

## Duplex Guided Balloon Angioplasty of Failing Infringuinal Bypass Grafts<sup>☆</sup>

N.A. Marks,<sup>\*</sup> A.P. Hingorani and E. Ascher

Division of Vascular Surgery, Maimonides Medical Center, 4802 Tenth Ave., Brooklyn, NY 11219, USA

**Objective.** To assess the results of angioplasty and stent placement under duplex guidance for failing grafts.

**Methods.** Over 22 months, 25 patients (72% males) with a mean age of  $74 \pm 10$  years presented to our institution with a failing infringuinal bypass. The site of the most significant stenotic lesion was in the inflow in four cases, conduit in 18 cases and at the outflow in 11 cases. All arterial (20) or graft (13) entry sites cannulations were performed under direct duplex visualization. Duplex scanning was the sole imaging modality used to manipulate the guide wire and directional catheters from the ipsilateral CFA to a site beyond the most distal stenotic lesion. Selection and placement of balloons and stents were also guided by duplex. In 11 cases (33%), the contralateral CFA was used as the entry site and a standard approach (fluoroscopy and contrast material) was employed. Completion duplex exams were obtained in all cases.

**Results.** The overall technical success was 97% (32/33 cases). In only one case, the outflow stenotic lesion in the plantar artery could not be traversed with the guidewire due to extreme tortuosity. Overall local complications rate was 6% (two cases). One vein bypass pseudoaneurysm caused by rupture with a cutting balloon was repaired by patch angioplasty and one SFA pseudoaneurysm at the puncture site required open repair. Overall 30-day survival rate was 100%. Overall 6-month limb salvage and primary patency rates were 100 and 69%, respectively.

**Conclusions.** Duplex guided endovascular therapy is an effective modality for the treatment of failing infringuinal arterial bypasses.

**Keywords:** Duplex-guided angioplasty; Failing infringuinal bypasses; Nephrotoxic contrast avoidance; Radiation exposure decrease; Interventional ultrasound; Cutting balloon.

### Introduction

The high-resolution images and accurate hemodynamic information provided by modern duplex scanners makes them a reliable tool for intraoperative and postoperative surveillance of infringuinal bypasses.<sup>1–10</sup> Moreover, timely repair of bypass stenoses may improve graft patency and limb salvage rates.<sup>11–13</sup> Balloon angioplasty has been shown to have similar results to surgical repair of graft stenoses.<sup>14–19</sup> Endovascular techniques traditionally employ the use of contrast arteriography and fluoroscopy, Johnson *et al.* attempted to augment this approach with duplex scanning to monitor the hemodynamic success of balloon angioplasties of failing infringuinal bypasses.<sup>20</sup>

In our recently published reports, we extended the application of ultrasound from diagnostic to therapeutic. The feasibility of duplex guidance for femoral–popliteal and infrapopliteal balloon angioplasties in patients with renal insufficiency was demonstrated in an attempt to avoid use of nephrotoxic contrast agents and radiation exposure.<sup>21,22</sup> To further explore the limitation and advantages of duplex-guided balloon angioplasty (DGBA), we describe the use of duplex guidance for balloon angioplasties of 33 failing infringuinal bypasses.

### Methods

#### Patients

Over the last 22 months, 25 patients (72% males) with a mean age of  $74 \pm 10$  years (range 48–89 years) presented at our institution with 33 failing infringuinal bypasses in 26 limbs. All patients had

<sup>☆</sup>Presented at the XIX Annual Meeting of the European Society for Vascular Surgery, September 16–19, 2005, Finlandia Hall, Helsinki, Finland.

<sup>\*</sup>Corresponding author. Natalie Marks, MD, RVT, Division of Vascular Surgery, Maimonides Medical Center, 4802 Tenth Ave., Brooklyn, NY 11219, USA.  
E-mail address: [nmarks@maimonidesmed.org](mailto:nmarks@maimonidesmed.org)

preoperative graft duplex scans, which identified at least one hemodynamically significant stenosis in the inflow artery, bypass conduit or outflow artery. Hemodynamically significant stenosis was defined as  $\geq 70\%$  diameter reduction measured by color image and confirmed with PSV ratio of  $\geq 3$ . Primary procedures were performed in 20 cases, 1st redo angioplasty in six cases, 2nd redo angioplasty in six cases and 3rd redo in the remaining case. Associated risk factors such as hypertension, diabetes, renal insufficiency (serum creatinine level  $\geq 1.5$  mg/dl), coronary artery disease and smoking were present in 84, 68, 60, 48 and 44% of cases, respectively. A total of 33 attempted balloon angioplasties (27 vein; six PTFE) were included in this study. Twelve vein grafts were common femoral artery (CFA) to popliteal artery (PA) (six) and infrapopliteal (six) bypasses, 10 were superficial femoral artery (SFA) to PA (three) and infrapopliteal (seven) bypasses and the remaining five were PA to PA (two) and infrapopliteal (three) bypasses. Of the six PTFE grafts four were CFA to popliteal (two) and infrapopliteal (two) bypasses and the remaining two were superficial femoral artery to popliteal bypasses. Bypass operations were performed from 3 to 78 months prior to the current procedure (mean  $26 \pm 22$  months).

#### Preoperative evaluation

None of the patients in this series were subjected to preoperative contrast arteriography. All patients underwent preoperative graft duplex scans in our vascular laboratory. Our duplex scan protocol included visualization of the ipsilateral infrainguinal inflow arteries, entire bypass conduit and outflow artery. After color and/or power imaging, spectral analysis was routinely obtained from the following points: proximal artery, proximal anastomosis, proximal, mid and distal bypass conduit, distal anastomosis and distal artery. Additional images were taken from areas of stenosis identified by color imaging and confirmed by peak systolic velocity (PSV) step-up. Balloon angioplasty was recommended for severe stenoses defined as  $\geq 70\%$  diameter reduction measured on color and/or power image and confirmed by PSV ratio  $\geq 3$  (Fig. 1). A single stenosis was demonstrated in 18 cases (55%) and multiple (range 2–5, mean  $1.8 \pm 1.1$ ) stenoses were present in the remaining 13 cases (45%). The site of the most significant stenotic lesion was at the inflow in four cases, conduit in 18 cases and at the outflow in 11 cases. Highest PSV at the stenotic areas were registered

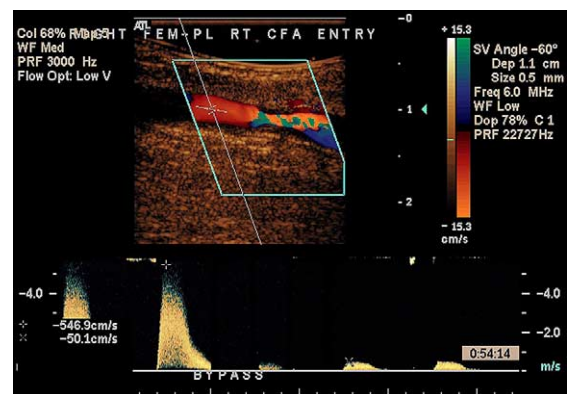


Fig. 1. Spectral analysis of the distal anastomosis of the femoral to popliteal artery vein bypass graft confirmed critical stenosis by PSV ratio of  $> 10$  (54.7 cm/s over 50 cm/s).

and compared before and after the procedure. Bypass volume flows (VF) were also recorded.

#### Technique

We used an ATL HDI 5000 scanner (Phillips Medical Systems, Bothell, WA) with SonoCT<sup>®</sup> in all cases. A linear 4–7 MHz probe inserted in a sterile plastic cover with coupling gel was utilized for artery and graft insonation on the thigh and calf. In addition, a compact linear 7–15 MHz 'hockey stick' probe allowed detailed visualization of more superficial arterial structures at the ankle and foot for bypasses to the dorsalis pedis and plantar arteries (seven cases) and for very superficial grafts (seven cases). Two cases required the use of a curved 2–5 MHz transducer to visualize distal anastomosis of the femoral to above-the-knee PA bypass in obese patients. All procedures were performed in the operating room under local anesthesia of the puncture site (an equal mixture of 1% lidocaine and 0.5% sensorcaine) and light sedation during inflation of the balloon angioplasty catheter. All access sites cannulations were done under direct duplex visualization. Short 6 Fr (23 cases), 5 Fr (eight cases) or 4 Fr (two cases) sheaths were chosen based on the profiles of anticipated balloons. Overall, 22 cases (67%) were completed in an antegrade fashion and the remaining 11 (33%) through a contralateral access. Twenty procedures were performed through the ipsilateral (nine cases) or contralateral (11) femoral puncture. The remaining 13 angioplasties were carried out through direct graft puncture (nine venous and four PTFE). Duplex scanning was the sole imaging modality used to manipulate the 0.035 in. Glidewire (Boston Scientific Corporation, Natick, MA 01760, USA) supported by either 5 Fr Selective Bern catheter (Boston Scientific Corporation, Natick, MA 01760,

Download English Version:

<https://daneshyari.com/en/article/2915033>

Download Persian Version:

<https://daneshyari.com/article/2915033>

[Daneshyari.com](https://daneshyari.com)