All CTOs in iliac and Lower Extremity Arteries Can be Crossed with Catheters and Guidewires: How to Do it And How to Deal Simply with Failed Re-Entry

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Faculty Disclosure
- No Conflict

Percutaneous treatment of peripheral arterial Occlusion has evolved greatly:

1. Improvement in Techniques, Wires, Catheters, Balloons and stents Lower Profile System, Atherectomy Devices
2. Devices to Cross the Occlusion and Re-enter the True Lumen

Subintimal Angioplasty/CTO
- Permits creation of Dissection plane + Re-entry without reducing future bypass options
- Create a New Non-diseased channel underneath the diseased lumen area

How Often Devices Needed? Based on Three Things

1. Endovascular Experience/Skills
   - Beginner, Intermediate, or Advance: Advance level < 10 %
2. Techniques Used
3. Complexity of the CTO Lesion
The Spectrum of Lumen Morphology in CTO - Clinical Challenges

- Necrotic core
- Proteoglycan-rich
- Large recanalization channels
- Minor recanalization channels
- Inflammation
- Fibrotic plaque
- Negative remodeling
- Calcification

Dr. Gregg Stone: Columbia Medical Center, Coronary Research Center

Angioplasty Attempts/Immediate Failures

- Of the 224 patients allocated to angioplasty, 216 underwent attempted angioplasty
- Of these, 43 (20%) were considered immediate failures:
  - Lumen could not be crossed with guidewire
  - Lumen crossed subintimally, but could not be re-entered
  - Perforation: Patient could not tolerate procedure
  - No lesion upon angiography
  - Lytic/Aspirin Resistant Thrombus

BASIL Trial participants, Lancet 2005; 366:1925-34.

Arterial Occlusion
- Cross the lesion
- Enter the true lumen
- Endovascular intervention

Wires & Catheters
- Cross lesion
- Enter true lumen
- Device

Re-entry Must Be: RASP
- Reproducible
- Accurate
- Safe
- Predictable

Treatment of Claudication
- Acute Limb Ischemia (ALI)
Advance Catheter & Wire under Roadmap

- Advance a 120 cm angle 4 Fr. Tempo Aqua over a .035 angle Glide wire 280 cm toward “Start” point
- Force the wire into the Occlusion “Prox Cap”
- For Long occlusion form a loop by passing wire back and forth.

Advance Catheter & Wire under Roadmap

- Advance the Wire and Catheter and into the occlusion (FORCE IT!)

Distal SFA Occlusion

- Advance the Wire followed by the Catheter until the “End” point is reached
- At this point “End” point and distal native vessel should be visualized on the Roadmap
Advance Catheter & Wire under Roadmap
- Pass the loop 0.5-1.0 cm into the patent distal native vessel followed by the catheter.

Advance Catheter & Wire under Roadmap
- by this point the wire and catheter has entered the True Lumen (feel the resistance). Wire easily pass distally.
- Pull out the wire and back bleeding from catheter (+) for true lumen access.

True Lumen
- Gently hand inject contrast to confirm (True Lumen).
- DO NOT inject if No back bleeding (stain the area).

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Critical Point
- Must Enter Wire into the True Lumen at the “END” Point.

Do Not Pass the wire too far beyond the “END” point.
- Extend the dissection distally ‘Convert AK to BK bypass’.
- Compromise important collaterals.
Unable to get into True Lumen

- Rotate and Change the angle of the Tempo Aqua (braided) at the “End” point and advance the wire

1. Place angle catheter at the “END” point and Rotate

Pass the wire into True Lumen (gives up resistance)

Wire is passed distally under Roadmap

Intraluminal CTO

- Straight tip Wire and Catheter
- 4F catheter and .018 Hydrophilic wire

Completion Arteriogram
Balloon Assisted CTO

Unable to get in from ABOVE

Distal Cap is Softer

Get in from Below

Distal Cap is Softer
Crossing and Re-Entry Devices

- Have increased the success of CTO and having a successful outcome
- Decreased need for retrograde approach esp popliteal
- Decreased need for Bypass Surgery
- Decreased stenting of “NO STENT” zone
- Decreased length of stented segment
- Decreased amount of Radiation and Contrast

Re-entry Devices

- Not a Crossing tool, but a Re-entry tool (RD)
- Must pass through the Occlusion first before using (RD)
- Must get to the “Point of Reconstitution”

Crossing Device

FRONTRUNNER XP CATHETER

- Percutaneous catheter-based technique of controlled blunt microdissection (CMD)
  - The catheter's blunt tip engages the lesion to penetrate the proximal cap of the CTO
  - The tip is actuated and delivers enough force to displace plaque, while minimizing the risk of vessel perforation

FRONTRUNNER XP CATHETER

- Repeated application of controlled blunt microdissection enables further device advancement until it reaches the distal end of the occlusion
- Micro-channel creation enables guidewire access for percutaneous intervention
Crossing Device (Frontrunner XP)

Penetrate Cap with Jaws Open
Advance FR with Jaws Closed

May enter True Lumen by FR
Blood return, inject 3 cc thru Micro Guide
Pass Wire thru MGC
Completion Arteriogram after EVI

Re-entry Device—Pioneer Catheter

True Lumen Entry
- Using IVUS component, orient catheter toward true lumen by rotating the entire catheter.
- Verify position with fluoro.
Locate Orientation Markers

• Deploy cannula in either “T” or “L” view
• Advance wire
• Retract needle
• Remove device

Outback® LTD Re-Entry Catheter

Gently Pass .014 wire while Needle is deployed

Non Hydrophilic Wire

Completion Arteriogram after EVI

Rotate 90°
Hold On to the Handle while “L” and “T”
Always Check Distal Run Off

Distal Aorta and B/L C. Iliac Occlusion

Wire & Catheter Technique
- Contralateral Catheter
- Flush Occlusion need
- Kissing Stents

B/L Iliac PTA & STENTING

Pioneer- IVUS

AVIOD SURGERY!
- Successful CTO can be accomplished using meticulous techniques, and attention to details
- Either wire&catheter technique and/or Crossing--- Re-entry Device
Don't ever give up!