The significance of an ultrasound detected stenosis in arteriovenous radiocephalic fistulae

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Introduction

• The presence of an ultrasound detected stenosis in a fistula should not by itself determine the need for intervention. The impact of a stenosis on the haemodynamics within the fistula is of more relevance.
• Comparison between clinical, ultrasound and dialysis machine derived parameters may determine whether ultrasound is a predictor of potential thrombosis in the surveillance of arteriovenous fistulae (AVF).
• Low flow is recognised as a risk factor for thrombosis in the vascular system. This study aimed to determine whether arterial or fistula flow, as estimated by ultrasound, was a predictor of the need for intervention, as dictated by deterioration in dialysis machine derived parameters.

Material & Methods

All patients with an autologous radiocephalic fistula were entered into an ultrasound surveillance programme. They were assessed at 6 weeks, 3 months and 6 months. A stenosis was defined as greater than (x 3.0) increase in the PSV peripheral to and through the stenosis, with evidence of either hyperplasia within the lumen or a luminal reduction of more than 50% (Fig 1). In addition a surrogate marker for volume flow in the cephalic vein was calculated as VPSV x VDIAM, as measured between the arterial and venous access sites. These measurements were recorded in relation to access sites for dialysis. APSV and ADIAM were also recorded.

Results

A total of 60 radiocephalic (r-c) fistulae were followed up to 6 months.
In r-c fistulae APSV, ADIAM (the product of APSV and ADIAM (a marker for arterial flow), VPSV, VDIAM and the product of VPSV and VDIAM (marker for venous flow) were investigated at 6 wks, 3mths and 6mths. (Table 1, Fig 2). The fistulae were divided into three groups; Normal, Ultrasound defined Stenosis and Fistulae with a stenosis where an intervention was planned. Intervention included requiring a new fistula. There was a significant difference at 3 and 6 months for all venous parameters when comparing the intervention and stenosis group. There was also a significant difference between the normal and intervention group for all parameters. The arterial diameter was the only parameter that was not significant (p=0.7671).

Discussion

Based upon current definition, the presence of a stenosis does not mandate intervention on an AVF. This study shows that ultrasound estimated flow in the venous limb of a radiocephalic fistula may predict the need for intervention as determined by deterioration in dialysis machine derived parameters. Further evaluation using ROC analysis is required to determine the degree of stenosis which can predict the need for intervention with greatest sensitivity and specificity.