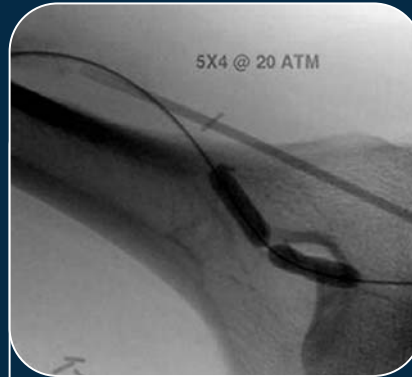


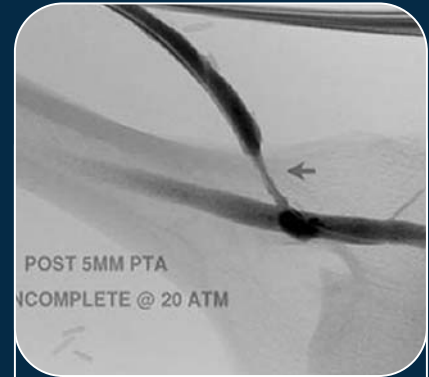
## HIGH PRESSURE ANGIOPLASTY OF A TRANSPOSED BASILIC VEIN FISTULA WITH JUXTA-ANASTOMOTIC STENOSIS AND DELAYED MATURATION



**FIGURE 1** Fistulogram 5 months after fistula creation demonstrating severe juxta-anastomotic stenosis extending from the brachial artery anastomosis into the transposed basilic vein segment.



**FIGURE 2** Angioplasty with a conventional 5 mm x 4 cm balloon at 20 atm failed to resolve the resistant lesion, as indicated by the prominent waist.



**FIGURE 3** Incomplete angioplasty with a conventional 5 mm balloon at 20 atm failed to resolve the lesion.

## Clinical Experience

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The juxta-anastomotic segment of native arteriovenous fistulae is prone to develop severe stenosis early after surgical creation.<sup>1,2</sup> This may be due to poor quality of the vein used at the time of fistula surgery, to subsequent sclerosis of this vein segment related to ischemia, or to other surgical factors. High pressure, turbulent blood flow may also contribute to the development of these lesions.<sup>5</sup> Early juxta-anastomotic stenosis of a native fistula is unlikely to be caused by the type of intimal hypertrophy that commonly affects the venous anastomosis of a graft.<sup>5</sup>

Surgical revision of a stenosed transposed upper arm fistula near the anastomosis is exceedingly difficult and generally requires sacrificing the stenotic segment and creating a new anastomosis, utilizing a more central portion of the transposed vein and

brachial artery. The more central the anastomosis, the deeper and more difficult the procedure, especially due to reoperation in a previously dissected area. Furthermore, less usable transposed vein is left for dialysis needle cannulation, resulting in a fistula that is difficult or impossible to access with two needles.

These lesions are commonly quite resistant to angioplasty and may require very high pressure to effectively dilate.<sup>2</sup> The following case demonstrates successful treatment of a highly resistant juxta-anastomotic lesion in a transposed upper arm fistula with delayed maturation using high pressure percutaneous transluminal angioplasty (PTA).

The patient, a 41-year-old male with end-stage renal disease due to diabetes

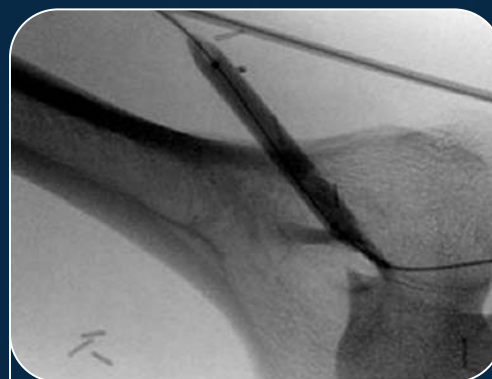
mellitus, initiated hemodialysis in December 2002 using a tunneled dialysis catheter placed in the right internal jugular vein. In January 2003, a left upper arm native arteriovenous fistula was created utilizing the brachial artery and the basilic vein with transposition. The fistula did not mature over the next several months — it had poor flow and thrill — and could not be cannulated for hemodialysis access. A fistulogram was performed in May 2003 showing severe stenosis extending from the brachial artery anastomosis 3 – 4 cm into the juxta-anastomotic segment of the transposed basilic vein (Figure 1). Angioplasty was performed using a conventional 5 mm x 4 cm balloon at 20 atmospheres (atm), but the waist failed to fully expand (Figure 2). Following incomplete PTA with a 5 mm balloon, severe stenosis persisted in

this fistula segment (Figure 3). Subsequently, a 6 mm x 4 cm Conquest™ PTA Balloon Dilatation Catheter (30 atm rated burst pressure) was used to dilate this lesion. This highly resistant lesion required 30 atm to efface the balloon waist (Figure 4). Following successful high pressure angioplasty with the Conquest™ PTA Balloon, there was no residual stenosis, with minimal self-limited extravasation, and immediate improvement in the fistula flow and thrill (Figure 5). Subsequently the fistula developed well and was successfully utilized for hemodialysis needle access. The fistula was restudied in August 2003 with mild venous outflow stenosis that responded well to angioplasty. At that time, the juxta-anastomotic segment was widely patent and did not require angioplasty. The fistula has functioned well since that time and has not required further intervention.

## Discussion

Native AV fistulae are recognized as the superior form of hemodialysis vascular access, and there is broad interest in promoting the use of native fistulae for maintenance hemodialysis.<sup>3</sup> Failure of a newly created fistula to mature (early failure) is common, limiting the prevalence of fistula usage. While abandonment of early failures was previously common practice, recent studies on aggressive evaluation and intervention of early fistula failures has demonstrated that many can be treated percutaneously to promote development of a mature fistula that can be cannulated for routine dual-needle hemodialysis access.<sup>1,2,4</sup> In many cases, severe stenotic lesions at or near the anastomosis require high pressure angioplasty to increase flow and promote fistula maturation.<sup>4</sup> Indeed, the long-term result of high pressure angioplasty at this site appears quite good. While restenosis may occur, it typically responds well to repeat angioplasty. Surgical revision may be reserved for those cases that recur rapidly and/or repeatedly after angioplasty.

In conclusion, the strength of the Conquest™ PTA Balloon Dilatation Catheter permits successful high pressure angioplasty of extremely resistant juxta-anastomotic stenotic lesions that can prevent normal fistula maturation. Early identification and successful intervention of such lesions by high pressure PTA may avoid or minimize catheter usage, and promote increased use of native fistulae nationally, as recommended by current clinical practice guidelines.<sup>3</sup>



**FIGURE 4** Full resolution of the resistant lesion with ultrahigh pressure PTA using a 6 mm x 4 cm Conquest™ PTA Balloon Dilatation Catheter at 30 atm. Note full effacement of the balloon waist.



**FIGURE 5** Successful high pressure PTA with the Conquest™ PTA Balloon immediately improved fistula flow and thrill, promoting fistula maturation, which subsequently allowed the fistula to be cannulated for routine hemodialysis access. The minimal post-procedural extravasation was self-limiting and there was no residual or recurrent juxta-anastomotic stenosis following the initial successful high pressure PTA.

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