Central Venous Occlusion (CVO) Repair

A New and Unique Procedure to Treat Arm Swelling and/or Save Access

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What is Central Occlusion?

- Central Occlusion is the obstruction of a central vein by a clot or stenosis.

What Causes Stenosis?

- Irritation of the endothelial lining and subsequent cell proliferation.
- Risk factors that contribute:
  - Dialysis Catheters
  - Any Subclavian Inserted Catheter or Device
  - PICCs
  - Ports
  - Pacers, Defibrillators
  - Previous Angioplasty and Stents

Vessels Affected

- The “Capital T” shape vessels
- Subclavian Veins, Brachiocephalic Veins, and Superior Vena Cava

Vessels Affected

- The “Capital T” stenosis subsequently affects the arm and/or dialysis access on the same side, as there is no outlet for the blood flow.
Assessing for Obstruction

- **Take a relevant access history**
  - If a patient has risk factors, and arm is swollen, refer to Interventionalist (especially access arm)

- **Signs and Symptoms**
  - Arm Swelling
  - Arm or Hand Pain
  - Collateralization (Accessory Vein Development)
  - Decrease in KT/V or URR (poor quality HD)
  - Sub-optimal access

Treating CVO

- **Attempt to open obstructed area:**
  - 1. Conventional Angioplasty & Stenting
    - If 100% occluded, classical methods of threading a hydrophilic guidewire become increasingly difficult. If the lesion cannot be crossed from arm or groin with front or back end of guidewire, angioplasty and stenting cannot be performed.
  - 2. Surgical Bypass (minimal success)

- **If recanalization fails, we have historically had several unpalatable options:**
  - Surgical banding or take down of the ipsilateral dialysis access – leaving patient catheter dependent or with new access
  - Surgical reconstruction with possible rib resection/ thoracotomy
  - Instruct patient to tolerate underlying symptoms and poor dialysis

New Option – RF Wire

- A skilled MD can safely use a RF Guidewire to cross a 100% occlusion.
- After crossing, angioplasty and stenting can be performed.
Case Study

- **Presenting with complaint:**
  - 66 y.o. R hand dominant man presenting with a swollen R extremity.
  - Increasing pain during last 2 months.
  - Swelling began after AVF placed, and has never been used.

**Physical Findings**
- Palpable but pulsatile thrill, detectable through the marked edema of R arm.
- Right tunneled internal jugular TDC present for dialysis.
- NOTE – Same side TDC and AV Access***

**Procedure Started**
- 1. Fistulagram and Venogram obtained, showing stenosis in the AVF and also collateralization in shoulder region consistent with brachiocephalic stenosis, at the level of the IJ TDC.
- 2. Angioplasty basilic vein area to prevent thrombosis of AVF.

**Fistulagram & Venogram Images**

**Side-Bar - Collateral vein development**
Case Study

- **After Basilic Stenosis Angioplasty**
  - 3. Withdrew TDC and performed simultaneous angiography with TDC and subclavian access through AVF - a 1.5 to 2cm gap was noted.

- **Highlighted is the area that 1.5 to 2cm gap was noted (occlusion)**
  - The AVF was patent (open) distal to occlusion, and SVC was patent proximally.

- **Case Study**
  - **A right anterior oblique (side) view of the occlusion (gap)**

- **Case Study**
  - **Therefore, we have to cross the lesion (2cm gap) to angioplasty and stent.**
    - 4. Attempt made with classic guidewire with front and back-end - failed.
    - 5. Then withdrew TDC to insert the introducer and snare necessary to use RF Wire.

- **Case Study**
  - **A side view of RF Wire passing occlusion into snare (gun sight technique)**
  - **A frontal view of Baylis Powerwire crossing the gap**

- **Case Study**
  - **Occlusion bridged with RF Wire to snare technique**
    - 6. After lesion is passed, the wire can be retrieved with snare and guided through.
    - 7. Serial angioplasty along tract is performed along with stenting.
    - 8. After angioplasty and stent, venogram and fistulagram are obtained.
Case Study

- After the wire is snared, angioplasty is performed along AVF tract
- Subsequently, stents placed as well.

Case Study

- Post Venogram (frontal view) showing a widely patent AVF outflow and brachiocephalic vein (central occlusion resolved)

Case Study

- Findings
  - AVF and Venogram demonstrated resolution of all collaterals, inline continuous flow noted
  - NO dialysis catheter was placed or needed
  - Thrill was markedly improved and no longer pulsatile
  - HD next day and used AVF successfully

CVO Prevention

- Vessel preservation
  - Avoid PICCs in CKD patients
  - NEVER use subclavian catheters unless 100% necessary
  - Avoid same side TDC and AV access
  - Avoid same side pacer as access
  - Proper cannulation techniques to avoid loosing arm as access

CVO Prevention

- Assessment and Early referral
  - Assess and maintain an accurate access history
  - Pulsatile AVF or AVG, increased venous pressure, decrease in access flow, decrease in clearance numbers or other evidence of recirculation or poor dialysis: Patient should be referred immediately to avoid further scarring and stenosis

Treatment Possibilities for Your Patients