Management of Venous Occlusion: Tunneling, Venoplasty and Other Tricks

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Disclosures

• I receive compensation in various forms from St Jude, Medtronic, Boston Scientific, Pressure Products, Biosense and Oscor
What would you do if you saw this venogram?

1. Go to the other side
2. Extract one of the leads for access
3. Try to get a wire across and use progressively larger dilators
4. Try to get a wire across and do venoplasty

Subclavian Venoplasty for Pacemaker and ICD Implantation

- 10-30% with prior leads have subclavian vein stenosis/occlusion
- We implant more frequently in patients with prior leads
- CRT – requires unrestricted catheter and lead manipulation
Venoplasty vs. Progressively Larger Dilators

- Venoplasty is faster
- Problems with dilators
  - catheters remain difficult to manipulate throughout the procedure.
  - distal stenosis (SVC/RA junction) is not opened

Complications - Progressively Larger Dilators
Our Experience with Subclavian Venoplasty

- Began subclavian venoplasty in 1999.
- 370 cases as of October 2010
- 8 EP physicians trained
- No adverse clinical outcome
  - No distal embolization - chronic occlusion no thrombus
  - No venous disruption – veins heavily encased in scar tissue
  - No damage to the leads

Basic System for Wire Resistant Subclavian Obstruction

- contrast injection system
- 5 F dilator
Range of Subclavian Obstruction

- Moderate to severe – wire readily crosses the obstruction
- Apparent total (wire resistant) – requires wire manipulation.
- Total (wire refractory) – unable to get a wire across.
Wires and Devices Used to “Cross” Obstruction or Occlusion

- .035 Terumo Glidewire (angled with a torque device)
- .018 glide wire (angled with a torque device)
- .014 angioplasty wires designed to cross total occlusions
  - Terumo Crosswire
  - Cross-IT XT (100, 200, 300 in order of stiffness)

using the 5 F dilator and glide wire to Cross the Occlusion
System for Crossing Difficult Occlusions

vertebral shaped tip with hydrophilic coating
(VERT Slip-Cath Beacon Tip by Cook Inc)

Vert to Direct Wire Peripheral
Vert to Direct Wire Central

wire will not advance

Vert to Cross Total
Total Occlusion – Unable to get a wire across

Wire Under Insulation and Extraction for Venous Access

- pacing lead
- needle under the insulation of the pacing lead
- 21 gauge Cook needle
Extraction & Wire Under Insulation

unscrew lead and retract to high RA

Wire Under the Insulation
Total Occlusion Unable to Cross with a Wire

Laser Case - need venogram from the femoral vein to better define proximal lumen
Laser Case
Need to keep tip directed along leads must be confirmed in orthogonal views

Total No Lead Laser
Overall Success With Wire Refractory Subclavian Occlusion

- Frontrunner alone 50%
- Addition of Outback to Frontrunner 65%
- Tornus 50% limited experience
- Laser Wire 14 of 16 so far

Balloons for Subclavian Venoplasty

- .035 inch central lumen – usually get a glidewire across the obstruction.
- Preferred size, 6 mm X 4 cm
- Preferred type, non compliant (rated burst = 15 atm) (e.g. PowerFlex-P3)
- Ultra non compliant Kevlar balloon if the waist is not relieved (rated burst = 30 atm) (e.g. Conquest)
Always start “distally” - profile of the balloon increases after the first inflation called “Winging”

never inflated

inflated and deflated

Complications - Progressively Larger Dilators
To prevent complications - **always** advance the glide wire into the PA before you inflate the balloon (or use progressively larger dilators) Video

required Kevlar balloon
Distal Obstruction Only

Focused Force Venoplasty for a Focal Stenosis Refractory to Kevlar
Focused Force Venoplasty
Required for Diffuse Narrowing Following Removal of an Over the Wire LV Lead

Balloon Explodes

6MMX4CM POWERFLEX BALLOON TO 18ATM RATED BURST 15ATM
30 Day Mortality
Transvenous = 2.5%
Surgical = 4.8%
Surgical LV Lead Placement UVA Charlottesville
Post Procedure Complications

- Acute renal injury = 26.2% surgical vs. 4.9% transvenous ($P < 0.001$)
- Infection = 11.9% surgical vs. 2.4% transvenous ($P < 0.03$)
- 30 day mortality via thoracotomy = 7.1%
- 30 Day Mortality = 2.5% transvenous vs. 4.7% surgical

Ailawadi G et al Heart Rhythm 2010;7:619–625

REPLACE Registry

- Thus 435 patients had an LV lead related procedure (add or replace a lead)
  - 89% success thus 47 patients had failed LV lead placement
  - 4 deaths occurred at the time of surgical LV lead placement
- 8.5% (4/47) surgical mortality if all 47 went for a surgical lead
Total Occlusion No Leads to Extract or Follow
Why Learn Venoplasty Techniques?

• Occlusions are usually not clinically apparent
• Not practical to obtain an interventional consult in the middle of the case
• Reduces case time.
• Reduces the need to Implant on the opposite side or perform laser lead extraction

If you don’t do venoplasty it will likely not get done

The End