Laser Treatment

Using the Spectranetics Turbo catheter to treat a calcified lesion and a thrombotic occlusion in the SFA.

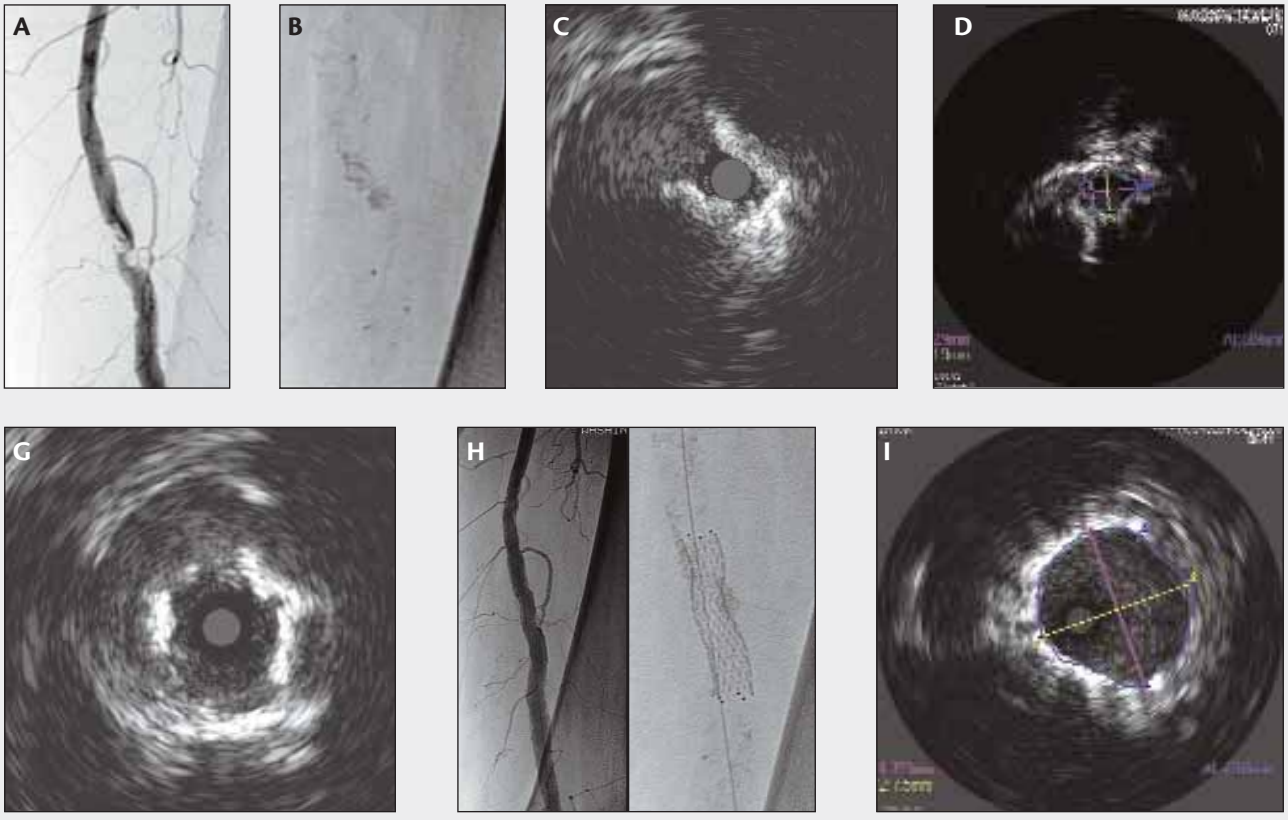
BY ROBERT GALLINO, MD

CASE 1

Treatment of a Calcified SFA

A 74-year-old man presented with calf discomfort upon walking less than one block. He was referred for angiography, which demonstrated a high-grade stenosis of the distal left SFA (Figure 1A). Figure 1B shows the extensive calcification that was seen on fluoroscopy. An 8-F crossover sheath was placed into the left external iliac artery and the lesion was then crossed with a V18 control guide wire (Boston Scientific Corporation,

CASE 1. CALCIFIED SFA



Natick, MA). Subsequent IVUS confirmed an approximate 270° arc of heavy calcium (Figure 1C). The minimal cross sectional area was 3.9 mm^2 (Figure 1D).

> "For lesions that contain a high-degree of calcification, there is always a concern that due to the rigidity of the lesion, balloon dilation may result in dissection or incomplete stent expansion."

Given the near circumferential heavy calcification, there were concerns that balloon dilation would either just stretch the "arc-free segment" of the vessel and/or produce a significant dissection. Additionally, there were concerns that if a stent was needed, the arc of calcium may not permit adequate stent expansion. In reviewing the treatment strategies, it was believed that excimer laser would be able to ablate the stenosis and likely render the lesion more compliant.

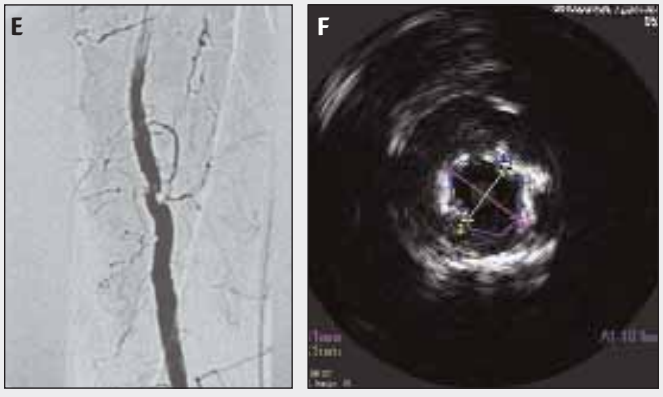


Figure 1. High-grade stenosis of distal SFA (A). Extensive calcification (B). 270° arc of heavy calcium (C). Post 2.5-mm Turbo laser catheter (D). Before laser treatment. Minimum cross sectional area 3.9 mm^2 (E). After laser treatment. Minimum cross sectional area 10.1 mm^2 (F). Post laser shows calcium fractured (G). Final result. Minimum cross sectional area 43 mm^2(H, I).

A 2.5-mm Turbo laser catheter (Spectranetics Corporation, Colorado Springs, CO) was positioned just proximal to the lesion and four passes were made slowly through the lesion at a fluency and rate of 60/80, respectively.

After application of the laser there was improved flow and a larger lumen (Figure 1E). Intravascular ultrasound showed not only that the cross sectional area had increased from 3.9 mm^2 to 10.1 mm^2 (Figure 1F), but the arcs of calcium had been fractured (Figure 1G). The reference vessel size was 7 mm, and a 7-mm X 40-mm, self-expanding Smart stent (Cordis Corporation, a Johnson & Johnson company, Miami, FL) was then deployed and was postdilated with a 7-mm Power Flex balloon (Cordis Corporation). Final angiography showed virtually no residual stenosis (Figure 1H). IVUS demonstrated that the stent was well-expanded, completely opposed, and the cross sectional area was now 43.1 mm^2 (Figure 1I). The patient was now able to walk for longer than 1 hour without claudication.

Conclusion

For lesions that contain a high-degree of calcification, there is always a concern that due to the rigidity of the lesion, balloon dilation may result in dissection or incomplete stent expansion. In these types of calcified lesions, excimer laser can be utilized as a first-line strategy to ablate and fragment the calcium, thereby enabling PTA and if needed, stent deployment and expansion.

CASE 2

Treating Thrombotic Occlusion of the SFA

A 68-year-old woman presented for evaluation of her left leg and foot discomfort. She had undergone PTA of an occluded left SFA 1 year earlier, treated with balloon dilation and subsequent stenting (three 6-mm X 100-mm self-expanding stents). Six-months after PTA, she had recurrence of left leg claudication upon walking short distances. Angiography demonstrated that the stents were now occluded. She then underwent a femoropopliteal bypass, which led to resolution of her symptoms. She did well for the next 9 months until, after a prolonged episode of kneeling while working in her garden, she acutely developed pain in the leg that progressed to rest pain of the foot. She had difficulty ambulating short distances, the foot felt cool, and it was difficult to sleep because of the pain. She was then referred to our office.

Angiography demonstrated that the femorpopliteal graft was occluded, as was the SFA (Figure 2A). There was no visualization of the popliteal artery (Figure 2B),

CASE 2. THROMBOTIC OCCLUSION

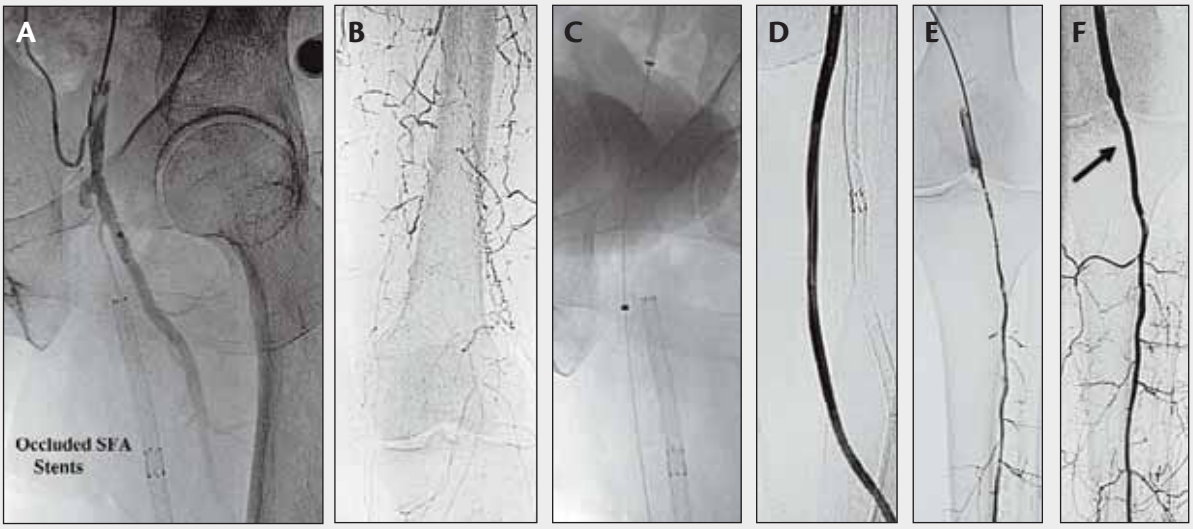


Figure 2. Occluded SFA (A). No visualization of the popliteal artery (B). 2.5-mm Turbo laser catheter (C). Post laser angiogram shows graft now patent (D). Stenosis of distal graft anastomosis (E). Post laser and stent placement (F).

and only faint filling of the peroneal artery. It was thought that the prolonged kneeling compromised the outflow distally from the graft, with subsequent graft thrombosis.

> "Laser has been shown to be effective in many thrombotic scenarios, such as the treatment of acute myocardial infarction and SVG disease."

An 8-F crossover sheath was placed in the left external iliac artery. A 5-F catheter was placed into the stump of the femoropopliteal graft. A .035-inch, straight Terumo wire (Terumo Medical Corporation, Somerset, NJ) crossed the entire graft and was placed into the peroneal artery. The wire was then exchanged for a .014-inch Mailman wire (Boston Scientific Corporation). A 2.5-mm Turbo laser catheter (Spectranetics Corporation) was then slowly advanced from the origin of the occluded graft into the popliteal artery (Figure 2C). Angiography performed after laser treatment showed that the graft was now patent (Figure 2D). There was a high-grade stenosis of the distal graft anastomosis (Figure 2E). Despite several balloon inflations, there remained a significant residual stenosis that was then treated with a 4-mm X 60-mm Abbott Xpert stent (Abbott Vascular, Abbott Park, IL), resulting in good flow through the graft and distally into the lower leg (Figure 2F).

After completion of the procedure, the patient had a palpable pulse in her foot and the numbness of the foot abated. During the next month, she did very well and was walking without claudication.

Conclusion

This case is an example of treating an acute occluded femoropopliteal bypass graft using the laser to restore flow through the graft and identify the primary lesion, which was the distal anastomosis. Presumably, the graft was full of thrombus, which was ablated with a 2.5-mm Turbo laser catheter. Laser has been shown to be effective in many thrombotic scenarios, such as the treatment of acute myocardial infarction and SVG disease. An acutely occluded graft is likely another lesion that can be effectively treated with excimer laser as a primary treatment option prior to subsequent intervention. ■

Robert Gallino, MD, is Director of Peripheral Vascular Interventions, Washington Hospital Center, Washington, DC. He has disclosed that he is a paid consultant to Spectranetics. Dr Gallino may be reached at robertgallino@hotmail.com; (301) 774-1323.