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TITLE

Prospective registry of imaging predictors of response to conventional balloon angioplasty for arteriovenous fistula stenosis – preliminary analysis

BACKGROUND

Conventional balloon angioplasty (CBA) is an established therapy for haemodialysis arteriovenous fistula (AVF) stenosis. Resistance to CBA (with >30% residual stenosis after CBA) occurs in approximately 15% of patients, leading to poor angiographic outcomes and necessitating the use of high-pressure or cutting balloons. Angiography (with quantitative vessel analysis – QVA) and ultrasonography (US) can potentially predict resistance to CBA and patency after angioplasty. Prior studies correlating intimal media thickening (IMT) on US with patency have found conflicting results. We aim to investigate the relationship of AVF stenosis imaging characteristics (US and QVA) with outcomes of CBA (resistance to CBA and long term patency). This is a preliminary analysis of the correlation between imaging characteristics and CBA resistance.

METHODS

This prospective observational study included 100 patients (115 stenotic lesions) who underwent CBA. US (IMT) and QVA (% luminal stenosis – %stenosis, minimal luminal diameter – MLD, reference vessel diameter – RVD, lesion length, lesion symmetry) were obtained before CBA. QVA was used to determine residual stenosis after CBA. Procedure details such as balloon inflation pressure and residual stenosis were analysed. Univariate linear regression analysis was used to study the relationships between these imaging variables, balloon inflation pressure and residual stenosis after CBA.

RESULT

Imaging characteristics did not correlate with the residual stenosis after CBA, except QVA(%stenosis), with a higher QVA(%stenosis) predicting higher residual stenosis after CBA (coefficient 0.31, $p = 0.005$). US(IMT) and QVA(MLD) showed significant correlation with inflation pressure used during CBA. US(IMT) correlated positively with inflation pressure used during angioplasty (coefficient 0.09, $p = 0.002$) while QVA(MLD) correlated negatively with inflation pressure (coefficient -1.15, $p = 0.014$). There is no relationship between balloon inflation pressure and residual stenosis.

CONCLUSIONS

The pre-angioplasty QVA(%stenosis) is predictive of greater residual stenosis after CBA and may therefore be of value in predicting patency after angioplasty. Follow up on patency will be reported upon study completion. Future studies should focus on whether the choice of angioplasty balloon may be guided by US(IMT) and QVA(MLD) due to their correlation with inflation pressure.

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