Sponsored by Intact Vascular, Inc.

Dissection Repair After Balloon Angioplasty of a Calcified SFA Lesion

BY EHRIN J. ARMSTRONG, MD, MSc

PATIENT PRESENTATION

A 67-year-old man presented with severe lifestyle-limiting claudication of the right lower extremity. The patient had a history of a right superficial femoral artery (SFA) endovascular intervention 4 years earlier with the placement of a nitinol stent in the distal SFA. He was compliant with medications, including aspirin, high-intensity statin, and an angiotensin-converting enzyme inhibitor. He also remained abstinent from smoking. Physiologic studies demonstrated an ankle-brachial index of 0.72, and a duplex ultrasound confirmed focal, severe stenosis of the mid-SFA, proximal to the previously implanted stent.

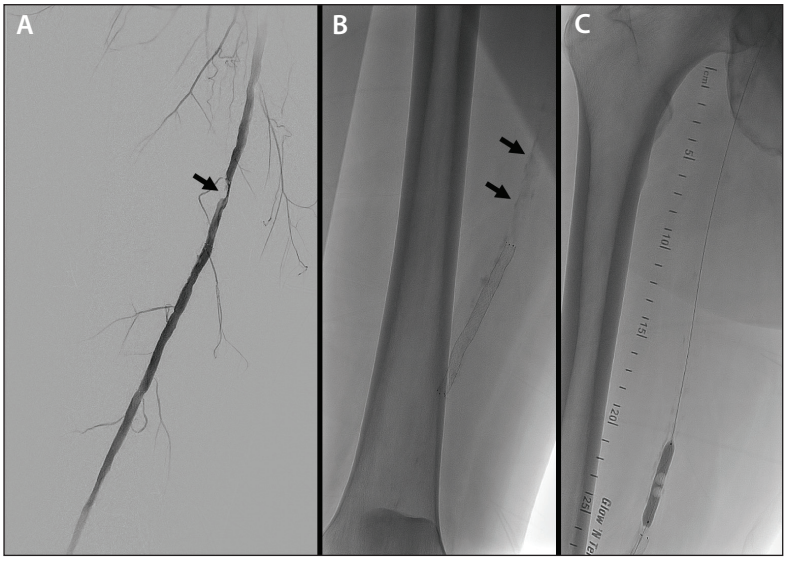

Figure 1. Mid-SFA stenosis (A); moderate-to-severe calcification (B); standard balloon angioplasty (C).

TREATMENT OPTIONS

Treatment options were discussed with the patient, including conservative management with a walking program and secondary risk factor reduction versus endovascular intervention. Due to the patient's severe continued claudication despite walking therapy, he opted for lower extremity angiography and possible intervention.

PROCEDURE

Right lower extremity angiography confirmed the presence of severe, focal stenosis in the mid-SFA (Figure 1A). Nonsubtracted images confirmed that the lesion was proximal to the previously implanted stent and that the lesion had moderate-to-severe calcification (Figure 1B). Based on the focal disease, balloon angioplasty was performed with a 5- X 40-mm balloon at 8 atm for 2 minutes (Figure 1C). After balloon angioplasty, angiography revealed a dissection in the mid-lesion segment (Figure 2A). The initial image of the dissection was consistent with a

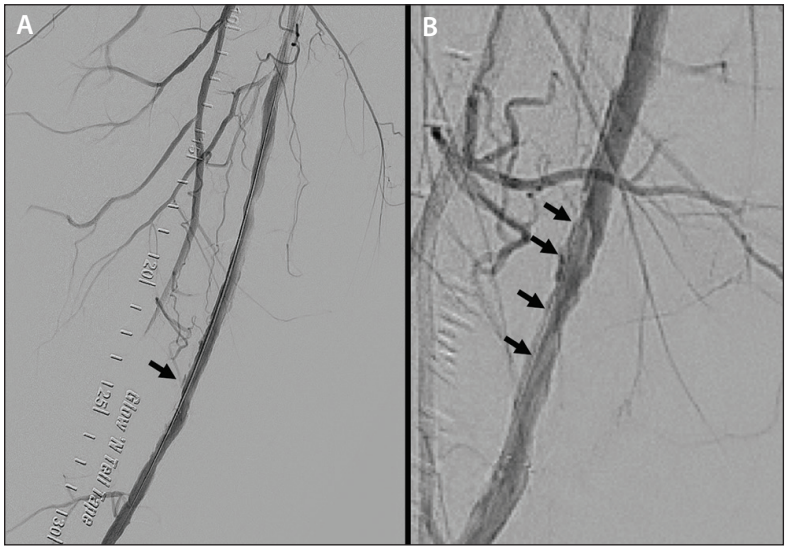

Figure 2. Panel A reveals a grade B dissection after percutaneous transluminal angioplasty, but an orthogonal view shows a severe, spiral dissection (B).

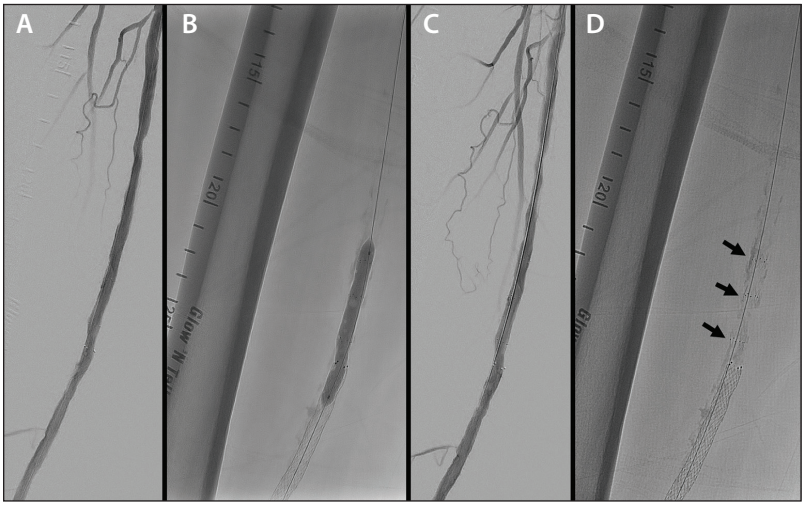

Figure 3. Three Tacks were placed (A) and postdilated (B). No residual dissection on the final angiogram (C). Panel D shows three Tack implants (arrows) in the mid SFA.

type B dissection. However, orthogonal imaging at high magnification revealed that the dissection spiraled around the lesion, consistent with a type D dissection (Figure 2B).

Based on the significant dissection after balloon angioplasty, using the Tack Endovascular System® (Intact Vascular, Inc.), three Tack® implants were implanted at the site of the dissection (Figure 3A). The Tacks were postdilated with a 5-mm balloon (Figure 3B). Final angiography revealed no residual dissection and an excellent angiographic result.

RESULTS

The patient was discharged home later the same day. At 1-month follow-up, the patient reported complete resolution of his claudication symptoms with high levels of physical activity. Duplex ultrasound also confirmed a patent SFA with no evidence of restenosis or Tack migration.

DISCUSSION

Dissections occur after almost all balloon angioplasties and result from longitudinal stress, radial expansion stress, and shear stress exerted on the atherosclerotic plaque.[1] Despite the prevalence of dissections, few data have historically been available regarding the natural history of dissections and which dissections should be treated. Recently, data from a Japanese study demonstrated that any dissection ≥ grade B was associated with an increased risk of restenosis after balloon angioplasty.[2] These data suggest that dissections are often undertreated and that more aggressive treatment of dissections may improve patency after an endovascular intervention.

Treatment options for dissections include prolonged balloon angioplasty, stent implantation, or Tack placement. Small studies have demonstrated that extremely long duration of balloon angioplasty (mean, 7.8 minutes) may reduce dissection severity compared with balloon inflations of 3 minutes.[3] Stent implantation remains a treatment option for dissections but has the disadvantage of leaving a heavy nitinol burden behind, with the attendant risk of in-stent restenosis. In comparison, the Tack Endovascular System is purpose-built for the repair of dissections after balloon angioplasty. Each Tack is 6 mm long and the delivery system comes preloaded with six Tacks. This system makes it possible to treat discontinuous areas of dissection with a single delivery system.

In the current case, orthogonal imaging confirmed a severe dissection at the site of balloon angioplasty. This case emphasizes the importance of high-quality imaging and the use of multiple views to identify dissections. Intravascular ultrasound can also be considered for further dissection characterization.[4] Rather than placing an additional stent, the placement of three Tack implants made it possible to effectively treat the areas of dissection while minimizing the extent of nitinol implant. Based on data from the recent TOBA II trial, similar lesions (focal, moderate-severe calcium) treated with plain old balloon angioplasty reported 89.6% primary patency at 12 months.[5] These impressive results demonstrate that balloon angioplasty, when optimized with Tack implantation, can be durable and provide long-term symptom relief for patients with severe claudication. ■

1. Armstrong EJ, Brodmann M, Deaton DH, et al. Dissections after infrainguinal percutaneous transluminal angioplasty: a systematic review and current state of clinical evidence. J Endovasc Ther. 2019;26:479-489.
2. Fujihara M, Takahara M, Sasaki S, et al. Angiographic dissection patterns and patency outcomes after balloon angioplasty for superficial femoral artery disease. J Endovasc Ther. 2017;24:367-375.
3. Horie K, Tanaka A, Taguri M, et al. Impact of prolonged inflation times during plain balloon angioplasty on angiographic dissection in femoropopliteal lesions. J Endovasc Ther. 2018;25:683-691.
4. Shammas NW, Torey JT, Shammas J. Dissections in peripheral vascular interventions: a proposed classification using intravascular ultrasound. J Invasive Cardiol. 2018;30:145-146.
5. Gray W. TOBA II 12-month results: Tack optimized balloon angioplasty. Presented at: Vascular InterVentional Advances (VIVA); November 5–8, 2018; Las Vegas, Nevada.

Ehrin J. Armstrong, MD, MSc
Associate Professor of Cardiology
University of Colorado
Aurora, Colorado
ehrin.armstrong@gmail.com
Disclosures: TOBA II/TOBA II BTK investigator and consultant to Intact Vascular.