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


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**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.