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External elastic lamina vs. luminal diameter measurement for determining stent diameter by optical coherence tomography: an ILUMIEN III substudy

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Abstract

Aims: Optical coherence tomography (OCT)-guided external elastic lamina (EEL)-based stent sizing is safe and as effective as intravascular ultrasound in achieving post-procedural lumen dimensions. However, when compared with automated lumen diameter (LD) measurements, this approach is time-consuming. We aimed to compare vessel diameter measurements and stent diameter selection using either of these approaches and examined whether applying a correction factor to automated LD measurements could result in selecting similar stent diameters to the EEL-based approach.

Methods and results: We retrospectively compared EEL-based measurements vs. automated LD in reference segments in 154 OCT acquisitions and derived a correction factor for stent sizing using the ratio of EEL to LD measurements. We then prospectively applied the correction factor in 119 OCT acquisitions. EEL could be adequately identified in 100 acquisitions (84%) at the distal reference to allow vessel diameter measurement. Vessel diameters were larger with EEL-based vs. LD measurements at both proximal

(4.12 ± 0.74 vs. 3.14 ± 0.67 mm, $P < 0.0001$) and distal reference segments (3.34 ± 0.75 vs. 2.64 ± 0.65 mm, $P < 0.0001$). EEL-based downsizing led to selection of larger stents vs. an LD-based upsizing approach (3.33 ± 0.47 vs. 2.70 ± 0.44 , $P < 0.0001$). Application of correction factors to LD [proximal 1.32 (IQR 1.23-1.37) and distal 1.25 (IQR 1.19-1.36)] resulted in discordance in stent sizing by >0.25 mm in 63% and potentially hazardous stent oversizing in 41% of cases.

Conclusion: EEL-based stent downsizing led to selection of larger stent diameters vs. LD upsizing. While applying a correction factor to automated LD measurements resulted in similar mean diameters to EEL-based measurements, this approach cannot be used clinically due to frequent and potentially hazardous stent over-sizing.

Keywords: intravascular imaging; optical coherence tomography; stent sizing.

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