Advanced Central Venous Reconstruction

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Disclosure

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I have the following potential conflicts of interest to report:

☑ Consulting: SIRtex
☐ Employment in industry
☐ Stockholder of a healthcare company
☐ Owner of a healthcare company
☐ Other(s)

☐ I do not have any potential conflict of interest
Outline

• Review of relevant anatomy

• Tools of CVO recan

• Avoiding complications
Patient evaluation for CVO recanalization

Things to consider
- Symptoms
- Need for access
- Transplant candidacy
- Comorbidities and functional capacity
- Extent and chronicity of obstruction
- Presence of AVF
- Alternative options
  - Other side AVF
  - Femoral vs other venous access
  - Surgery
  - PD?

Goals of revascularization
- Treat TCVO symptoms?
  - Restoration of venous inflow and outflow
  - Symptom resolution and maintenance of patency
- Establish hemodialysis access?
  - Access into the RA
Relevant anatomy
Brachiocephalic vein /Subclavian artery relation
SVC/Azygos anatomy
Pericardial Sac
Azygos

Infra Azygos
SVC

Suora Azygos
SVC

BCV

Infra Azygos
SVC
SVC occlusion

Supra-Azygos

Infra-Azygos
Right atrial appendage

- AO (Aorta)
- RVOT (Right Ventricular Outflow Tract)
- LA (Left Atrium)
Right atrial appendage
Tools

- Rosch-Uchida/coaxial needle
  5. Murphy T et al. JVIR. 1999;10:1131
  7. Goo et al. AJR. 2010;194:1352–6

- Trans septal needle
  1. Arabi et al. CVIR. 2016. 39:927–934

- Outback:
  2. Brountzos et al. CVIR. 2011;34:207–11.

- RF wire

- Surfacer: Inside-Out Approach
Wire catheter recan

• 1\textsuperscript{st} line
• Standard access points
  – IJV
  – Arm
  – Femoral
• Through TDC tunnel

• Benefits:
  – Intra luminal
  – Less risk of perforation and rupture

• Limitations:
  – Chronic occlusion
  – Long segments
  – Collateral cannulation
Get as close as possible to occlusion

- 80 y old male
- ESRD, HD
- Catheter removed 2016
- Planned for fistula
- Bilateral venograms
Get as close as possible to occlusion
Recan through the HD cath tunnel

61 y old male
SVC syndrome, perm catheter removed ??
SVC angioplasty through perm cath tunnel
Back end of wire

• Benefits:
  – Lower profile than needles
  – Short segments

• Limitations:
  – Long segments
  – Extraluminal
  – Higher risk of perforation and rupture
  – Poor steerability
V18 or hydrophilic

• 37 y old female
• Infected left AVF
• On transplant list
• Needed a perm cath
Chiba needle

• 22 G 15 cm or 20 cm
• 11 cm Braided sheath from IJV (to avoid sheath perforation by the needle)
• Get as close as possible to occlusion
• Make a gentle curve on the needle to improve steerability.
• Align with target in SVC
• Advance needle under multiple projections

• Benefits:
  – Lower profile than other needles
  – Useful for short segments

• Limitations:
  – Long segments
  – Likely Extraluminal (transmediastinal)
  – Higher risk of perforation and rupture
  – Poor steerability
• 18 year-old female with SLE on chronic medication infusion through a Port-A-Cath since 5 years presented with dysfunctional catheter due to SVC occlusion.
Outback re-entry device

Benefits:
- Less traumatic
- Low profile (6 Fr)
- Directional puncture

Limitations:
- Short distance
- Poor penetration of tough fibrous occlusions
- Sheering of wires
- Extraluminal (potential perforation)

2. Brountzos et al. CVIR. 2011;34:207–11
Trans septal needle

- The transseptal needle (BRK-1, 71 cm; St Jude Medical, MN, USA)
- 18 G, accepts 0.018” wire
- Angled 8.5Fr sheath.
- 45 degree curve provides steerability

- Technical success: ~90%
- Complications: 5-10%

1. Arabi et al. CVIR. 2016. 39:927–934
A 15 year-old male with infra azygos SVC occlusion due to chronic dialysis.
TIPS needle recan

Failed Outback
Balloon-stent chain technique
Complications

Hemopericardium/tamponade  

Hemothorax
Technical tips to avoid complications

1. Properly align the needle with the target snare/balloon/catheter using multiple projections to minimize number of passes.

2. Confirm proper anatomic wire course prior to performing any balloon dilatation. (Cone-Beam CT is preferred).

3. Insert a 3-5 mm balloon from one access and a covered-stent over the through-and-through wire from the other access to immediately deploy following pre-dilatation (balloon-stent chain technique) in order to minimize the risk of pericardial tamponade.

4. Puncture from the lower venous pressure side (against flow)
Balloon-Stent Chain technique
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