

BALLOON ANGIOPLASTY FOR TREATMENT OF HEMODIALYSIS-RELATED STENOSES

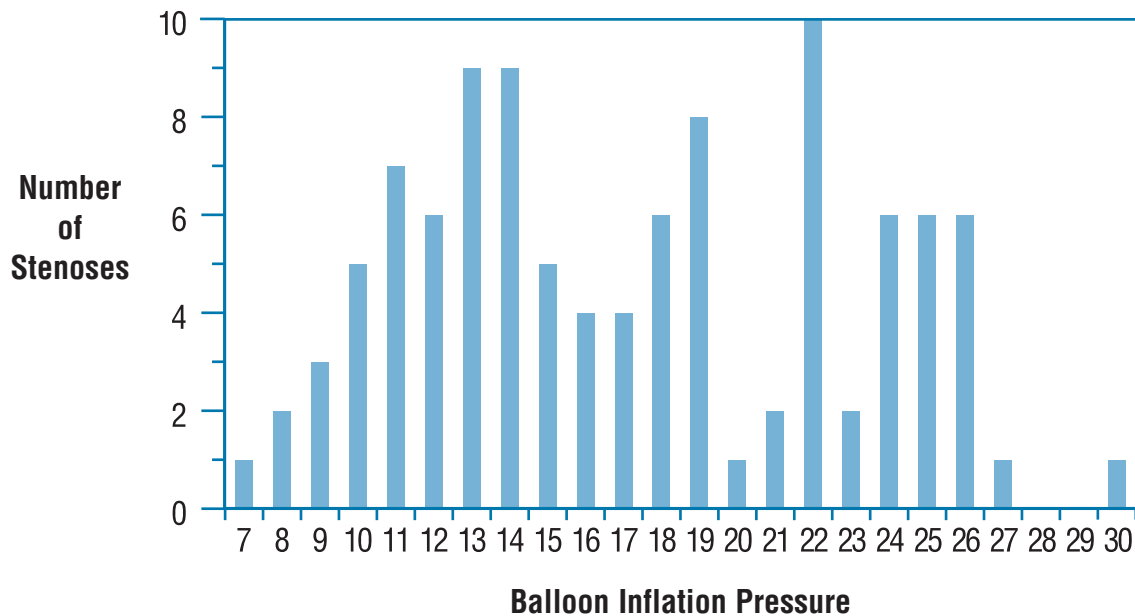


FIGURE 1 Distribution of balloon inflation pressures required to dilate 104 hemodialysis graft-related venous stenoses.

Clinical Experience

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The natural history of a hemodialysis graft is the gradual development of neointimal hyperplastic stenoses. The progressive growth of a stenosis will produce a focal narrowing which reduces blood flow and thereby decreases the performance of the vascular access. If left untreated, these aggressive lesions will eventually lead to occlusion and thrombosis of the vascular access.

Angioplasty continues to be the primary percutaneous technique for

the treatment of neointimal hyperplastic stenoses. It remains the standard of care to which other percutaneous methods are compared. The National Kidney Foundation K/DOQI Guidelines recommend the use of angioplasty for the treatment of hemodynamically significant lesions which are identified within the vascular access circuit.¹

When compared to arterial atherosclerotic lesions, neointimal hyperplastic stenoses are much more resistant

to balloon dilation and tend to recur quickly and aggressively. Despite the frequent use of angioplasty to treat hemodialysis access-related stenoses, there have been few clinical studies describing the balloon inflation pressures which are required to dilate these tenacious lesions. For this reason, I recently performed a prospective investigation to determine the inflation pressures which are necessary to dilate hemodialysis-related stenoses.

Study

This study included 89 patients with PTFE hemodialysis grafts who underwent balloon angioplasty of 104 stenoses. During the angioplasty procedure, the balloon inflation pressure that was required to fully dilate the stenosis was recorded. In this series of patients, the mean inflation pressure required to dilate 75 venous anastomotic stenoses was 17.9 ± 5.2 atm (range: 8 – 30 atm). The mean inflation pressure required to dilate 29 native vein stenoses was 15.6 ± 6.1 atm. The distribution of balloon inflation pressures for all 104 stenoses is shown in Figure 1. Approximately, one third of these stenoses required an inflation pressure of 20 atmospheres or higher.

The new generation of high-pressure angioplasty balloons has improved our ability to effectively treat intimal hyperplastic stenoses. However, the majority of these high-pressure balloons have rated burst pressures of only 20 atmospheres and further inflation above this pressure increases the risk of balloon rupture (Figure 2). As previously described, approximately 30 – 35% of venous anastomotic stenoses will require balloon inflation pressures above 20 atmospheres. Therefore, standard high-pressure balloons are not adequate for routine effective treatment of these resistant stenoses.

Recently, an ultra-high-pressure balloon (Conquest™ balloon catheter, Bard Peripheral Vascular) with a rated burst pressure up to 30 atmospheres has become available. The higher burst pressure of the Conquest™ angioplasty balloon substantially improves our ability to successfully dilate highly resistant stenoses which require inflation pressures above 20 atmospheres. Furthermore, the low profile of the Conquest™ angioplasty balloon allows the use of a 6 French vascular sheath with 7 mm and 8 mm diameter balloons, the sizes which are commonly utilized for treatment of venous anastomotic stenoses.

Summary

In summary, intimal hyperplastic stenoses associated with PTFE hemodialysis grafts commonly require high (≥ 20 atm) inflation pressures for effective treatment. The Conquest™ balloon provides an excellent option for successful treatment of these highly resistant stenoses.



FIGURE 2a A balloon inflation pressure of 26 atmospheres failed to fully dilate this venous stenosis.



FIGURE 2b Rupture of the angioplasty balloon causing injury to the adjacent vein and extravasation of contrast material.

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References:

1. National Kidney Foundation. K/DOQI Clinical Practice Guidelines for Vascular Access. *Am J Kidney Dis.* 2001;37 (suppl 1):S137-S181.

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