

Excimer Laser to Treat SFA In-Stent Restenosis

Excimer laser-assisted recanalization of SFA in-stent restenosis simplifies reintervention on restenosed stents and may prevent complications.

BY GIANCARLO BIAMINO, MD

As clinical experience, stent designs, and techniques improve, patency rates associated with the endovascular treatment of the superficial femoral artery (SFA) also improve. However, a fairly high frequency of restenosis remains the major limitation of all currently available endovascular techniques. Recent data suggest that there is a considerable frequency of stent fractures after long-segment SFA stenting, which is associated with a higher in-stent restenosis and reocclusion rate. In-stent restenosis, especially the diffuse disease common in long segment SFA stenting, is difficult to treat with balloon angioplasty alone. The lesions are commonly densely fibrotic and can contain thrombotic material. Recoil and embolization are significant risks associated with this procedure. Debulking the atherosclerotic material prior to ballooning simplifies the procedure and may reduce the risk of embolization.

EXCIMER LASER DEBULKING OF THE SFA

The pulsed excimer laser has been extensively evaluated in debulking atherosclerotic material, demonstrating that the photoablative effect of laser light can be used to recanalize occlusions not amenable to conventional PTA.¹⁻⁵ The basic concept of laser atherectomy is to apply light energy directly to the arterial plaque, thereby altering the plaque in some helpful way, without damaging the surrounding artery. Lasers suitable for intravascular use produce an intense monochromatic light beam that can be delivered through fiberoptic catheters to a small area of tissue with great precision. Excimer laser debulking of SFA in-stent lesions ablates atherosclerotic and thrombotic material, facilitating subsequent balloon dilation and reduces the risk of thromboembolic events. As shown in Figure 1, excimer laser debulking creates a smooth channel and facilitates a good postballoon angiographic result. Larger 2.3-mm and 2.5-mm excimer laser catheters have been recently cleared by the FDA. These catheters allow for greater debulking in large peripheral arteries.

The excimer laser delivers high-energy pulses of ultraviolet energy through flexible fibers to ablate material at a cellular level without the use of blades. Excimer laser catheters have been tested in bench studies to evaluate the interaction of

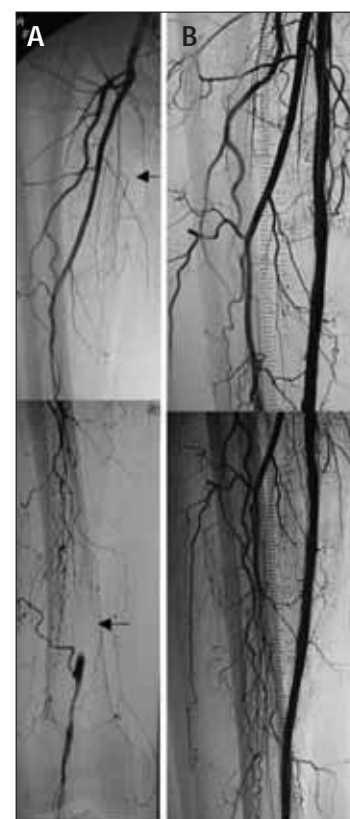


Figure 1. In-Stent occlusion before laser (A). Final result after debulking with a 2-mm excimer laser catheter and balloon (B). (Case images courtesy of Gary Ansel, MD)

the laser energy on stents. The tests repeatedly applied laser energy to the stent body and showed no adverse effects on the stent material. Furthermore, the excimer laser has been studied in coronary in-stent restenosis and has been shown to safely navigate through the stent without catching on stent struts or doing damage to the stent body. The Laser Angioplasty of Restenosed Stents (LARS) trial was a prospective randomized trial comparing excimer laser coronary atherectomy plus PTCA to PTCA alone in diffuse coronary in-stent restenosis. A subanalysis of the data showed that in the PTCA-only group, there was a mild trend toward more balloon-induced dissection and stent damage in the form of stent strut distortion and changes in stent to vessel wall apposition.⁶ The ability of the laser to safely navigate through a stent without harming the stent body is especially important in SFA restenosis, in which stent fractures are common. Stent fractures can result in broken struts or complete stent separation. In these situations, traditional atherectomy devices with moving blades can potentially catch on the fractured stent segment and may result in further stent damage or even complete dislocation.

CONCLUSION

Although new stent designs continue to improve the long-term outcomes of endovascular procedures in the SFA, restenosis will remain a challenge to interventionalists. Excimer laser debulking of in-stent restenosis simplifies reintervention on restenosed stents and may prevent complications. Clinical studies are necessary to evaluate the long-term effects of debulking in in-stent restenosis. In the meantime, the excimer laser is a convenient and easy-to-use tool to facilitate balloon angioplasty of in-stent restenosis without increasing the risk of further stent damage.

Giancarlo Biamino, MD, is Director of the Department of Clinical and Interventional Angiology, University of Leipzig Heart Center, Leipzig, Germany. He has disclosed that he is on the Spectranetics Medical Advisory Board and is a paid consultant to the company. Dr. Biamino may be reached at +49 341 865 1478; biag@medizin.uni-leipzig.de.

1. Abela GS. Laser arterial recanalization: a current perspective. *J Am Coll Cardiol.* 1998;12:103-105.

2. Deckelbaum LI, Isner JM, Donaldson R, et al. Reduction of laser-induced pathologic tissue injury using pulsed energy delivery. *Am J Cardiol.* 1985;56:662-667.

3. Grundfest WS, Litvack F, Goldenberg T, et al. Pulsed ultraviolet lasers and the potential for safe laser angioplasty. *Am J Surg.* 1985;150:220-226.

4. Grundfest WS, Litvack F, Forrester JS, et al. Laser ablation of human atherosclerotic plaque without adjacent tissue injury. *J Am Coll Cardiol.* 1985;5:929-933.

5. Isner JM, Donaldson RF, Deckelbaum LI, et al. The excimer laser: gross, light microscopic and ultrastructural analysis of potential use in laser therapy of cardiovascular disease. *J Am Coll Cardiol.* 1985;6:1102-1109.

6. Vitesse Cos Excimer Laser Catheter [instructions for use]. Colorado Springs, CO: The Spectranetics Corporation.