ULTRAHIGH-PRESSURE ANGIOPLASTY OF
RECURRENT / REFRACTORY STENOSIS IN AN
UPPER ARM HEMODIALYSIS FISTULA

Clinical Experience
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Recurrent and refractory stenotic lesions in native fistulae and hemodialysis grafts are common in hemodialysis patients.1,2 Approximately 10% of our hemodialysis patients experience such stenoses. In our practice, recurrent stenosis is described as the return of a patient for stenosis treatment in less than three months following a previous intervention for a lesion at the same hemodialysis access site. We define refractory stenosis as a stenotic lesion unresponsive to balloon dilation at the time of intervention based on anatomic or physiologic (flow) criteria. This case is an example of both recurrent and refractory venous stenosis of a hemodialysis vascular access that was successfully treated using the Conquest™ PTA Balloon Dilatation Catheter (Bard Peripheral Vascular, Inc., Tempe, AZ).

Case Report
The patient, a 77-year-old male, had a native brachiocephalic fistula created in the upper arm approximately 20 months prior to initial referral to Interventional Radiology for assessment of access blood flow. At that time, the patient presented with decreased flow (350 mL/min) by transonic assessment of the fistula (Transonic Systems Inc., Ithaca, NY). A fistulogram demonstrated a venous stenosis 4 cm beyond the fistula site (Figure 1). The fistula itself was widely patent. Conventional percutaneous transluminal angioplasty (PTA) was performed with a moderate-pressure angioplasty balloon (8x40 mm Ultra-thin™ Diamond™ Balloon Dilatation Catheter; rated burst pressure: 15 atm; Boston Scientific, Natick, MA). Angiographic improvement was observed (Figure 2) and the patient was discharged. At the next hemodialysis treatment, following the conventional PTA treatment, the patient’s access flow rate had increased to 550 mL/min by transonic assessment.
Three months subsequent to conventional PTA, however, the patient presented again with decreased access flow (250 mL/min by transonic assessment). The patient was again referred to Interventional Radiology. A fistulogram demonstrated recurrent stenosis at the same site (Figure 3). Flow measurement with the AngioFlow™ System (Angiodynamics Inc., Queensbury, NY) demonstrated a reduction in access flow to 190 mL/min. Given the short time to recurrence of the stenosis, an 8x10 mm cutting balloon (Boston Scientific, Natick, MA) was utilized. No angiographic improvement was apparent following this procedure (Figure 4); flow measurement with the AngioFlow™ device demonstrated an access flow of 170 mL/min. At this point, a 9x40 mm ultrahigh-pressure Conquest™ PTA Balloon Dilatation Catheter (rated burst pressure: 26 atm) was utilized to dilate the recurrent, refractory stenotic lesion. Ultrahigh-pressure PTA resulted in marked improvement in the angiographic appearance (Figure 5). Treatment with the Conquest™ device led to a dramatic improvement in access flow, which increased to 1,260 mL/min as determined by the AngioFlow™ device. The increased flow rate was confirmed at the next hemodialysis session by transonic assessment.

Discussion

In the past—without the use of flow criteria—this patient would have returned to dialysis, where flow rates would have been found inadequate. The patient would have required repeated interventions or surgical revision. This case demonstrates limitations of conventional moderate-pressure PTA and cutting balloons in the treatment of larger diameter fibrotic stenosis in a hemodialysis fistula. By using a larger diameter (9x40 mm) Conquest™ balloon for ultrahigh-pressure PTA, we were able to disrupt the fibrotic, elastic lesion. Without this large diameter ultrahigh-pressure balloon, the patient would likely have needed to return for repeat interventions and ultimately for surgery for revision or creation of a new access. By utilizing the ultrahigh-pressure Conquest™ PTA balloon with the larger diameter, we were able to prolong the life of this hemodialysis access site.

In conclusion, the Conquest™ PTA Balloon Dilatation Catheter is an invaluable tool in the treatment of hemodialysis patients— for decreasing the number of repeated interventions and prolonging the life of a dialysis access site in the setting of recurrent or refractory venous stenosis.2

References: