Feasibility of serial intracoronary ultrasound imaging for assessment of progression of intimal proliferation in cardiac transplant recipients

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Abstract

Background

Serial quantitative coronary angiography is used to assess progression of coronary disease; however, pathology studies have demonstrated angiographic insensitivity for determining atheroma. Intracoronary ultrasound (ICUS) can define and measure the components of the arterial wall and offers the potential for precise quantitative assessment of disease progression on serial examinations. The present study was done to test the feasibility of serially assessing intimal proliferation at the same coronary site with ICUS imaging in cardiac transplant recipients.

Methods and results

ICUS imaging was done with a 30-MHz, 5F or 4.3F ultrasound imaging catheter at the time of angiography in 70 cardiac allografts (3.8 sites per patient) initially and 1 year later. Mean intimal thickness (IT), luminal area (LA), and total area (TA) of lumen plus intima and an index of intimal thickness (II = TA - LA/TA) were measured at each site. Additionally, vessels were graded using a scale incorporating criteria of intimal thickness and circumferential involvement. Side-by-side comparisons of paired angiograms were performed both to verify the similarity of ICUS imaging site and to detect new angiographic abnormalities. At least one site could be assessed serially by ICUS in 100% of patients, but only 189 of the original 263 coronary sites (72%) (2.7 sites per patient) could be matched satisfactorily on the second study. Thirty-nine patients (56%) had mild IT and 31 patients (44%) had moderate or severe IT on the initial study. Both groups showed the same IT progression the following year (delta = 0.05 +/- 0.13 versus 0.07 +/- 0.15 mm; P = NS). Twenty-seven of the 70 patients (39%) showed progression by ICUS. The 23 patients with ICUS progression and angiographically normal vessels had the same progression in intimal thickening as the 4 patients with ICUS progression but showing angiographic disease (delta = 0.17 +/- 0.13 versus 0.22 +/- 0.10 mm; P = NS).

Conclusions

Replication of the intracoronary imaging site by judgment of two observers at an initial study and at a second study 1 year later was possible in at least one vessel site in 100% of the 70 patients and in 72% (189 of 263) of the original imaging sites (2.7 sites per patient). Serial ICUS demonstrates progression of intimal thickening at specific sites in only some cardiac transplant patients. Progression of intimal proliferation can occur in individuals in the presence or

absence of initially increased intimal thickening or of angiographic disease at the time of the initial studies. Angiography is insensitive for recognizing early intimal thickening of the coronary vessels.