Intravascular ultrasound imaging of coronary arteries. Is three layers the norm?

Circulation. 1992;86:154–158

Authors
P J Fitzgerald, F G St Goar, A J Connolly, F J Pinto, M E Billingham, R L Popp, and P G Yock

Abstract

Background

The purpose of this study was to evaluate the significance of the three-layered appearance of coronary arteries in adolescence and adults from intravascular ultrasound scans and to correlate these observations with histopathology.

Methods and results

Sixteen intact hearts were excised at autopsy from patients with no clinical history of coronary artery disease. The patients' ages ranged from 13 to 55 years. A 30-MHz ultrasound imaging catheter was used to obtain images throughout the epicardial coronary vasculature. A total of 72 image cross sections was marked by epivascular sutures, and the corresponding histological sections were examined. Ultrasound images were classified into two groups: images exhibiting three-layered appearance and images without distinct layering. Histological analysis revealed a significantly greater degree of intimal thickening in segments with three layers (243 +/- 105 microns) than in nonlayered segments (112 +/- 55 microns). Discriminant analysis of these data predicted the threshold between the two groups to be 178 microns. Measurements of medial thickness were not different between these two groups (235 +/- 61 versus 210 +/- 76 microns). In the nonlayered group, the average patient age was 27.1 +/- 8.5 years, whereas in the three-layered groups, the average age was 42.8 +/- 9.8 years.

Conclusions

The intracoronary ultrasound image appearance of young, morphologically normal coronary artery walls is homogeneous without layering. A three-layered appearance suggests the presence of at least 178 microns of intimal thickening and is seen more frequently with advancing age.