Central Vein Stenosis
The Surgeon

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Disclosure

Speaker name:

.....Pierre Bourquelot.....

☐ I have the following potential conflicts of interest to report:

☐ Consulting

☐ Employment in industry

☐ Shareholder in a healthcare company

☐ Owner of a healthcare company

☐ Other(s)

X I do not have any potential conflict of interest

Thoracic Central Veins Stenosis

- It is a daily major concern for angioaccess surgeons who are looking for creation of long-term patency AVF and patient survival
- Most of stenoses are related to central vein catheters (CVC), some are not
- They may also be related to external compression aggravated by high and turbulent flow
- Percutaneous is not as successful as it is for arm vein stenoses

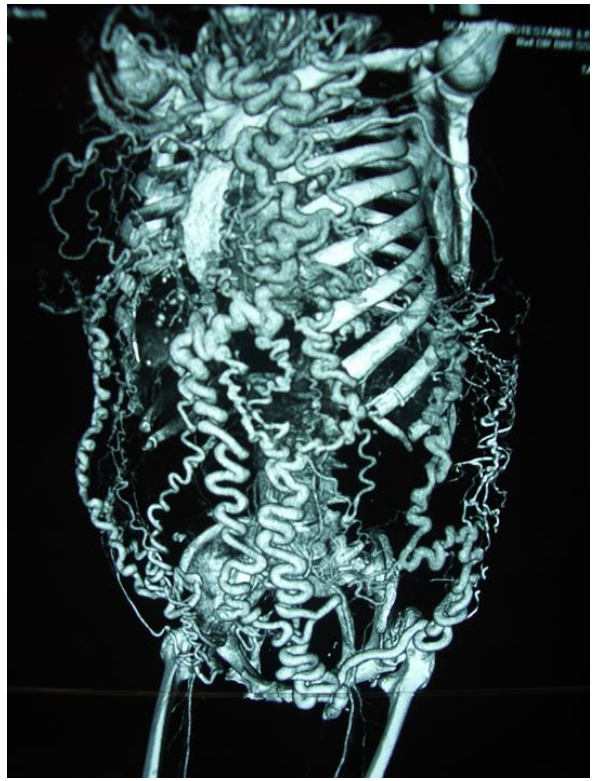
Central Thoracic Vein & AVF

1. May be a disaster
2. PTFE by-pass to the Internal Jugular Vein
3. Costo Clavicular decompression

A frequent disaster…in children

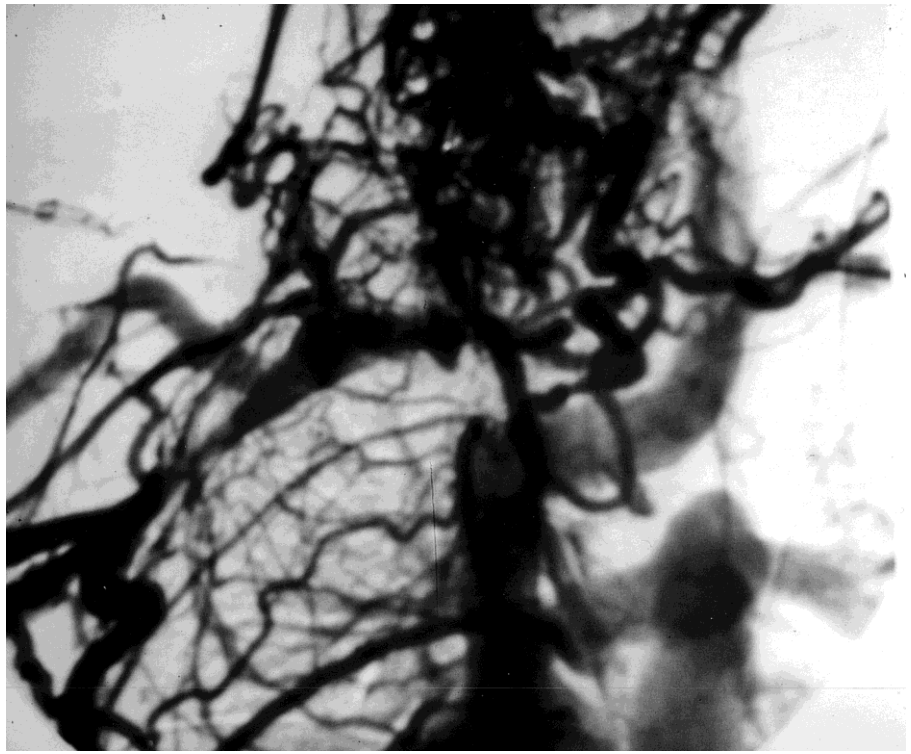
Infant - Spina bifida

Superior Vena Cava Thrombosis



9 y.o. child - B.C. AVF

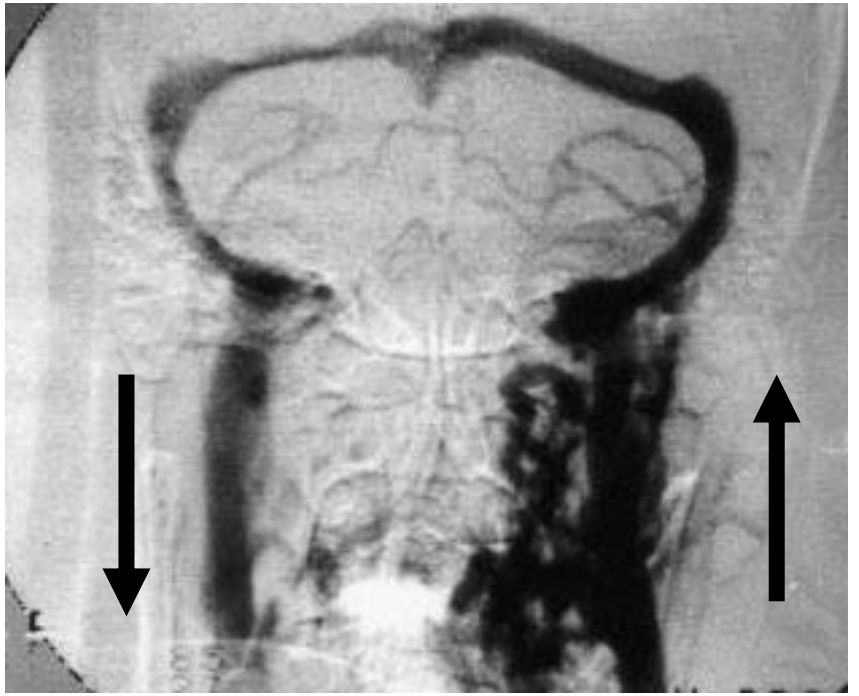
R.Innominate V. Occluded– AVF ligation



…and adults …

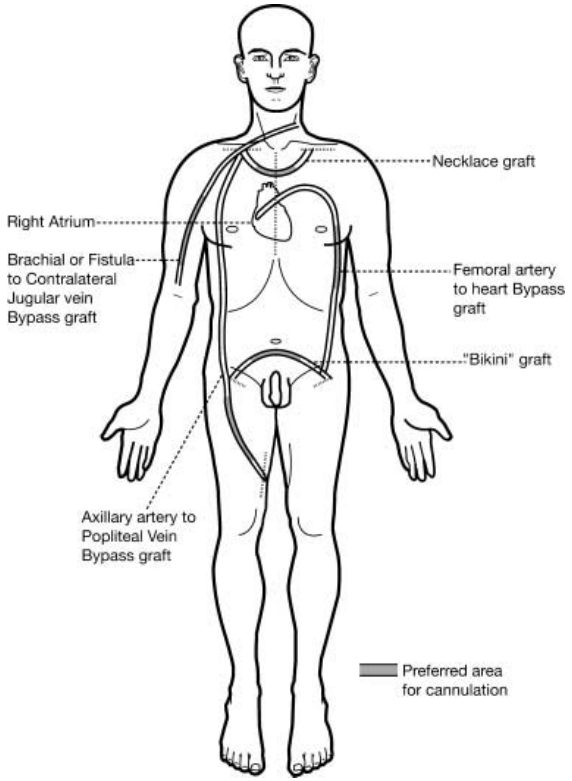
Moon Face

IJV retrograde flow – Intracranial hypertension - ↓ visual acuity

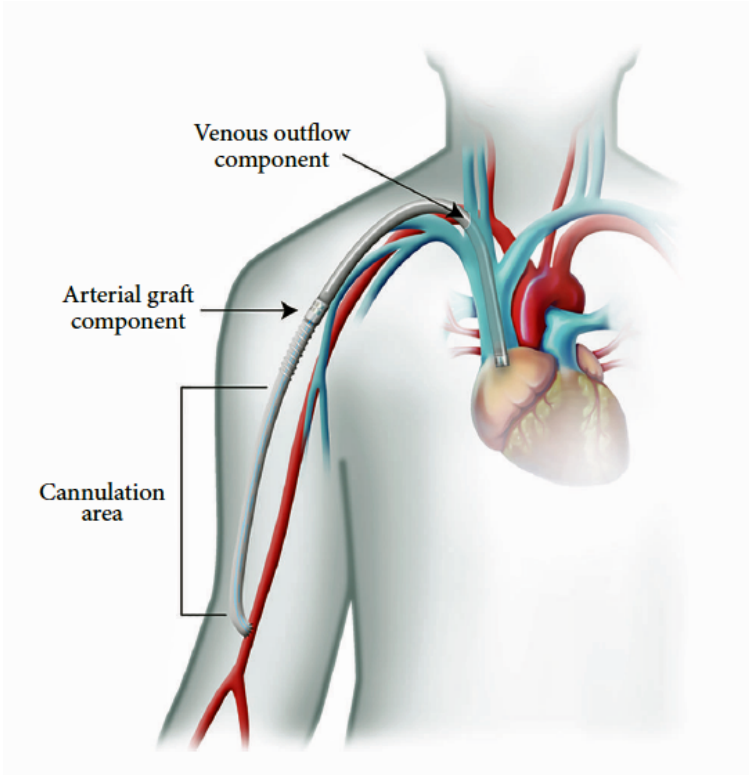


Exotic angioaccesses

E. Chemla Ann Vasc Surg. 2005



HERO JR. Wallace JVS. 2013



Central Thoracic Vein & AVF

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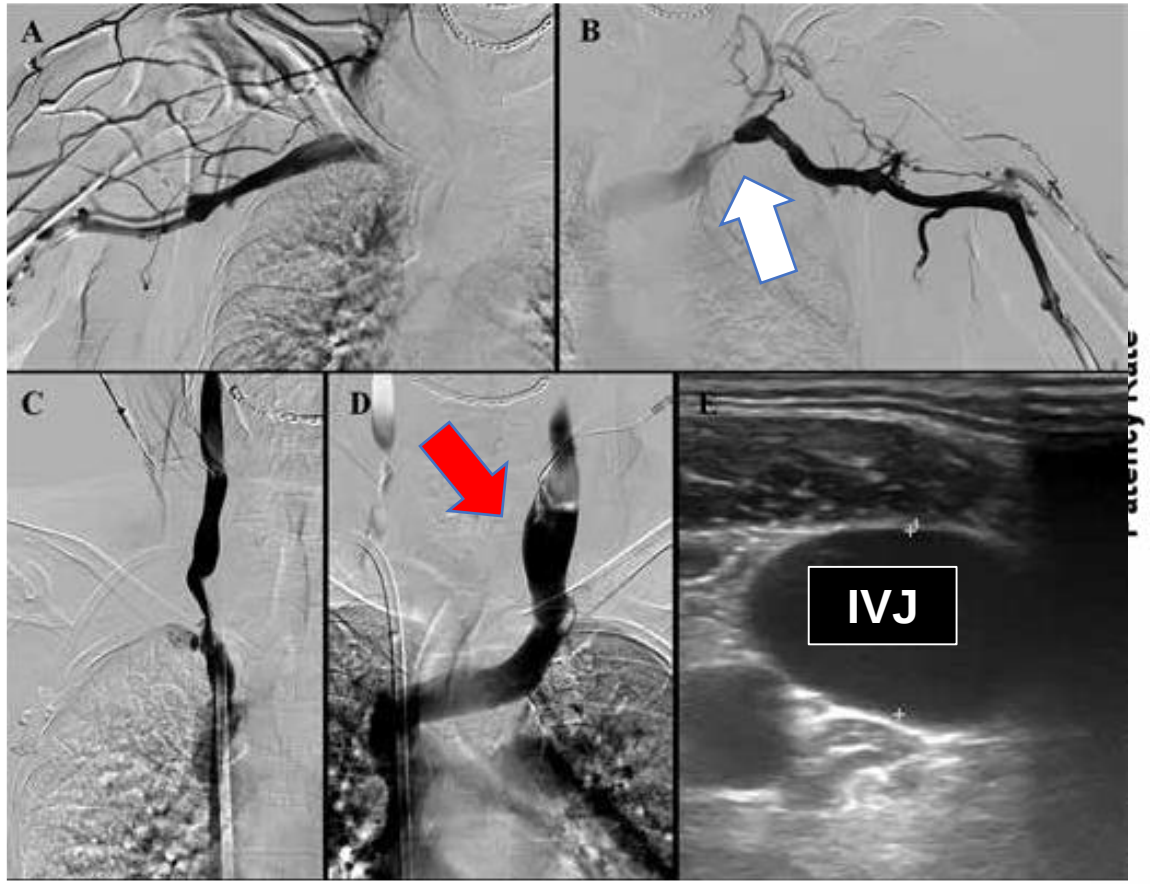
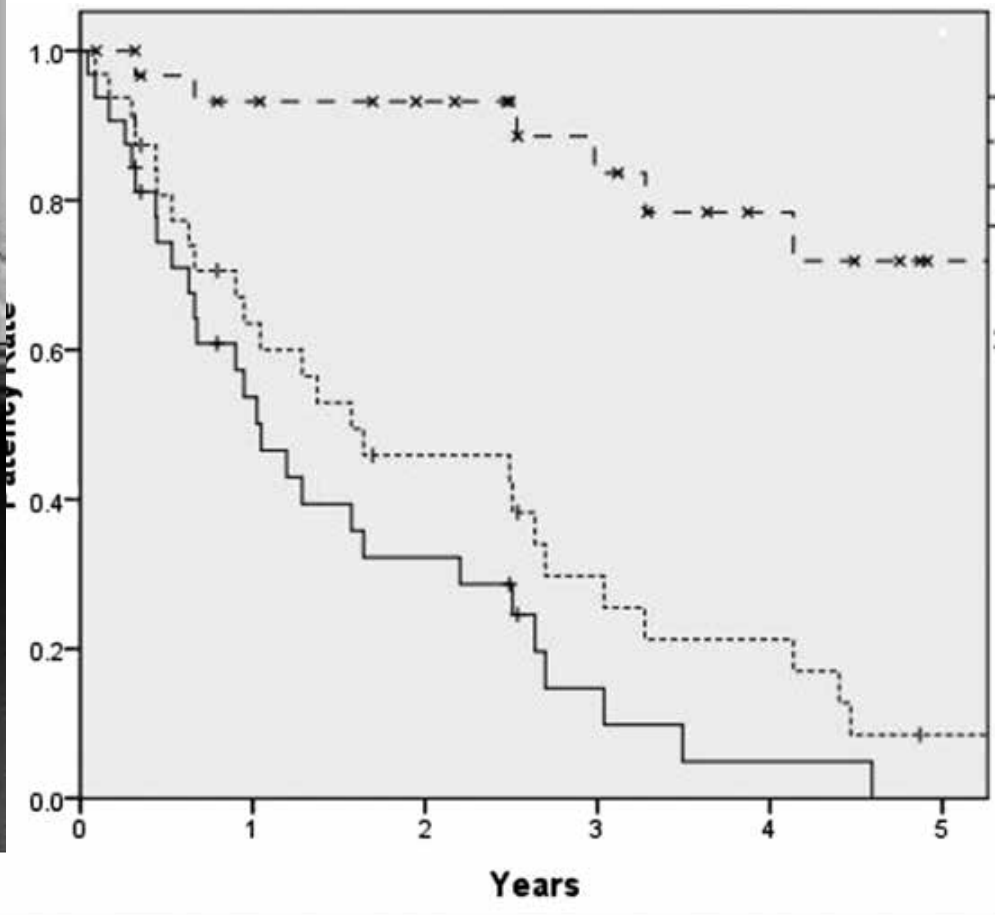
Brachial to jugular vein PTFE by-pass

Kim, J Vasc Access 2015

- In patients with CVS, the ipsilateral IJV may be used for outflow
- Preop. duplex and venography of IJV and innominate vein
- 32 patients, from 2001 to 2011, retrospective monocentric study
- Mean age of pts. 57.6 ± 12.3 years, mean follow-up 43.5 ± 27.4 mos.
- Primary patency was 54%, 32%, 15% at 1, 2, 3 years, respectively.
- Second. patency was 93%, 93%, 89% at 1, 2, 3 years, respectively.
- Steal 1, seroma 2, hematoma 1, swollen arm 3, infection 2, pseudo aneurysm 1, bleeding from puncture site 1,stenosis 8, thrombosis 13

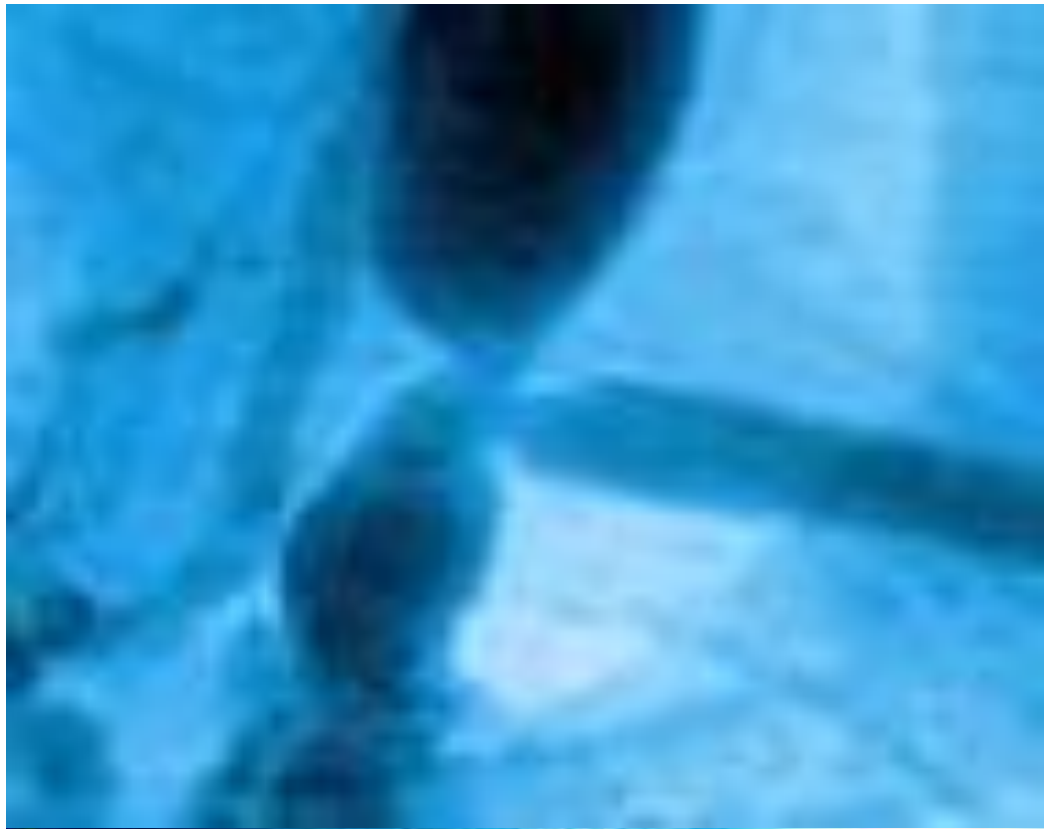
Brachial Jugular AV Graft





Subclavian Vein By-Pass to contralateral IJV

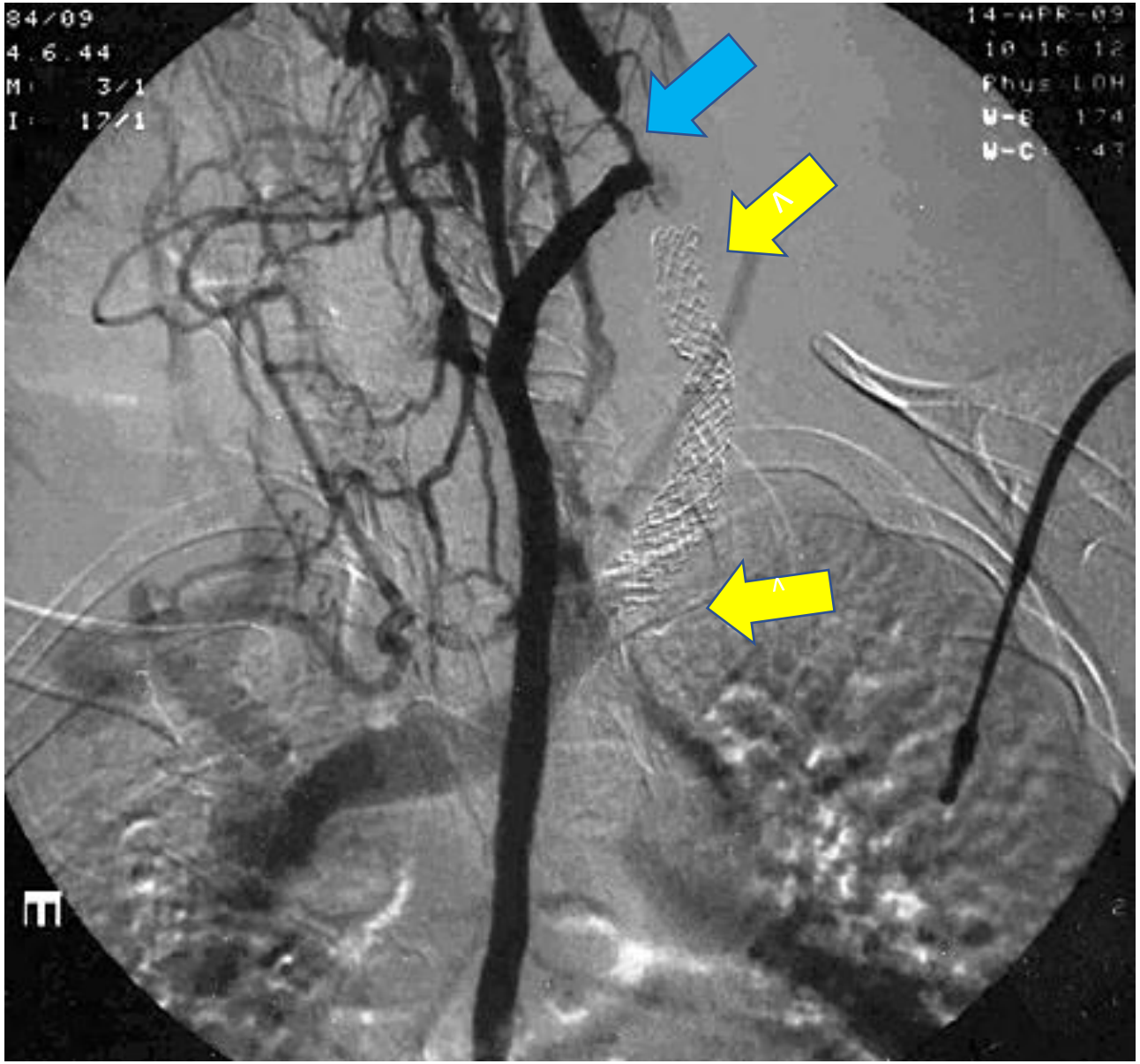
Jugular Anastomosis Stenosis



PTFE to Lateral Jugular Vein

Venous anastomosis stenosis:

- above : +++
- below : thrombosed stent in lower LJV



PTFE to Lateral Jugular Vein

Venous anastomosis stenosis:

- above : +++
- below : thrombosed

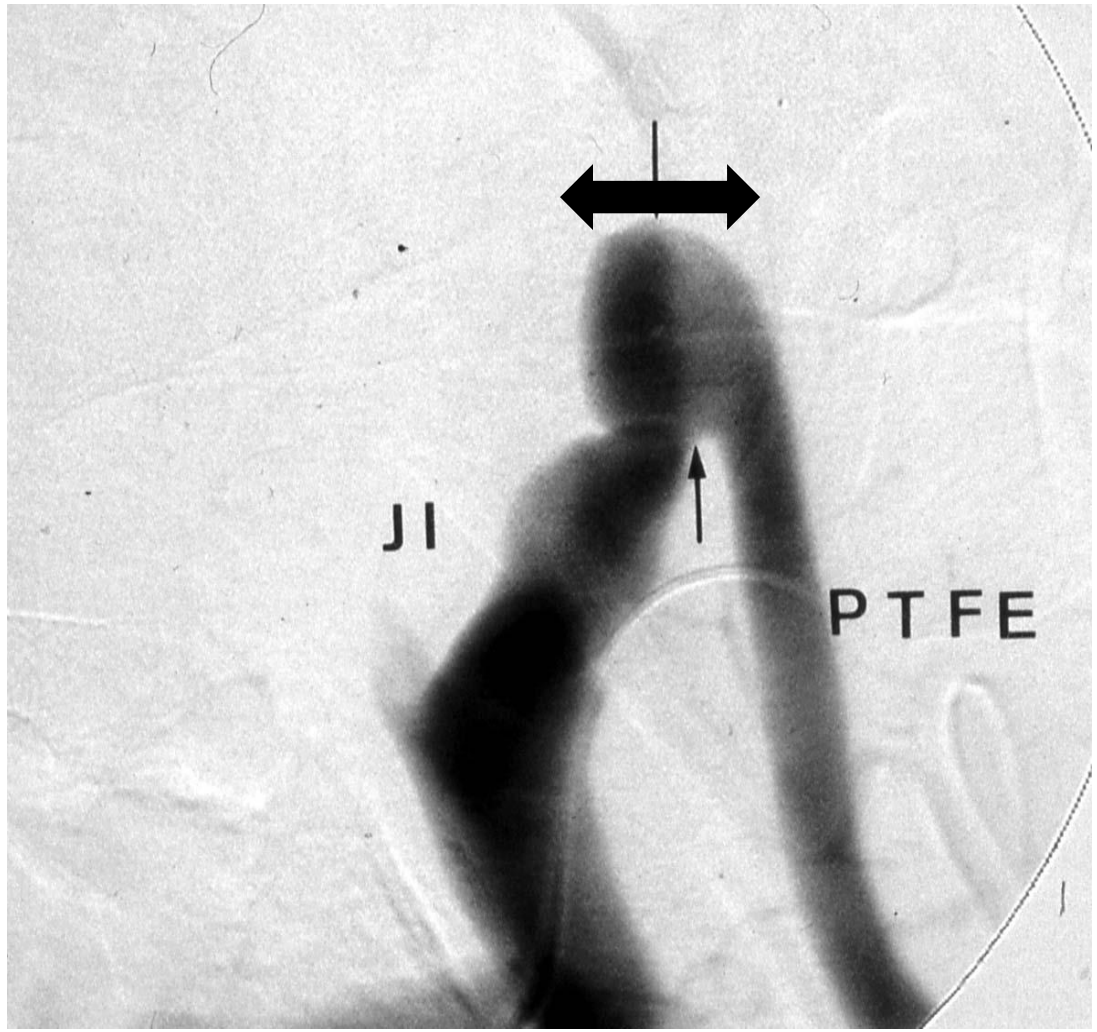
stent in lower LJV

Subclavian Vein By-Pass to the Internal Jugular Vein

PTFE thin-wall 6mm

IJV ligation above the anastomosis to prevent retrograde flow

Early anastomosis stenosis is possibly related to the thinness of the IVJ wall



Central Thoracic Vein & AVF

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Subclavian Vein Effort Thrombosis (Molina 2009)

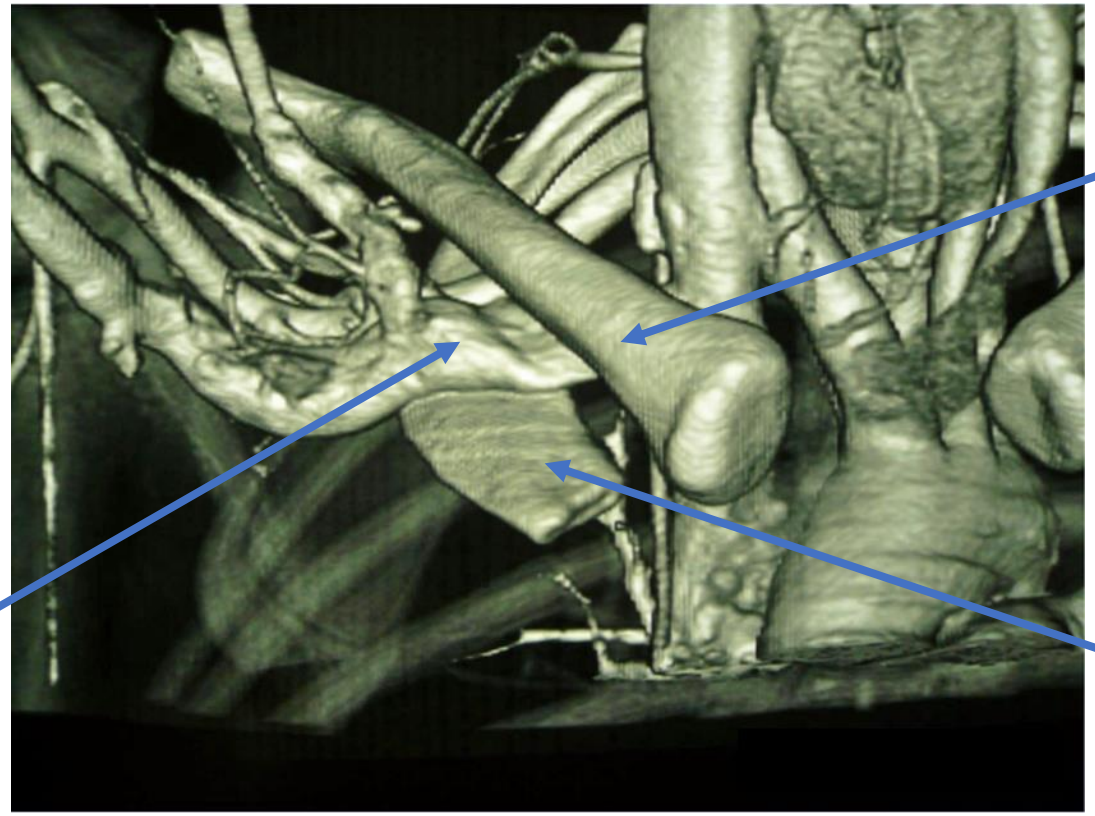
- Vein thrombosis is a complication of the Thoracic Outlet Syndrome (TOS) observed in young patients with arms exertional maneuvers
- Symptoms : Subclavian Vein Acute pain and arm swelling
- Treatment :
  1. Urgent : Catheter directed thrombolytic therapy is mandatory
  2. Surgical procedure following immediately :
     - **Decompression** of the thoracic inlet : first rib, the subclavius and scalene muscle tendon
     - **Reestablishment of the normal subclavian vein caliber** (saphenous patch)
- Results: all 126 pts had a patent vein at a follow-up of 6 months to 25 years (66 of them were beyond 5 years). All 126 resumed normal activities.

HD Thoracic Outlet Syndrome

PTA with or without stenting is the preferred initial treatment for a central venous stenosis. According to K. Illig (2011) it is, indeed, the primary option for treating areas of stenosis surrounded by soft tissue, but **stenoses occurring at the costo clavicular junction** are caused by **bony compression** and, therefore, should be considered **dialysis-associated venous thoracic outlet syndrome** (TOS)

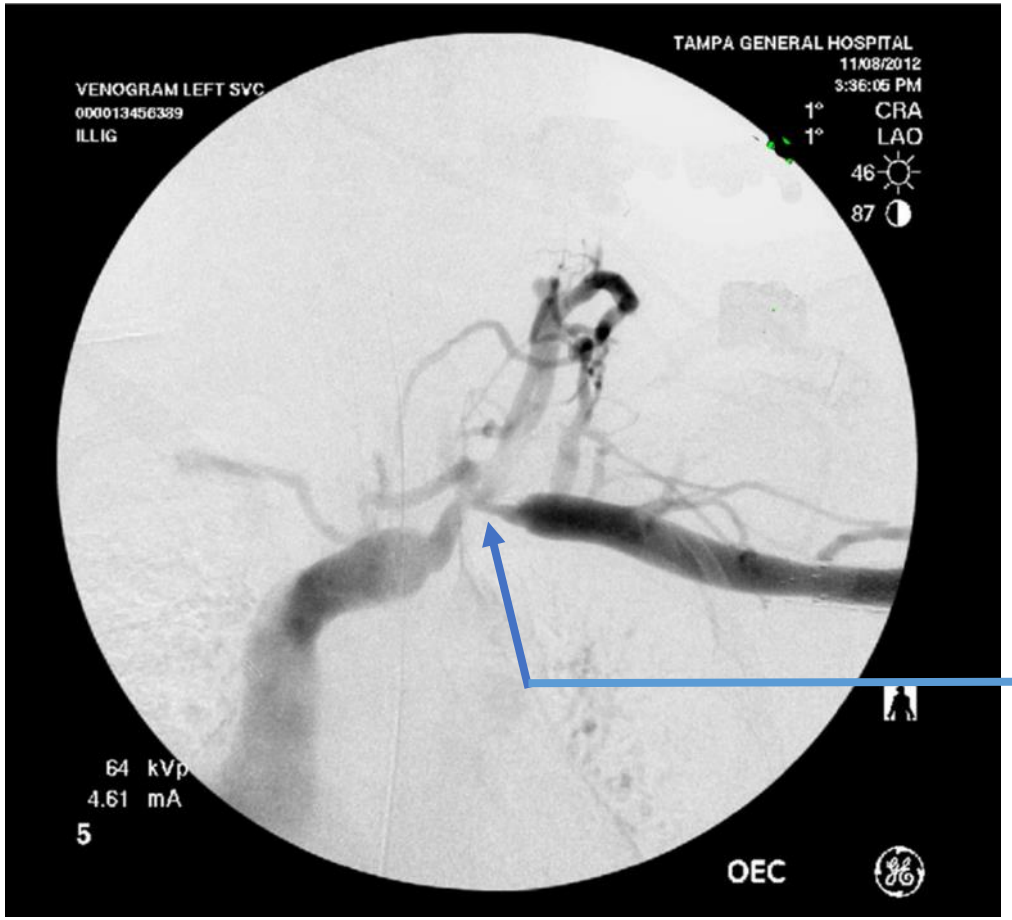
The treatment of venous TOS, based on decades of experience, generally requires bony decompression frequently associated or followed by endo-vascular procedures for long-term patency

Costo Clavicular Junction CT Scan



Courtesy W Foster, K Illig Ann Vasc Surg 2015

Dialysis-associated venous thoracic outlet syndrome (TOS)



Subclavian Vein at costo clavicular junction

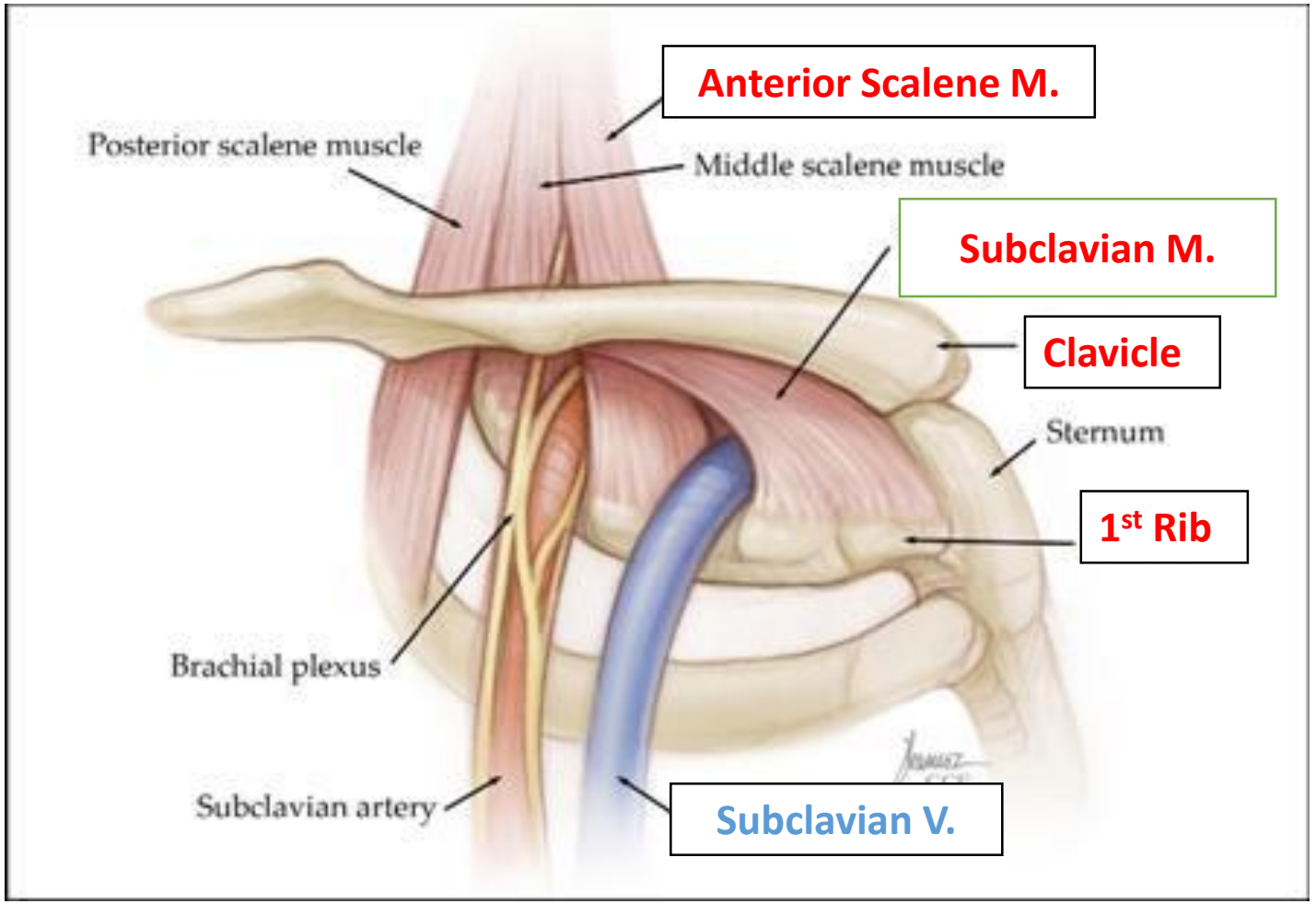
Patients

- Between July 2012 and December 2013, 24 patients with threatened AV access and subclavian vein stenosis (n=18) or occlusion (n=6) were operated on
- Symptoms
  - 15 patients, sent for AVF ligation, had dysfunctional access with excessive decannulation bleeding, venous hypertension, or pain
  - 10 had significant arm and/or head swelling, at times enough to interfere with access
  - NB: 7 off had stents in place through the Costo Clavicular Junction (CCJ)
- 13 patients had undergone up to 8 prior interventions (median 3 per patient)
- Ipsilateral AV accesses: 2 patients had grafts, 20 had AVF, and 2 patients had AVF created at the time of the procedure. One patient had ipsilateral pacemaker/defibrillator leads through a highly stenotic CCJ

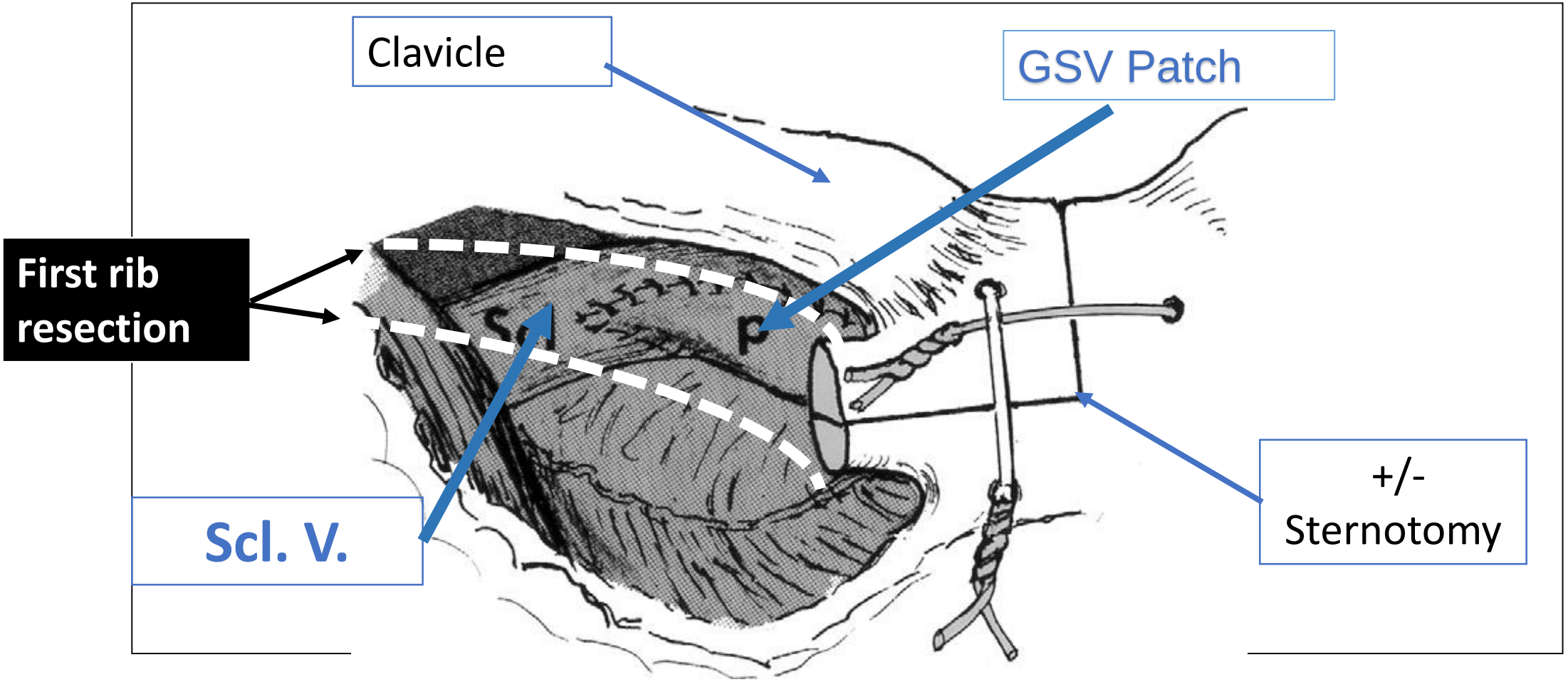
Procedures

- Decompression of the subclavian vein at the Costo Clavicular Jct.
  - 21 patient underwent half anterFirst Rib Resection
  - 3 patients underwent medial Claviculectomy (2 reconstructions, 1 stent)
- Associated procedures
  - AVF Revision
    - 7 patients underwent revision (aneurysm repair, correction of stenoses, superficialization) of their existing AV fistulae.
    - 2 pts had acute thrombosis declotting
    - 2 pts had subclavian vein bypass
  - AVF Creation
    - 2 patients

Thoracic Outlet Anatomy



Subclavicular 1st Rib Resection

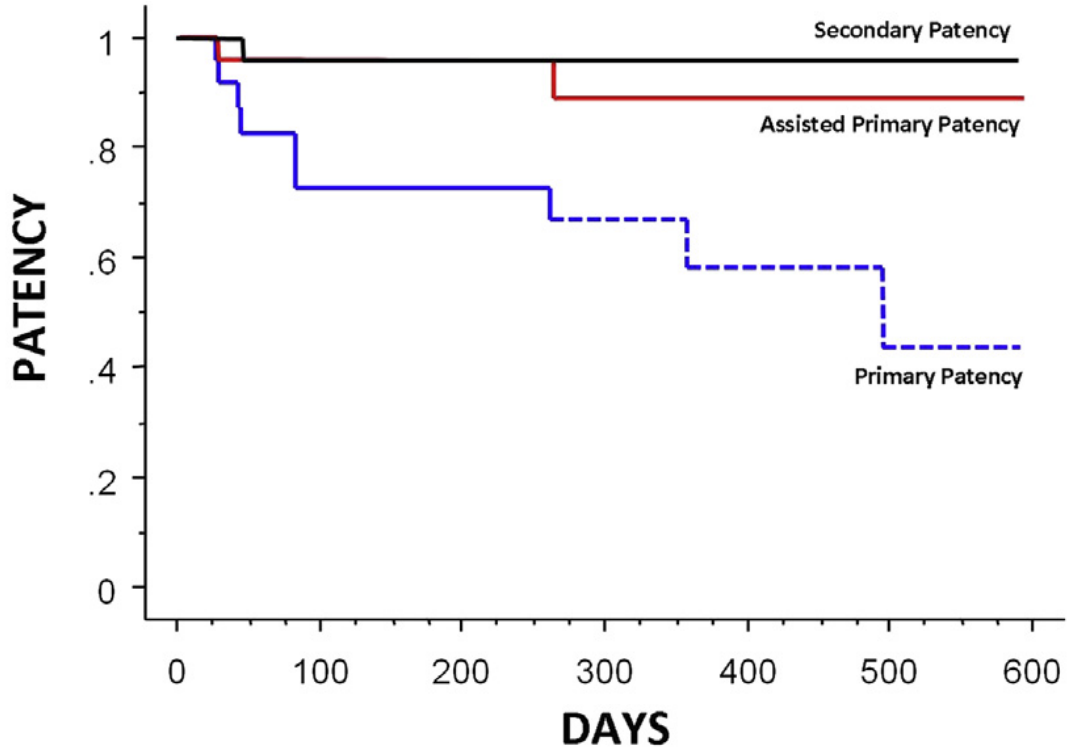


Early Results

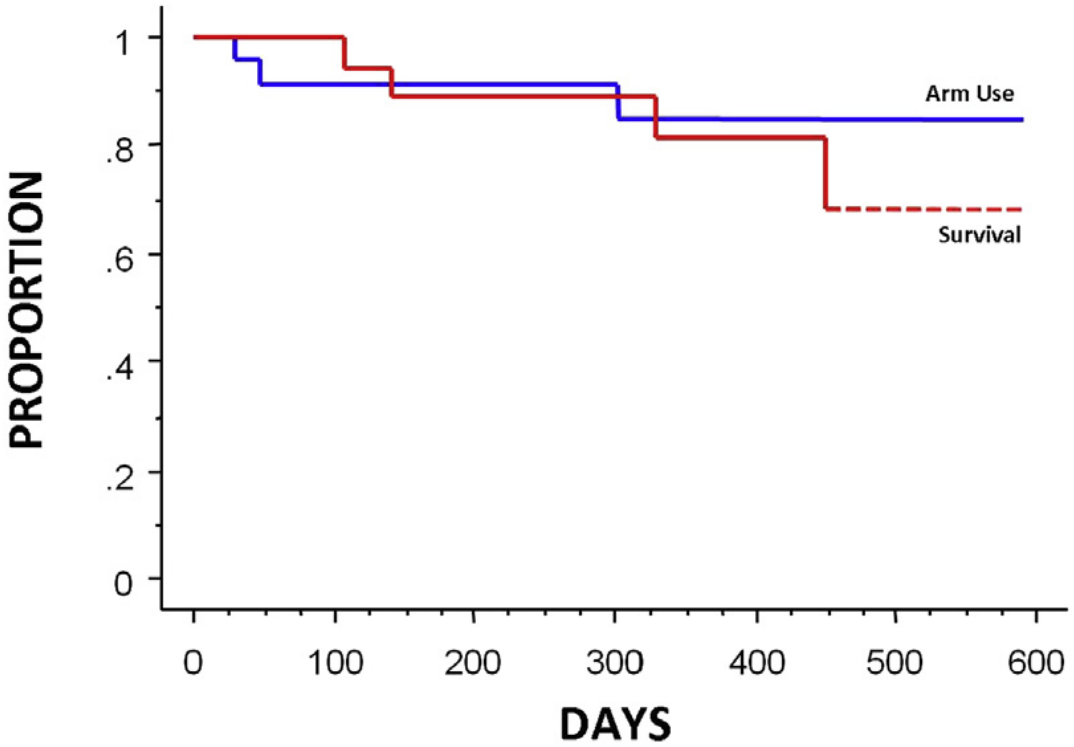
- Technical success rates: 96% (23/24) for both AVF patency and costo clavicular junction decompression
  - One failure: AVF occlusion on the first postoperative day.
- Complications:
  - One acute hemothorax required thoracoscopic drainage: the patient had on-table thrombolysis at the time of surgery
  - One hematoma: drainage, wound infection, ultimate A.Access loss: the patient was immunocompromised
- No deaths within 30 days.

Patency rates

AVF



Arm use & Patient survival



Dotted lines indicate a standard error of >10.

Conclusion

- Central thoracic vein stenosis is a major disaster for the patient
- When the stenoses becomes symptomatic :
  - many AVF have to be ligated and the ipsilateral upper limb is lost for future AVF
  - few reported solutions have durable success, percutaneous procedures and jugular vein by-pass included
- Subclavian vein stenosis at the costo-clavicular junction may benefit from surgical treatment of the Thoracic Outlet Syndrome. Diagnostic and treatment are straightforward for TOS oriented surgeons

Thank you for your attention

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