

ANGIOPLASTY OF A STENOSED FISTULA WITH AN ULTRAHIGH-PRESSURE, NONCOMPLIANT BALLOON



FIGURE 1 Fistulogram demonstrating a 3 cm high-grade stenotic lesion within a brachial-basilic fistula with little antegrade flow.

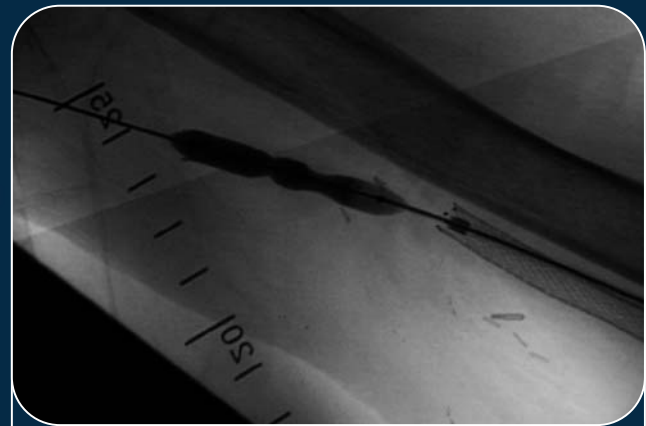


FIGURE 2 Failure of a 7 mm x 4 cm high-pressure balloon (20 atm rated burst pressure) to resolve the lesion. Note balloon waist.

Clinical Experience

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Maintenance of high-flow vascular access is critical to the survival of patients who require hemodialysis. Unfortunately, hemodialysis vascular accesses frequently become stenotic, typically as a consequence of intimal hyperplasia. Thrombosis of a stenotic access is the most common cause of access failure.

Percutaneous transluminal angioplasty (PTA) is the standard of care for patients with access stenosis exceeding 50% of the lumen. This minimally invasive procedure can prolong the usable life of the access, while reducing patient morbidity and mortality.^{1,2} However, because of fibrosis, it is not

unusual for a stenotic lesion to resist dilation pressures up to or above 20 atmospheres.³ Initial technical failure rates as high as 80% have been described,⁴ yet if most angioplasty balloons are inflated to a higher pressure, they may burst, damaging the access, perhaps permanently.

Mills-Peninsula Medical Center operates two 200 patient outpatient dialysis centers in the San Francisco Bay Area. Patients from these and two outlying regional centers are monitored for changes in access flow using ultrasound dilution. If diminishing graft flow is detected, vascular surgical consultation is obtained, while patients with an

occluded access are taken directly to the operating suite for surgical or endovascular graft thrombectomy. Fistulograms, outflow venograms and, when indicated, extremity arteriograms are obtained to determine the cause of the flow problem. Intragraft and venous stenoses are most often managed with balloon angioplasty. The Conquest™ PTA Balloon Dilatation Catheter, an ultrahigh-pressure, noncompliant PTA balloon,⁵ has revolutionized management of many of these patients, allowing very effective percutaneous treatment of stenoses, including challenging fibrotic lesions. The following case is representative of our clinical experience.

Case Report

A 74-year-old woman with renal failure secondary to diabetes and hypertension had received hemodialysis for 5 years. Most recently, she was dialyzed through an upper arm transposed brachial-basilic fistula that had been created 15 months prior to presentation with diminution in her fistula flow rates from 750 to 350 mL/min. She underwent placement of a 4F catheter into the most proximal portion of the fistula. A fistulogram demonstrated a 3 cm high-grade stenosis within the fistula, with little antegrade flow (Figure 1). The more central veins were without stenosis.

After the lesion had been traversed with a guidewire, the 4F catheter was exchanged for a 6F sheath. Initial attempts at dilating the stenosis with a standard 5 mm x 7 cm balloon catheter were unsuccessful. Likewise, attempts with a high-pressure 7 mm x 4 cm balloon catheter (20 atm rated burst pressure) did not fully efface the lesion (Figure 2). An 8 mm x 4 cm, ultrahigh-pressure Conquest™ PTA Balloon Dilatation Catheter (30 atm rated burst pressure) was subsequently introduced and inflated, allowing successful dilatation of this challenging lesion (Figure 3). On final fistulogram, there was prompt antegrade flow through the fistula without residual stenosis (Figure 4). Ultrasound dilution access flow rates after correction of the stenosis were increased to 800 mL/min. The graft remains widely patent with preserved flow rates 4 months after the procedure.

Discussion

Successful percutaneous treatment of dialysis access stenoses avoids a surgical procedure and perhaps the placement of a dialysis catheter. With standard angioplasty balloons and conventional PTA pressures, many intimal hyperplastic lesions cannot be treated adequately, requiring higher pressures with a noncompliant PTA balloon. Complications may result from overdistention of vein segments near the stenosis when using more compliant balloons. Such balloons can perforate the normal vein adjacent to the stenosis by overdilating it, without resolving the lesion. The truly non-compliant, ultrahigh-pressure Conquest™ balloon, which can be inserted through a 6F sheath, changes little in diameter, even when inflated to 30 atmospheres. Thus, the Conquest™ PTA Balloon Dilatation Catheter allows successful treatment of even difficult, fibrotic lesions.

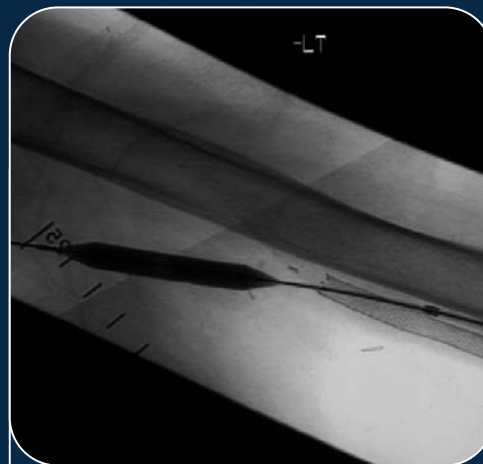


FIGURE 3 Full resolution of the same resistant lesion with an ultrahigh-pressure, noncompliant using a 8 mm x 4 cm Conquest™ PTA Balloon Dilatation Catheter (rated burst pressure: 30 atm).



FIGURE 4 Fistulogram at conclusion of procedure confirming restoration of access flow following successful treatment with a Conquest™ PTA Balloon Dilatation Catheter.

References:

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2. Gelbfish G. Surgery versus percutaneous treatment of thrombosed dialysis access grafts: is there a best method? *J Vasc Interv Radiol.* 1998;9:875-877.
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4. Vesely T. Percutaneous transluminal angioplasty for the treatment of failing hemodialysis grafts and fistulae. *Semin Dial.* 1998;11:351-359.
5. Ross JR. Ultrahigh-pressure PTA for hemodialysis. *Endovasc Today.* 2003;2:61-4.

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