Treating Superior Vena Cava Syndrome

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THE PERIPHERAL EVENT OF THE YEAR
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The Superior Vena Cava

- Formed by merger of left/right brachiocephalic veins + azygous
- Venous blood from head/neck/upper extremities
- 6 to 8 cm in length
- 1.5 to 2 cm wide

Abner, A. Chest, 1993
• SVC surrounded by rigid structures (ie mediastinum, sternum, right mainstem bronchus)
• Thin walled and easily compressible secondary to low pressure
• Prone to obstruction relative to its “neighbors”
• As obstruction develops, venous collaterals form
• Alternate pathways for venous return to the RA
• Severity of sx depends on the time course of obstruction
SVC Syndrome

• Constellation of signs and symptoms caused by obstruction of blood flow in the superior vena cava.
• Secondary to external compression, invasion, constriction or thrombosis of the SVC
• Can be partial or complete obstruction
SCVS (cont)

- Leads to increased venous pressure and results in edema of the head, neck, arms, and upper chest
- Dilated veins on the chest wall
- Pleural/pericardial effusions
- Cerebral edema/Increased IC pressure
Etiology - - Malignancy

- Account for 80-97% of SVCS cases
- Lung Cancer 75-80%
- Lymphoma 10-15%
- Others 5%
  - Metastatic
  - Thymoma
  - Germ cell tumor

Patients

SVC syndrome A 65-year-old male smoker presented with non-productive cough, fatigue, worsening dyspnea on exertion, hoarseness, and a six-month history of progressively enlarging veins over the anterior chest wall. Chest imaging study showed a right-sided superior sulcus (Pancoast) tumor that was compressing the superior vena cava with a serpentine-shaped posterior extension impinging upon the sympathetic chain, phrenic nerve (impairing diaphragmatic motility contributing to the dyspnea) and recurrent laryngeal nerve. Biopsy confirmed a bronchogenic adenocarcinoma. Reproduced with permission from: Parekh Vaibhav, MD.
67 year old female patient, chronic smoker. Hx of aggressive breast cancer in the past, received CT/Surgery and RT.

1 year Hx of progressively worsening swelling of face, neck and B/L upper extremities.

Also C/O severe intractable headaches, blurred vision and worsening SOB.

CT angio revealed occlusion of the SVC, both innominate veins and Right subclavian vein
SVC / Rt Subclavian V & Lt Innominate V Angio

Rt Subclavian V & Rt Innominate V total occlusion

Lt Innominate V Total occlusion

Total occlusion of SVC

Anatomy of the SVC and Central Venous Occlusion delineated- through Rt Axillary v Lt Subclavian V & Rt Femoral V approach
Attempts to cross the Rt Subcalvian V & Innominate V occlusion into SVC antegrade from Rt axillary V - failed

Attempts to cross the lesion with Straight Terumo GW/cook curved catheter failed. It ended in dissection towards the proximal Innominate V and SVC.
Attempts to cross the SVC occlusion into Lt Innominate V - successful

SVC & Lt Innom V lesion Crossed with Terumo GW From Rt Fem Vein approach

Guide wire exteriorised from Lt Subclavian V by snaring
Lesion dottered with cook sheath / dilator

True lumen confirmed

PTA performed 16x40 mm Atlas
Established flow from L Innominate Vein to SVC

Repeat attempt to cross the lesion from Right Subclavian vein failed. small perforation
Rt Fem V approach

Attempted for sharp recanalisation with Brockenborough needle

Initial attempt failed
2nd attempt with BB needle

Used the guide wire in false lumen as the guide for sharp recanalisation. LAO view angio facilitated identifying lower end of occlusion for entry with BB needle.
BB needle engaged into the occlusion

BB needle manoeuvred through the occlusion

Check angio Through mullin Sheath encouraging

Terumo G Wire passed
Wire position appeared good

Attempts to snare GW failed

Angio confirmed the subintimal position of the Guide wire
CART technique

Two 0.014 coronary G W
Two 3 mm coronary
Balloons in different Subintimal planes

Both balloons dilated simultaneously in different subintimal planes to break the flaps to facilitate communication between the two subintimal planes
Check angio post dual Balloon PTA shows communication to SVC from Rt subclavian V

Guide wire negotiated from Rt subclavian Vein to SVC

Guide wire snared & Exteriorised from Rt Femoral Vein
0.014 Guide wire was exchanged for 0.035 extra support G W

Successful PTA performed 10 x 40 mm balloon
Post PTA
Flow established from Rt S/C V to SVC

Left Fem V accessed G W across Rt Innom/Subclavian V extreiorised from L Fem V. Preparation for Wall Stent deployment needs 12 F sheath

Additional PTA performed 14 x 40 mm Atlas
Approach to intervention needed 4 accesses

Bilateral Femoral Vein access

Left Subclavian Vein access

Rt Axillary Vein access

Wall stents delivered through 10 / 12 F sheaths

Needed bilateral Femoral Vein access to Facilitate Wall stent deployment
Post PTA – Both Central veins to SVC recanalised

2 Wall Stents from both Femoral Veins positioned

Wall Stents deployed
2 wall stents – 18x80 and 22x60

Stents post dilated

Final result
3 weeks Later
Conclusions

• Chronic SVC recanalization – very intense and time consuming (patience and persistence….)
• Know the anatomy well, be prepared to tackle the life threatening complications
• Frequent need for sharp recanalization and need for stents
• Sub-acute SVC obstructions are relatively easier to reconstruct – can be used a bridge until the RT/CT kicks in.
• Short term/Intermediate patency is good…. long term patency rates unknown.
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