

# Simplified Approach for Crossing Total Occlusions: Forget the New Gadgets; All You Need is a Catheter and a Wire

NOTES

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With the recent advances in endovascular interventions, a wide array of new approaches has been developed in an attempt to improve arterial perfusion to the lower extremity without the traditional arterial bypass surgery. Arterial occlusions have been traditionally treated by arterial bypass surgery. Recently, endovascular techniques have gained much interest in the management of chronic arterial occlusions.

Percutaneous intentional extraluminal recanalization (PIER) was first described by Bolia in 1989.<sup>1</sup> Subintimal recanalization can be used to treat lesions that are typically difficult to treat with intraluminal percutaneous transluminal angioplasty including long chronic occlusions, diffuse tandem occlusions, and calcified occlusions. Major contraindications include fresh thrombus, recent occlusions, and thrombosed aneurysm. If the wire passes easily into the occlusion or there is evidence of acute/subacute occlusion, use of thrombolytics will help to unmask the underlying stenosis or lesion. Utilizing PIER technique to treat limb ischemia may be comparable to those treated with surgical arterial bypass especially if stents are used to improve patency.

Indications for utilizing this treatment modality include life style limiting claudication, rest pain, and limb salvage in high-risk patients for revascularization, or if a patient refuses surgery.

## Preprocedure Evaluation

It is essential to perform a complete evaluation of inflow and outflow arteries of the affected extremity. This should include aortoiliac anatomy to help with possible contralateral approach. This evaluation can be performed utilizing arteriogram, CTA, or MRA. The approximate “start” and “end” points, length of occlusion, and diameter of the artery are taken into consideration. All patients are started on 81 mg of Aspirin and 75 mg of Plavix a few days before the procedure. There is no contraindication in patients with renal insufficiency who need endovascular intervention, since Gadolinium or diluted contrast agent (quarter-strength Visipaque, GE Medical) can be used during intervention.

Techniques for crossing total occlusion:

1. Iliac artery occlusion
  - a. Use contralateral approach with distal common iliac and/or external iliac occlusion.
  - b. Use ipsilateral approach with proximal and/or mid common iliac occlusion.
2. Aorta and iliac occlusion: Use bilateral common femoral arteries to traverse the occlusion.
3. Superficial femoral artery

- a. Use contralateral approach in cases involving a short proximal SFA stump, an obese patient, CFA disease, or a groin scar.
- b. Use ipsilateral approach in cases of mid- to distal SFA occlusion, infra-popliteal lesion, severe aortoiliac tortuosity, or a thin patient.

## Contralateral Approach for Crossing Total Occlusion (CTO) Superficial Femoral Artery

1. Place a 6F 55 cm contralateral sheath. Place the tip at the CFA.
2. Perform a selective arteriography to study the entire symptomatic lower extremity (baseline).
3. Identify your “start” and “end” points of the occlusion.
4. Place the image intensifier to cover the start and end points. If the occlusion is too long, place the start point the top of the image intensifier.
5. Perform a road map through the sheath to visualize your start point and your end point (if possible).
6. Advance a 100 or 120 cm angle 4F glide catheter over an exchange length angle glidewire (280 cm). Place the tip of the glide catheter at the start point (where SFA patency ends and occlusion starts).
7. Push (force) the angle glidewire into the occlusion. The wire may stay semi-straight or form a loop. For long segment occlusions form a loop by passing the wire back and forth until a loop is formed. Once a loop is formed, pass the glide catheter into the occlusion. Advance the wire more followed by the glide catheter until the end point is reached. For short segment occlusion (2–5 cm), slowly pass the wire without forming a loop and then advance the glide catheter. Continue to do this maneuver of advancing glide catheter over glidewire until the end point is reached.
8. At this point the end point and the patent distal SFA should be visualized on your road map. If not, then move the image intensifier down to cover this area and perform a new road map through the 6F sheath. Then pass the loop approximately 1 to 2 cm into the patent distal SFA. At this point the tip of the loop usually enters the true lumen. Gently pass the glide catheter through the end point into the native SFA.
9. Remove the wire. Backbleeding from the glide catheter is a good sign that you are in the true lumen of the patent SFA. Gently hand inject half-strength dye to confirm this. Once this has been accomplished the wire is exchanged for a stiffer 280 cm wire and a predilatation is done with a 4 mm diameter Opta balloon (Cordis Endovascular) with (appropriate length), followed by 7 mm diameter SMART stent (Cordis Endovascular) to cover the entire lesion. Post-stent angioplasty is usually done with a 5 mm diameter balloon.

10. If true lumen is not entered, during hand injection a channel might be seen leading to the native patent SFA (true lumen). In this case, roadmapping through the glide catheter is done and the guidewire is gently manipulated into the true lumen. Otherwise, the angle glide catheter is slightly pulled back, and rotated to push the wire into the true lumen in a different direction. This should be done under roadmapping (done through the sheath) with image intensifier magnified. Rotating the tip of the angle glide catheter allows entering the true lumen through an alternative subintimal channel. All efforts should be done to advance the wire into the true lumen at the end point using this technique. Advancing the loop wire further causes extension of the dissection plane into the native SFA, jeopardizing major collateral or future shorter bypass. If there is failure of access to the true lumen, pull back on the glide catheter, then recreate and advance the wire into a new subintimal plane. Once reaching the end point follow the direction previously described.

#### References

1. Bolia A, Brennan J, Bell PR. Recanalization of femoro-popliteal occlusions: improving success by subintimal recanalization. *Clinical Radiol* 1989;4:325.

#### NOTES