The Challenge of Vessel Calcification and How to Approach It

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Disclosure Statement of Financial Interest

Within the past 12 months, I or my spouse/partner have had a financial interest/arrangement or affiliation with the organization(s) listed below.

Affiliation/Financial Relationship

- Grant/Research Support
- Consulting Fees/Honoraria
- Major Stock Shareholder/Equity
- Royalty Income
- Ownership/Founder
- Intellectual Property Rights
- Other

Company

- None
- Abbott, Endologix, Boston Scientific, CSI, Medtronic, Bard
- None
- None
- None
- None
- VIVA Board Member
1. Torsion

2. Torsion

3. Compression

4. Flexion

The SFA and Popliteal Arteries Are Complex!
Unique PVI Issues With Heavily Calcified Lesions:

- Often difficult to cross lesion, esp. if CTO
- May be non-dilatable
- Prone to dissection w/ high pressure PTA
- Risk of perforation @ high pressures
- Risk of embolization (pts w/ BTK dz too)
- Difficult to deliver stents
- Poor (short & long term) expansion of stents
PVI Considerations in Heavily Calcified Lesions

- Should you use embolic protection?
- Wires? Size, cross-ability, support
- Will atherectomy help?
- Non-compliant/ focal force balloons needed- how high should you go?
- Should you stent? When, and which one?
- Need bail out equipment (covered stents)
Calcified Lesions: Unique challenges Deserve Unique Approaches

• Lower threshold for using embolic protection
• Lower threshold for using atherectomy
• Higher % of focal force or noncompliant PTA
• Aggressively “pre-treat” all lesions (and confirm “dilatability”) BEFORE stenting or use of a DCB; and NEVER “primary stent”
• Almost exclusive use of interwoven stents for me in CA++ femero-popliteal lesions
Crossing Calcified Lesions...

• **SFA- mid pop:**
  - XC angled 035 Glidewire/ straight strong cath
  - If can’t cross CA++ prox cap, straight Glidewire
  - ↑ refractory proximal cap: laser, crossing device, or retrograde access
  - If severe, eccentric calcified “micro-channels”, can use 0.014 or 0.018 wires

• **Mid pop- Tibials:**
  - 0.018 (V-18 Control) or 0.014 (Command, Pilot, Winn, Victory, CTO wires, etc) with transfer cath
  - *More important to stay in true lumen*
Crossing CA++ Lesions (cont’d)

**Caveats**

- Re-entry devices may be harder to track to the occlusion/re-entry point.
  - May need to do PTA first (3, 4 mm balloons)
  - Re-entry needles may not penetrate vessel

- Retrograde access often needed/helpful, but remember that retrograde access vessels themselves may be calcified
Caveats for Calcified Aorto-Iliac and Common Femoral Arteries

• ↑ use of noncompliant PTA, covered stents or EVAR-type stent grafts for CA++ aorta, iliacs
• Straight glidewire, often brachial access
• 0.014, 0.018” wires for CA++ “micro-channels”
• CFA: Usually atherectomy/ atherotomy with dEPD and large DCB; large Supera if needed
Highly CA++ Disease w/ BTK issues
Crossing CTO w/ GW  Angio thru 0.035 QC cath
Crossing with 0.014 wire and 0.018 catheter
Distal EPD (Nav 6)

(0.017 tip Viper wire; “off label”)
CSI Orbital atherectomy w/ dEPD
PTA
No Flow
2nd 0.014 wire thru 0.035 QC cath
Aspiration into EPD basket
EPD out; 2\textsuperscript{nd} wire still in
Alternative SFA/Pop Strategy - long Dz

Heavily calcified CTO and popliteal disease
0.018 wires into micro-channels
Able to wire into SFA branch; Navi-cross Support catheter
2 wires in; Navi-Cross back 

2\textsuperscript{nd} wire into SFA
0.014 wire thru popliteal disease

0.018 catheter advanced
0.014 PTA to facilitate dEPD device
(sometimes needed to pass re-entry devices also)
Distal EPD
Aggressive PTA and FF PTA
Deploying 6.0 Supera

Measuring for next stent
2nd Supera

7.0 Dorado NC PTA
Atherotomy & Supera
CA++ Adductor Lesion
Focal Force PTA SFA and Pop
6mm @ 14 atm, with dEPD
Immediate results w/o post dilatation
“Vascular Mimetic”
Heavily calcified CFA and SFA; ABI 0.41 L
Shuttle sheath from LBA

0.014 wire into SFA
CSI 2 mm solid crown
Focal force PTA SFA and CFA
Moderate Calcium  Tight CFA
Wiring micro-channels with 0.014 wire; Exchange to XC length Nav6 EPD wire
Largest Jetstream device
Angio: CFA improved, CA++ “chunks” proximal SFA
Atherotomy CFA
CFA Better; Atherotomy proximal SFA
7 mm FF PTA Prox SFA

6.5 Supera Stent In proximal SFA
CFA: No stent

SFA: Supera Stents
Complex Iliac CTO, CA++, and AAA
AAA; Iliac Disease, and CTO:
Pioneer re-entry

Angio in Aorta
PTA (Before “Pre-closes”)
Angio after MULTIPLE PTA’s
14F Dilator, THEN Sheath through CTO after PTA
Dilator, then Sheath Up on Right
Deploying TriVascular Main Body
Completion Aortogram
Conclusions

• Calcified CTO’s represent unique challenges, which can usually be overcome by individualized procedural modifications.
• CA++ Femero-popliteal lesions may require ↑ utilization of atherectomy, embolic protection, and interwoven stent devices.
• CA++ Aorto-iliac lesions may benefit from covered stents or stent grafts.
Thank You for Your (Kaola-ty) Attention!
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