

Debulking Procedures: Potential Device Specific Indications

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During the past decade, the endovascular treatment of peripheral arterial disease has become more widespread due to the impressive extension of the endovascular toolbox to include different atherectomy technologies. The promise of atherectomy is to avoid the "barotraumas" defined as complications of traditional angioplasty such as dissection, elastic recoil, and disruption of the internal elastic lamina resulting in overwhelming neointima and smooth muscle cell proliferation. The oldest atherectomy technologies are the excimer laser and the Rotablator. The excimer laser technology is based on the principle of photoablation converting occlusive material into microbubbles being immediately dissolved into the blood. The Rotablator and the newer diamondback device are high speed rotational "sanding" devices particularly developed for the treatment of highly calcified plaque particularly in small vessel lesions, such as the popliteal and infrapopliteal segments. The Silverhawk system, currently the most widespread used device, is a directional atherectomy device particularly designed for eccentric and not severely calcified infrainguinal lesions whereas a variation of this device, the Rockhawk, is dedicated for the treatment of calcified plaques. The Jetstream system is the latest approved rotational atherectomy device focusing on native arteries with a reference vessel diameter of 4-6 mm in its current version; uniquely this device also has an aspiration capability making the device not only an atherectomy device but potentially also a thrombectomy device. This article will review the different indications for the use of these atherectomy devices including tips and specific device limitations.

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Clinical Evaluation of the Patient

Baseline evaluation of every patient regardless of the therapeutic approach to be used includes physical examination, calculation of the ankle brachial index, and in some patients a treadmill test for walking distance determination. The indications for an endovascular intervention should be limited to either lifestyle limiting claudication or to critical limb ischemia. During the physician's consultation the special needs of each individual patient must be evaluated. In general, the first step of the treatment of claudicants includes lifestyle modification, risk factor management, exercise training, and vasoactive medications such as cilostazol.¹ A duplex ultrasound examination is critical for planning and selecting the proper endovascular technology that will be used. The duplex ultrasound is the best diagnostic tool for the determina-

tion of plaque composition, plaque location, and lesion extent. This knowledge is crucial in deciding the most appropriate atherectomy technology. Furthermore, a duplex ultrasound performed by an experienced physician or technician can obviate the need for cross-sectional morphologic imaging. Magnetic resonance angiography and computed tomography angiography remain reserved for patients in whom the result of the duplex ultrasound examination is inconclusive as can occur in patients with extremely calcified vessels that produce acoustic shadowing of the vessel lumen limiting evaluation.

The Role for Atherectomy

The theoretic goal of atherectomy is to avoid the so-called barotraumas associated after angioplasty. These include vessel wall overstretch resulting in discontinuation of the internal elastic lamina, dissection, and acute elastic recoil. Even though the initial atherectomy studies using the Simpson Atherocath device^{2,3} or the Rotablator⁴ failed to show improved vessel patency when compared to balloon angio-

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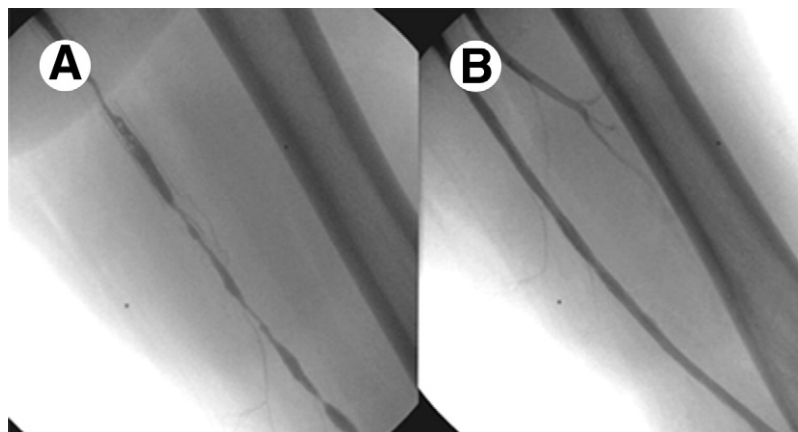


Figure 1 (A, B) Diffused and partially eccentric superficial femoral artery (SFA) lesion before (A) and after (B) Silverhawk atherectomy.

plasty; the introduction of new and more effective devices have recently led to the rebirth of atherectomy. However, the use of atherectomy systems is still only based on individual experiences and registry reports;⁵⁻⁷ randomized controlled trials comparing atherectomy systems with balloon angioplasty or stenting are still missing.

Indications for Particular Atherectomy Devices

Silverhawk Device

Silverhawk Device (FoxHollow-ev3, North Plymouth, MN) was designed for the treatment of vessel diameters between 3 and 7 mm. This device features an eccentrically exposed cut-

ter that is covered in housing during introduction and removal over a 0.014-in guidewire. Based on the design of the system, the major indications for the Silverhawk device are focal eccentric lesions that are not severely calcified (Fig. 1), bifurcation lesions of the infrainguinal arteries including the common femoral artery (Fig. 2), bypass anastomotic lesions, and long diffuse femoropopliteal lesions including chronic total occlusions (Fig. 3). Even though it is not yet approved for the treatment of in-stent restenosis lesions; Silverhawk atherectomy seems to be more effective than balloon angioplasty or cutting balloon angioplasty^{5,8} for these lesions. This device can usually be used to debulk a lesion and serve as stand alone therapy (without the need for additional angioplasty or stenting).

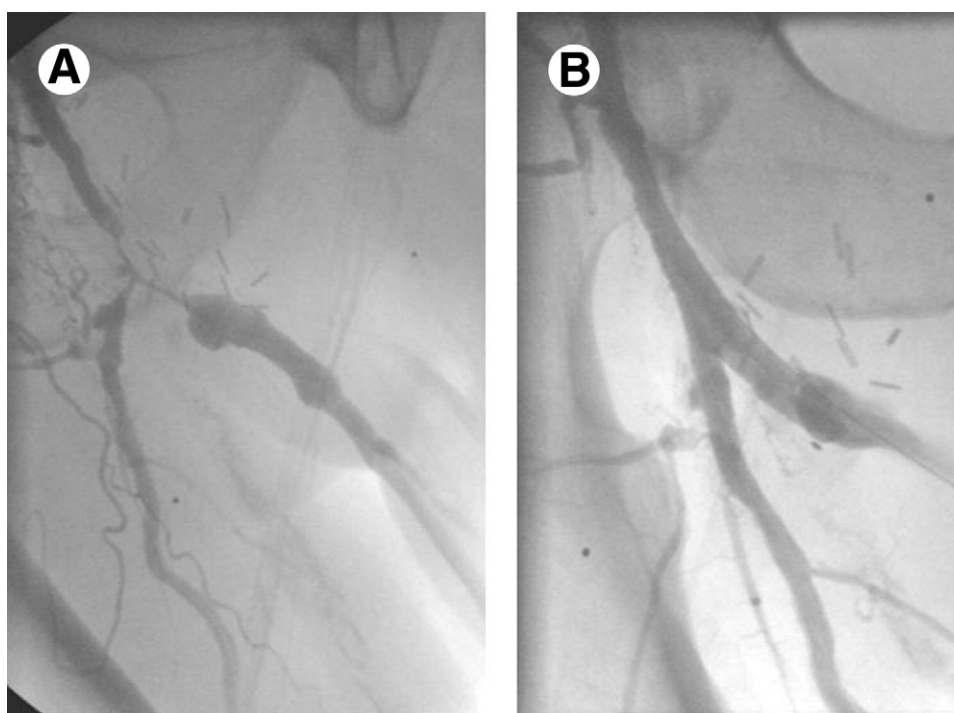


Figure 2 (A, B) Bifurcation lesion including the right common femoral artery, deep femoral artery, and a venous femoro-popliteal bypass before (A) and after (B) Silverhawk atherectomy.

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