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Intravascular Ultrasound Imaging Before and After Directional Coronary Atherectomy (DCA)

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To determine the effect of directional coronary atherectomy (DCA) on the atherosclerotic plaque, intravascular ultrasound (IVUS) studies were performed pre and post DCA. In 16 cases without adjunctive balloon dilatation, lumen cross-sectional area (CSA), vessel CSA, atheroma CSA, calcium (Ca) score, eccentricity index, and % area-atheroma by IVUS were compared at the same section of the artery.

	<u>Pre DCA</u>	<u>Post DCA</u>	
Lumen CSA (mm ²)	2.7±0.7	7.3±1.6**	
Vessel CSA (mm ²)	16.5±4.2	18.4±4.4*	
Atheroma CSA (mm ²)	13.8±3.9	11.1±3.9**	
Calcium Score	1.3±0.9	1.2±0.9	
Eccentricity Index	0.59±0.27	0.34±0.19*	
% Area-Atheroma (%)	83±5	59±10**	
Angio % diam stenosis	72±11	18±15**	(*p<0.05, **p<0.01)

DCA removed 20% of the atheroma CSA, and stretched the vessel total CSA by 12%. The mean increase in the lumen created by DCA was 4.6 mm², 59% of this was due to the cutting effect and 41% was due to a stretching effect. The calcium index did not change, which suggests that DCA does not remove much calcified tissue. The decrease in eccentricity index indicates that DCA does not cut atheroma uniformly. Despite a successful angiographic appearance, IVUS demonstrates that DCA leaves a large residual plaque burden (59% CSA) which could explain the high restenosis rate with this technique.