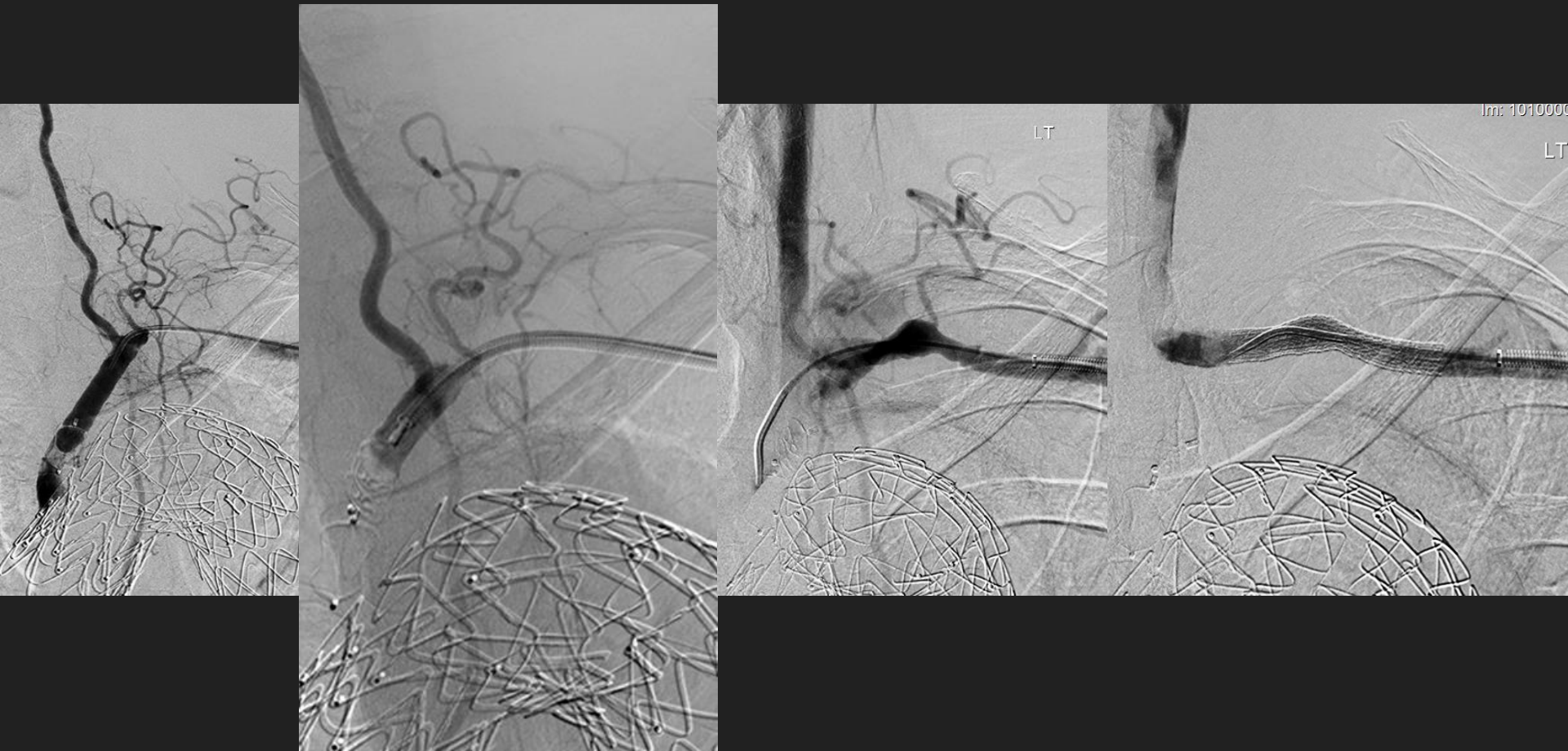




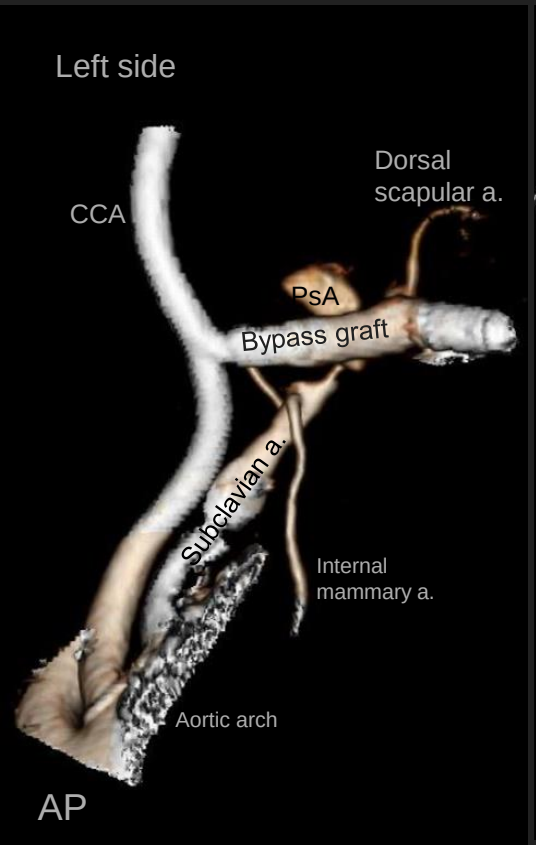


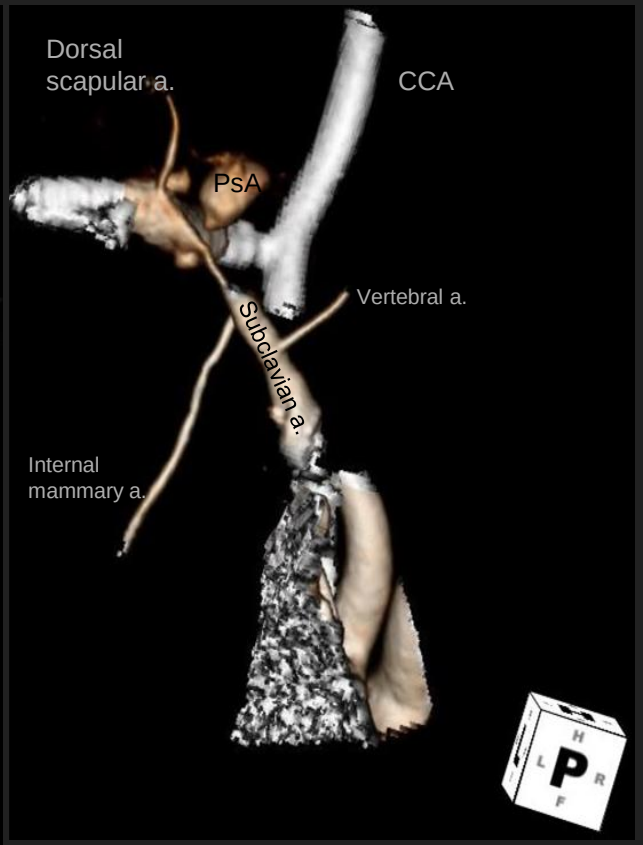


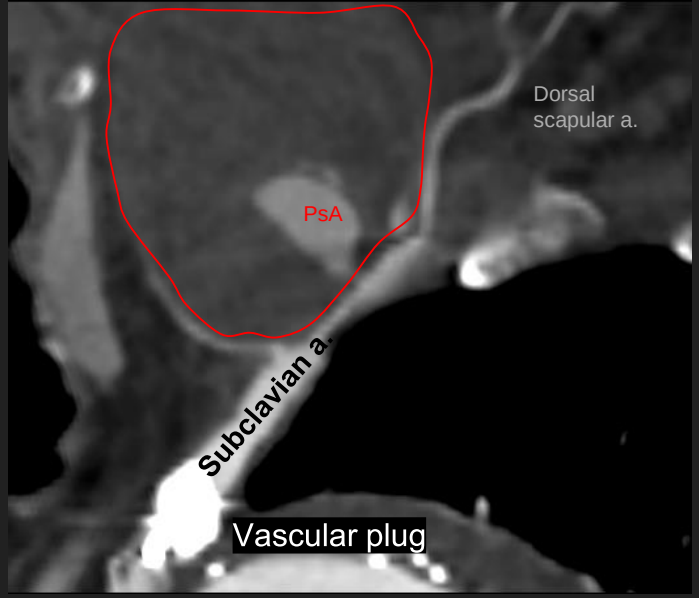
Procedure 2: Placement of a 2nd vascular plug in the left SCA. Deployment of a covered stent within the left common carotid to subclavian bypass to exclude the pseudoaneurysm.



Follow-up CT: Persistent flow into the growing pseudoaneurysm through the left SCA and dorsal scapular artery

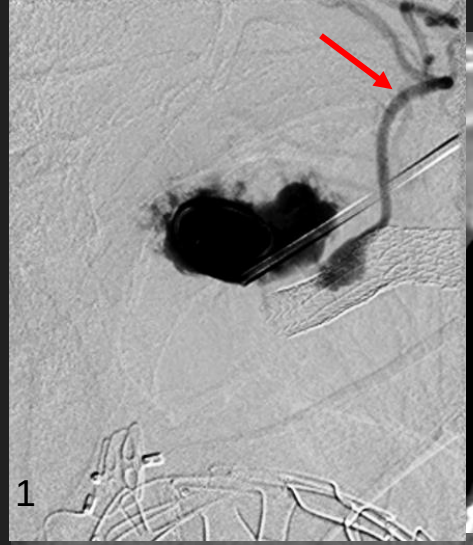


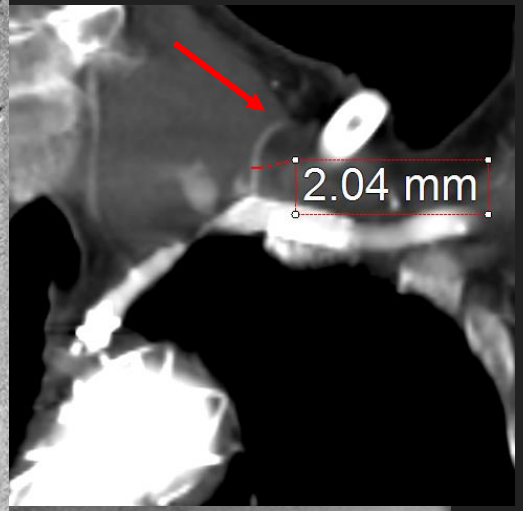


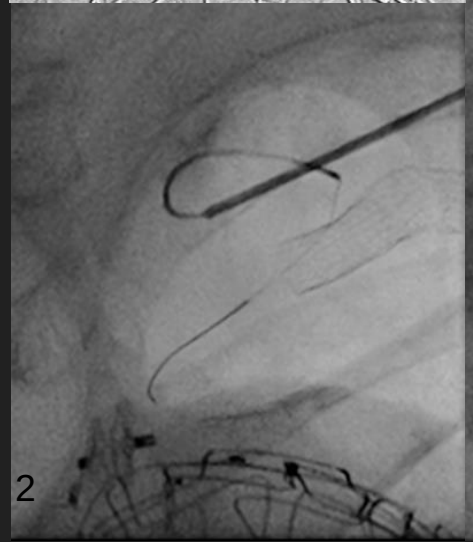


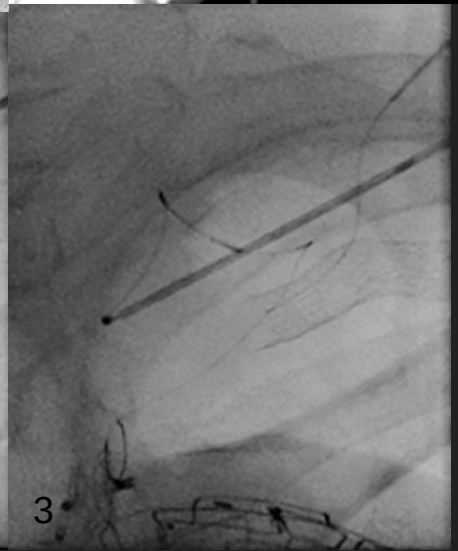
Interventional management

- Direct puncture of the pseudoaneurysm under ultrasound guidance (1)
- A guidewire reached the left SCA through the narrow neck (2), however, the microcatheter was not tracking over the wire (3)
- Dorsal scapular artery (arrow) noted angiographically and localized on ultrasound was accessed percutaneously



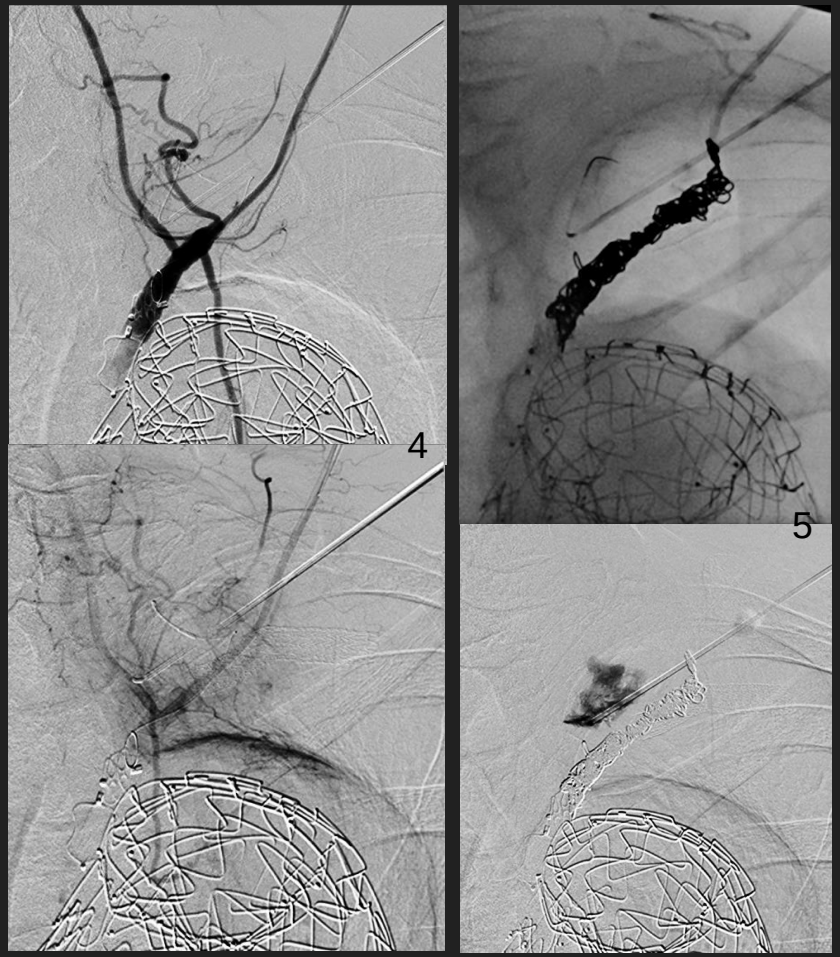




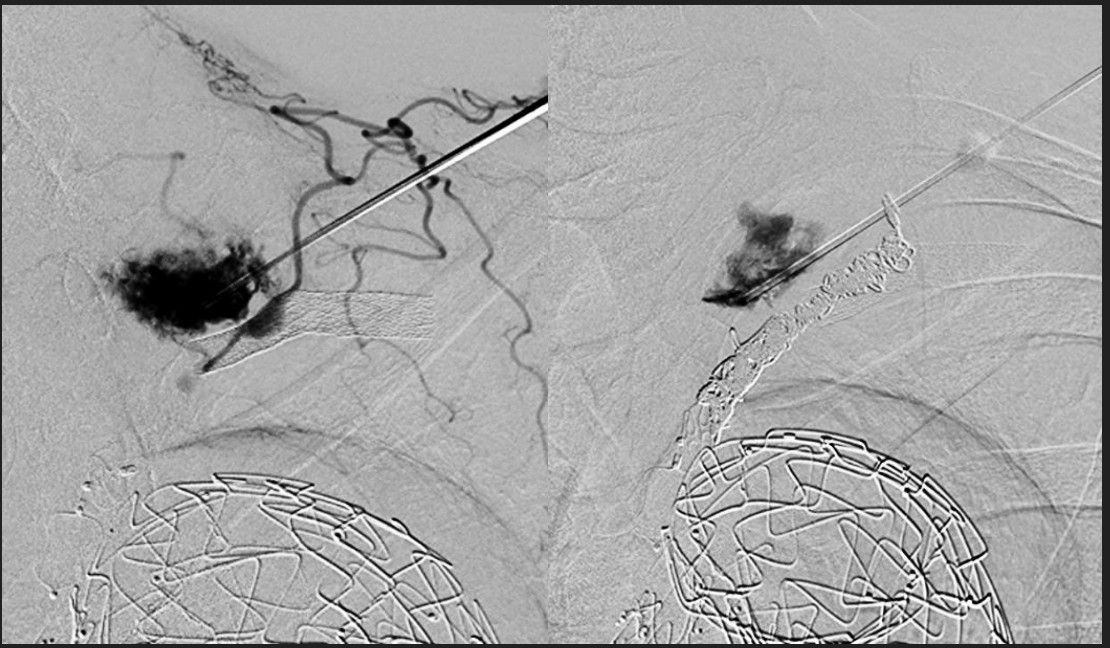


Interventional management

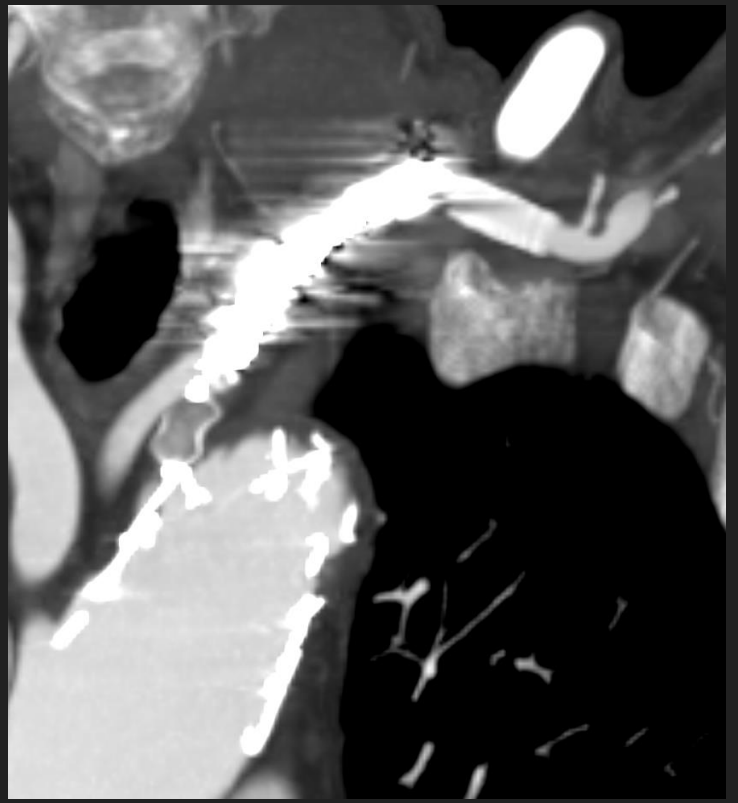
- Under ultrasound guidance, the left dorsal scapular artery was accessed percutaneously (4) and through which the in and outflow around the PsA was under control
- Coiling of the left subclavian to proximal dorsal scapular arteries across the PsA neck was achieved (5)
- No refill of the PsA on follow-up



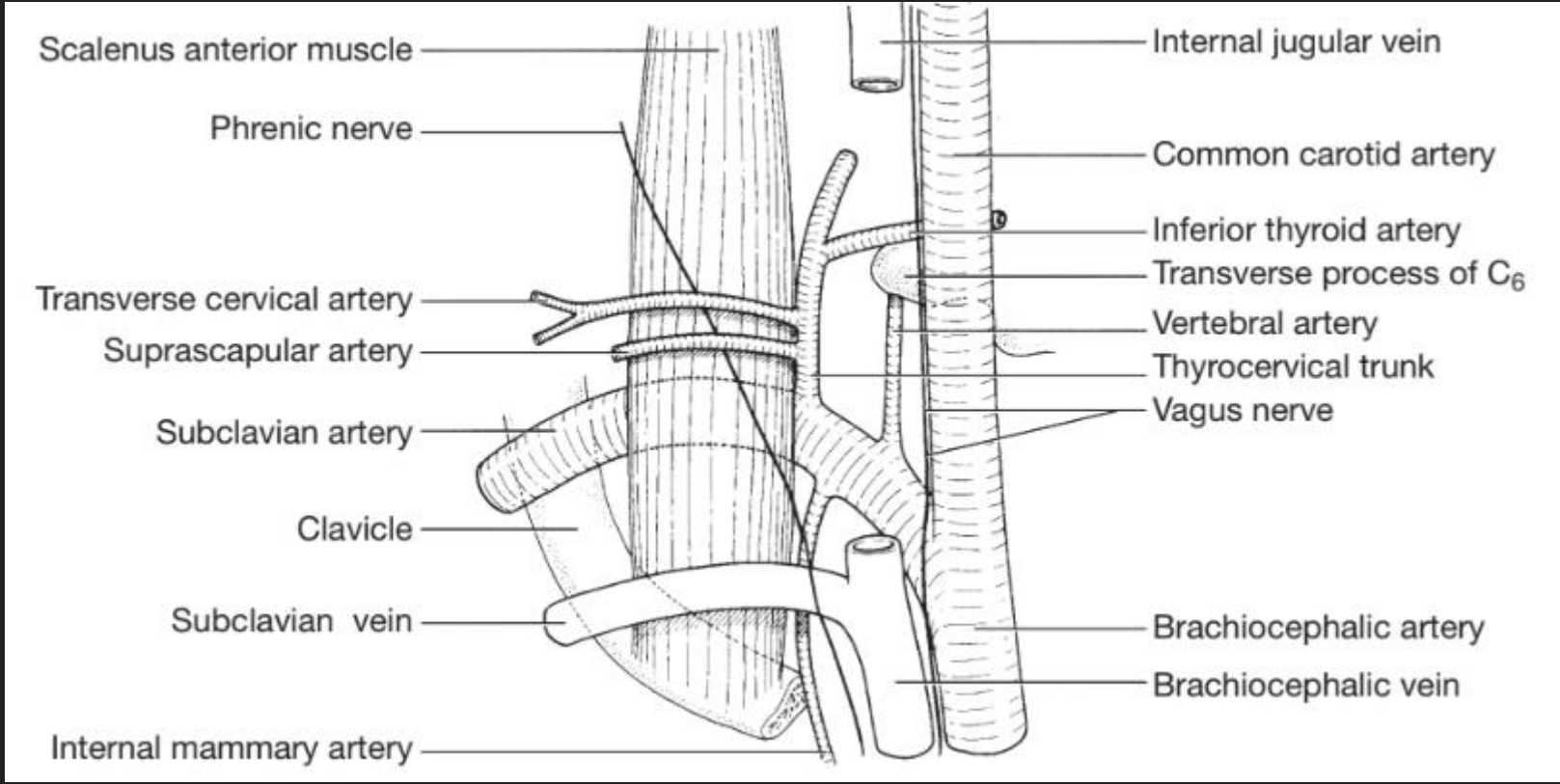
Injection of the pseudoaneurysm shows no filling of the feeding vessels post coiling



Follow-up in 10 weeks show no refill of the pseudoaneurysm



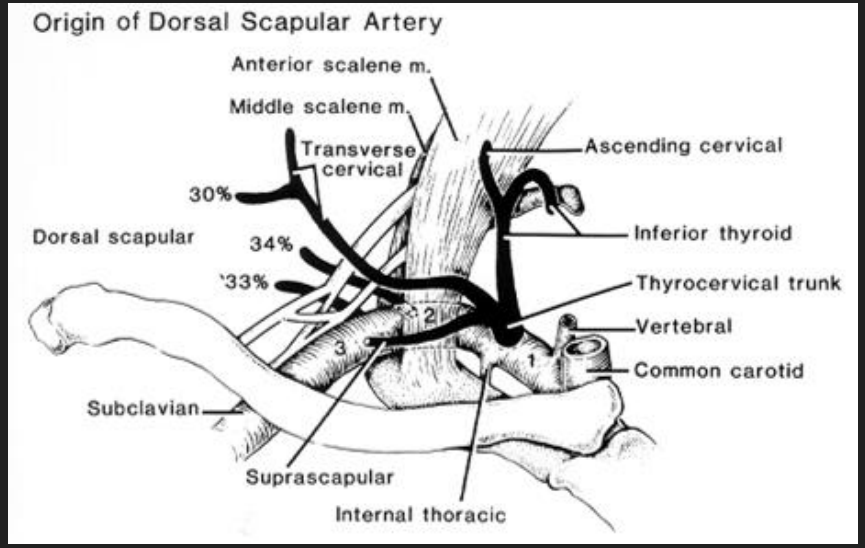
Discussion



Ryan - Anatomy for diagnostic imaging, 3rd edition

Discussion

- Dorsal scapular artery
  - 30% thyrocervical trunk (TCT)
  - 70% 3rd or 2nd parts of the subclavian artery
  - Contributes to the scapular arterial anastomosis
  - Passes through the brachial plexus
    - 40% arise from the SCA and pass between the upper and middle BP trunks
    - 23% arise from the SCA and pass between the middle and lower BP trunks
    - 23% arise from the TCT and pass superior to the BP.\



Verenna, Anne-Marie A., et al. "Dorsal scapular artery variations and relationship to the brachial plexus, and a related thoracic outlet syndrome case." *Journal of brachial plexus and peripheral nerve injury* 11.01 (2016): e21-e28.

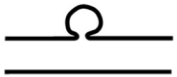
https://www.anatomyatlases.org/AnatomicVariants/Cardiovascular/Images0100/0121.shtml

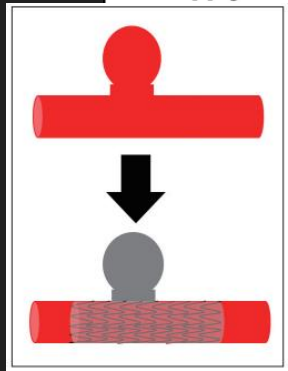
Subclavian artery pseudoaneurysm

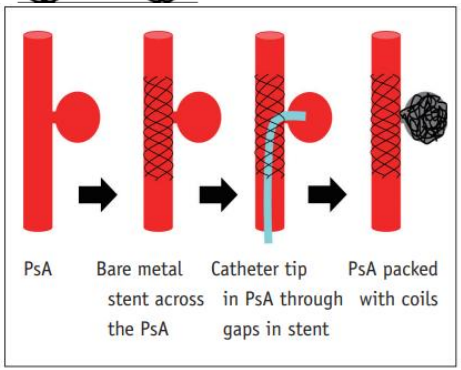
- Most commonly iatrogenic (secondary to intervention)
  - Blunt and penetrating injuries are less common
- Treatment approach
  - Endovascular, percutaneous or surgical
    - Dependant on the location and characteristics (shape, neck, collateral flow)

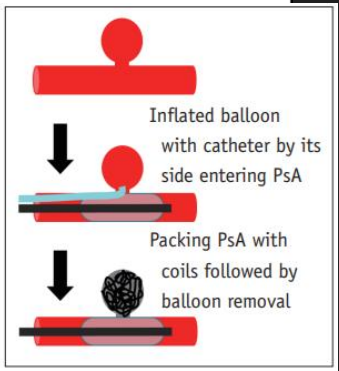
IR techniques

- US-guided compression
- Coils, thrombin, glue, stent graft exclusion
- Sac packing
- Sandwich technique
  - "front door, back door and side windows”
- Stent assisted coiling and balloon remodelling technique

FEATURES		MANAGEMENT
Superficial Artery		Management by ultrasound compression of pseudoaneurysm neck or pseudoaneurysm itself. Direct Percutaneous Management (see below)
Endoluminally Inaccessible		Direct Percutaneous Management: • Direct Coil Embolization • Direct Thrombin Injection • Direct Glue Injection
Endoluminally Accessible (Inexpendable Donor Artery)		
Narrow Neck		Embolization of Pseudoaneurysm Itself.
Wide Neck		Embolization with Stent or Balloon Remodeling. Stent Graft Placement. Embolization with Balloon Remodeling (if infected).
Endoluminally Accessible (Expendable Donor Artery)		
No Collateral Supply		Proximal Embolization of Donor Artery.
Collateral Supply		Proximal and Distal Embolization of Donor Artery.







Saad, Nael EA, et al. "Pseudoaneurysms and the role of minimally invasive techniques in their management." *Radiographics* 25.suppl_1 (2005): S173-S189.

Madhusudhan, Kumble Seetharama, et al. "Interventional radiology in the management of visceral artery pseudoaneurysms: a review of techniques and embolic materials." *Korean journal of radiology* 17.3 (2016): 351-363.

Complications

- Puncture site
  - Bleeding, arterial thrombosis, arteriovenous fistula and nerve damage
- Intervention site
  - Pseudoaneurysm, arterial dissection, non-target embolization, distal migration of coil
- Post-embolization complications
  - Secondary infection and post-embolization syndrome
  - Incomplete exclusion or collateral supply requiring repeat embolization