Novel technique to cross infrapopliteal artery chronic total occlusion

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Disclosure

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I have the following potential conflicts of interest to report:

☒ Speaker for Penumbra Inc.
☐ Employment in industry
☐ Stockholder of a healthcare company
☐ Owner of a healthcare company
☐ Other(s)

☐ I do not have any potential conflict of interest
Infrapopliteal Artery Chronic Total Occlusions

- Very common in critical limb ischemia
- Common practice to cross using wire and support catheter
- Slew of specialty crossing devices
- Concern for time, cost and safety
Turnpike Spiral Catheter

- Usually used as a support catheter in coronary chronic total occlusions
- Describe a novel technique to cross the infrapopliteal artery CTO using this catheter
Birth of the Concept
Case Presentation-1

75 y Male, ex-smoker with a background of ESRD on HD, DM, HTN and HPL was referred to me for a non-healing right 5th digit amputation.

Non-compressible ABIs with occluded right PT.
Right Infrapopliteal Angiograms
Defining and Engaging the Proximal Cap
Crossing with the Turnpike
Spiraling the Catheter
Crossing into the Distal Cap
Case Presentation-2

58 y Native American woman with DM/HTN/HPL presents with non-healing left great toe gangrene following a trivial injury

ABI of L LE: 0.4

Duplex Arterial Ultrasound: Severe Left SFA and infrapopliteal arterial disease
Diagnostic Left Infrapopliteal Angiograms
Step-1 Engaging the Cap
Crossing with the Turnpike
Intervention
Left AT Stenting and Final Angiograms
Other Case Examples
How Does It Work?

- Histopathology of CTOs: Microchannels
- Catheter Size, Shape and Constituents
- Importance of Spiraling technique
Histopathology of CTO
Important Property of Spiraling Through
Turnpike Spiral Catheter

- Dual-layer coil with internal braid shaft construction provides bulk/momentum to bury into the CTO, traverse the CTO and effective transmission of forward torque.
- Tapered distal end [helps with the transit through the fibrotic resistive tissue of these CTOs].
- Tungsten loaded soft tip [flexibility to traverse the tortuous microchannels]
- Crossing profile [ideal for crossing infrapopliteal CTOs as infrapopliteal arteries have a diameter ranging from 1.5mm to 4mm]. If smaller, the catheter would not have the bulk to traverse the CTO. If larger, then it would lose the penetrating power.
- Transmission of forward movement with a cork screwing motion is the result of the 2 cm blue external nylon coil on the distal shaft of the catheter [best way to drill through a fibrotic occlusion]
- Provides an almost one to one tactile feedback [helps us assess the consistency of the crossing zone and therefore provide reassurance that we are intraluminal]
- Partial hydrophilic coating in its distal end [helps slide through the fibrotic occlusion]
- Appropriate weight of the catheter [provides the momentum to pierce through the CTO]
- Proximal end has a sturdy base to help rotate the catheter [aids in the forward cork screw motion]
Turnpike Spiral Catheter: Key Features

- Hydrophilic Surface with a Tungsten loaded Tapered Soft Tip
- Provides the bulk and Momentum to Drill Through
- Provides excellent tactile feedback and transmission of near one to one torque
Conclusions

• Spiraling through CTOs may be a better approach than pushing through

• Turnpike catheter can be considered an alternative for infrapopliteal artery CTOs in absence of calcification and tortuosity

• Need for hybrid/fusion catheter-wire to cross infrapopliteal artery CTOs
Thanks
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