New Devices and Technologies for Tibial Disease

AIM 2016

Craig M. Walker, MD, FACC, FACP
Clinical Professor of Medicine
Tulane University School of Medicine
New Orleans, LA
Clinical Professor of Medicine
LSU School of Medicine
New Orleans, LA
Founder, President, and Medical Director
Cardiovascular Institute of the South
Houma, LA

Disclosures

Speaker’s Bureau:
- Abbott
- Bard
- Boehringer-Ingelheim
- Bristol-Myers-Squibb/Sanofi
- Cook Medical
- Cordis
- DSI/Lilly
- Gore
- Spectranetics

PVD Training:
- Abbott
- Bard
- Boston Scientific
- Spectranetics
- TriReme Medical

Stockholder:
- CardioProLific
- Cardiva
- Spectranetics
- Vasemed

Consultant/Medical/Scientific Boards:
- Abbott
- Boston Scientific
- Cardiva
- Cook Medical
- CR Bard
- Lake Regional Medical
- Medtronic
- Spectranetics

My Favorite Techniques

- Access
- Guidewires
- Support catheters
- Use of Drug-eluting stents for proximal IP vessel treatment

ACCESS IS CRITICAL

- I like to start with antegrade femoral approach
- Avoid tortuosity improving torque
- Better reach
- Better push
- Facilitates trans-collateral crossing
- Allows use of large sheaths

- Consider tibial or popliteal access if unable to cross from above
- Although I have had excellent success and low complication rates acutely with tibial access I am concerned that this has the potential to injure distal vessels.

TIPS FOR ANTEGRADE APPROACH

- Utilize US guidance or dystrophic calcification
- Utilize micro-puncture technique
- Utilize braided sheaths placed as far distal as possible
- Avoid kinking
- Improve imaging
- Better push
Guidewire attributes affecting selection

- Wire length
- Wire diameter
- Tip penetrance
- Torquability
- Shaft support
- Shaft flexibility
- Visibility
- Coatings
- Sleeves
- Tip shapeability
- Tip retention
- Device compatibility
- Coating
- Durability

Understanding Guide Wires

The Three Most Important Design Features that Impact Performance

**Distal Tip**
- Tip Load?
- Spring Coil?
- Tapered?
- Coating?

**Core**
- Thickness?
- Material?
- Smooth or Abrupt Taper?

**Coating**
- Hydrophilic + Polymer Sleeve?
- Hydrophilic on Spring Coil?
- Hydrophobic (silicon)

**Trade Offs**
- Thicker core wire is more supportive and transmits torque better (except in tortuous anatomy)
- Thinner core wire tracks more easily

Understanding Guide Wires

**Tip Load** – measure of tip stiffness at 1 cm: Back wire in drill press with 1 cm protruding and push against a gram scale. When the wire bends 2 mm in either direction the measurement (in gram force) is tip load.

Spring Coil – helps transmit torque/tactile feedback

Tapering of the spring coil and the tip provides more penetration

Coating enhances or detracts from tactile feedback

**Trade Off:**
- The higher the tip load, the better the penetration but the more that wire wants to go straight and will not track the vessel.

Understanding Guide Wires

**Core**
- Thickness?
- Material?
- Smooth or Abrupt Taper?

**Trade Off:**
- The thicker the core, the better the torque and durability but the more the wire wants to go straight.

Understanding Guide Wires

**Coating**
- Hydrophilic + Polymer Sleeve?
- Hydrophilic on Spring Coil?
- Hydrophobic on Spring Coil?
- Hydrophobic (silicon)

**Trade Off:**
- You sacrifice tactile feel for lubricity

Uncoated distal tip – provides some tactile feedback while maintaining lubricity

20th Century Wire Technology

Normal core
Guidewire Tip Shaping Techniques

- Penetrating the lesion entry point
  - Straight or small angle at the very distal tip
  - Secondary bend for navigating tortuosity
  - Small angle at the very distal tip, subtle secondary bend
  - Re-entering true lumen from subintima

- More acute angle like a J-tip

How Guidewires Fail to Cross

- Wire tip prolapses at the cap: wire with higher tip gram load, sharp short angle, SC
- Proximal segment of tip buckles: wire with higher tip gram load; hydrophilic coating or advance a support catheter near tip
- Tip enters lesion, wire fails to follow: wire with higher rail support; lower profile; hydrophilic, or advance a support catheter
- Wire Crosses but device fails to cross: wire with higher rail support or lower profile system

Keys To Success:
Selecting a guidewire for crossing

- Wire escalation approach
- Frequent wire exchanges
- Wire selection for penetrating the cap, versus navigating the middle of the lesion, versus device delivery
- Shaping of the tip
- Use of a support catheter
**Conclusion**

- The overwhelming majority of infrapopliteal CTO’s can be crossed with wires and support/crossing catheters allowing successful interventional treatment of CLI.
- Access is crucial. Antegrade femoral allows more control than contralateral. If lesions can’t be crossed antegrade then retrograde approach (tibial or trans-collateral) is useful.
- Imaging is crucial.