Assisted Patency with Primary Stent Placement in Distal Anastomotic Stenoses of Lower Limb Bypass Grafts

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PURPOSE: To evaluate the feasibility and effectiveness of primary stent placement for treating distal anastomotic infragenicular bypass stenoses in terms of technical success and middle-term (2-year) patency rates.

MATERIALS AND METHODS: Twenty-one patients underwent primary stent placement for the treatment of distal anastomotic stenoses after infragenicular bypasses. Patients underwent clinical and color flow and duplex Doppler ultrasonographic (US) examinations 1, 3, 6, and 12 months after the endovascular procedure and every year thereafter if no complications occurred. Angiography was performed in patients with positive findings at the clinical and US examinations to evaluate the need for repeat endovascular and/or surgical treatment. The mean follow-up was 18.3 months (range, 2–30 months).

RESULTS: Twenty-two clinically significant (>50%) distal anastomotic stenoses were detected in 22 infragenicular grafts created in the 21 patients. The median time between endovascular treatment and surgery was 7.5 months (range, 3–18 months). The mean stenosis length was 1.4 cm (range, 0.8–2.4 cm). Twenty-four stents were implanted, two of which were used to treat restenosis immediately below the previously implanted stent. The technical success rate was 100%. No complications occurred during any of the treatments, and no periprocedural major events or complications were registered. At follow-up, the cumulative primary, primary assisted, and secondary patency rates for the treated graft stenoses were 95%, 95%, and 100%, respectively, at 6 months; 71%, 81%, and 86% at 1 year; and 71%, 76%, and 81% at 2 years. The limb salvage rate was 88%.

CONCLUSIONS: Although this study was limited to a small number of patients, stent placement seems to be a feasible and effective tool in the endovascular treatment of distal anastomotic infragenicular bypass graft stenoses.

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Abbreviations: ABI = ankle-brachial index, DSA = digital subtraction angiography, PTA = percutaneous transluminal angioplasty, PTFE = polytetrafluoroethylene

ACCORDING to recent therapeutic protocols and Transatlantic Inter-Society Consensus recommendations, the bypass graft is currently considered the most durable and effective therapy for limb salvage in patients with limb-threatening lower-extremity ischemia (1–3). Long-term follow-up bypass patency (3–5 years) varies from 51% to 75%, depending on the type of bypass performed (saphenous vein or prosthetic graft) (3–8).

During the 1st year after peripheral bypass, the risk of clinically significant stenosis is very high (9). Close bypass surveillance is therefore mandatory to detect graft stenosis, which, if uncorrected, can lead to graft occlusion. Although the accurate and timely treatment of these lesions improves graft patency, an agreement about the selection of the optimal method of repair has not been reached.

Open surgical repair (patch angioplasty or short jump grafts) is an effective and durable treatment for infrainguinal bypass graft stenoses, with a technical success rate of 92% and patency rates ranging from 78% to 88% at 14 months (10–12). However, complex reconstructive techniques may be necessary to maintain graft patency and limb salvage.

Although percutaneous transluminal angioplasty (PTA) has been advo-

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Table 1
Summary of Demographic and Clinical Data

Patient No/Sex/Age (y)	Rutherford Classification	Details of Grafts	Stent Size (mm)	Outcome after Primary Stent Placement
1/M/64	5	Left CFA to bPA (vein graft)	4 × 30	PTA performed at 9 mo for anastomotic intrastent restenosis. Patent at 24-mo follow-up.
2/M/71	4	Right CFA to ATA (PTFE graft)	3 × 18	Patent at 24-mo follow-up.
3/F/68	4	Right SFA to bPA (vein graft)	4 × 24	Died due to myocardial infarction at 2 mo.
4/M/65	4	Left CFA to TPT (PTFE graft)	2.5 × 18	Patent at 24-mo follow-up.
5/M/81	4	Left CFA to TPT (vein graft)	2.5 × 18	Graft occlusion at 4 mo treated with placement of a new stent. Patent at 24-mo follow-up.
6/F/74	5	Left CFA to ATA (vein graft)	3 × 24	Graft occlusion at 8 mo treated with surgery.
7/M/73	4	Left CFA to bPA (vein graft)	4 × 18	Patent at 24-mo follow-up.
8/M/78	4	Right CFA to PTA (vein graft)	4 × 30	Patent at 24-mo follow-up.
9/M/63	4	Right CFA to PeA (vein graft)	2.5 × 18	Patent at 24-mo follow-up.
10/F/62	4	Left CFA to PTA (vein graft)	3 × 18	Patent at 24-mo follow-up.
11/M/65	5	Right CFA to ATA (vein graft)	3 × 24	Patent at 24-mo follow-up.
12/M/68	4	Left SFA to bPA (PTFE graft)	4 × 18	9 months: graft occlusion: below-knee amputation.
13/F/86	4	Right CFA to ATA (vein graft)	3 × 18	7 months: anastomotic restenosis: new stenting proced. 15 months: graft occlusion: below-knee amputation.
14/M/69	5	Right CFA to PeA (vein graft)	2.5 × 18	Patent at 24-mo follow-up.
15/M/65	4	Right CFA to TPT (vein graft)	2.5 × 18	Patent at 24-mo follow-up.
16/F/55	4	Left CFA to bPA (PTFE graft)	4 × 30	Patent at 24-mo follow-up.
17/F/89	5	Right CFA to PTA (vein graft)	3 × 24	15 months: died (myocardial infarction).
18/M/76	4	Right CFA to PeA (vein graft)	2.5 × 18	Patent at 24-mo follow-up.
19/M/74	4	Left CFA to bPA (vein graft) Left CFA to bPA (vein graft)	4 × 18 4 × 30	Patent at 24-mo follow-up. Patent at 24-mo follow-up.
20/M/73	4	Right CFA to PTA (vein graft)	4 × 24	10 months: intrastent restenosis: PTA: no relief of symptoms: surgery.
21/F/69	5	Right CFA to PTA (vein graft)	3 × 18	Patent at 24-mo follow-up.

Note.—ATA = anterior tibial artery, bPA = below-knee popliteal artery, CFA = common femoral artery, PeA = peroneal artery, PTA = posterior tibial artery, SFA = superficial femoral artery, TPT = tibioperoneal trunk.

cated as an alternative to surgery, with an initial technical success rate of up to 87%, 1- and 2-year patency rates are only 29%–53% (9,13–15).

The aim of our study was to evaluate the feasibility and effectiveness of primary stent placement for the treatment of severe distal anastomotic infragenicular bypass stenoses in terms of technical success and middle-term (2-year) patency rates.

Table 2
Configuration of Infragenicular Bypasses

Bypass Configuration	No. of Grafts*	No. of Vein Grafts	No. of PTFE Grafts
Femoropopliteal, below knee	7 (32)	5	2
Femoroanterior tibial	4 (18)	3	1
Femorotibioperoneal trunk	3 (14)	3	0
Femoroposterior tibial	5 (23)	4	1
Femoroperoneal	3 (14)	3	0

* Numbers in parentheses are percentages.

MATERIALS AND METHODS

From January 2000 to March 2003, 141 infragenicular bypasses (113 in situ saphenous vein grafts, 16 reversed saphenous vein grafts, and 12 composite grafts) were performed at our institution in 138 patients with ischemic limb disease. Our routine grafts surveillance program included clinical evaluation and color flow and duplex Doppler ultrasonographic (US) examinations 1, 6, and 12 months after surgery and for every year thereafter if there are no complications.

The entire graft was scanned with US, and Doppler samples were obtained at 1–2-cm intervals. A stenosis was classified as clinically significant (stenosis >50%) at US if it had a peak systolic flow velocity gradient of at least 2.5. If clinically significant stenoses were suspected at clinical and US examination, patients were scheduled to undergo arteriography to confirm the diagnosis of focal distal anastomotic stenoses.

All patients with a clinically significant distal anastomotic infragenicular bypass stenosis were enrolled in our study. Each patient provided informed consent before undergoing endovascular treatment. This study was