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Age-related Effect of Smoking on Coronary Artery Disease Assessed by Grayscale and Virtual Histology Intravascular Ultrasound

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Background: Although smoking is a risk factor for coronary atherosclerosis and sudden cardiac death, the age-related impact of smoking on lesion and plaque morphology has not yet been studied.

Methods: In PROSPECT, 687 pts presenting with acute coronary syndrome underwent 3-vessel grayscale and virtual histology intravascular ultrasound (VH-IVUS) imaging of 3185 non-culprit lesions. We studied 480 pts <65 years of age separately and compared quantitative and qualitative non-culprit lesion characteristics among non-smokers, former smokers (no smoking for >1 month), and current smokers (smoking within 1 month).

Results: In pts <65 years of age, current and former smokers showed significantly smaller normalized volumes (mm3/mm) of external elastic membrane (EEM), lumen, and P+M (plaque+media) as compared to non-smokers (Table). Conversely, in pts ≥65 years, current smokers had greater normalized P+M volumes than non-smokers with no difference in normalized EEM or lumen volumes between smokers vs. non-smokers. At the minimal lumen area site, current smokers had greater normalized P+M volumes than non-smokers. However, there was no significant difference in pts <65 years of age.

Conclusions: Smoking had a vascular constrictive effect on non-culprit coronary lesions in pts <65 years of age, but not in pts ≥65 years of age. Conversely, in pts ≥65 years of age, smoking was more likely to impact plaque instability.

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Coronary Computed Tomography Angiography Overestimate Coronary Lumen Dimension than Intravascular Ultrasound Especially Small Lumen Measurement

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Background: Intravascular ultrasound (IVUS) can detect luminal dimension relatively accurately but IVUS is more invasive, expensive and laborious than coronary computed tomography angiography (CTA).

Methods: 60 patients with intermediate stenosis by CTA underwent IVUS assessment of the comparative lesion. The results from IVUS and CTA were compared using the two-tailed paired t-test.

Results: There was a poor correlation between IVUS and CTA with respect to minimum lumen diameter (correlation 0.21, P=0.37) and minimal luminal area (correlation 0.18, P=0.45). The proximal reference lumen diameter detected by CTA is numerically higher than that of IVUS without statistical significance (3.16±0.59 mm vs 2.98±1.74 mm, P=0.14). The minimal lumen diameter detected by CTA is trend to higher than that of IVUS without statistical significance (2.27±0.81 mm vs 1.93±0.28 mm, P=0.07). There was a significant difference in the assessment of distal reference segment luminal diameter (2.63±0.65 mm vs 2.88±0.41 mm, P=0.03) and distal reference segment luminal area (6.70±1.93 mm² by IVUS vs 5.70±2.64 mm² by CTA, P=0.03). Bland Altman plot showed CTA overestimated the coronary lumen diameter by comparison with IVUS.

Conclusions: The luminal dimension detected by CTA is higher than that of IVUS. In conclusion CTA overestimated the coronary lumen dimension especially small lumen like minimum lumen and distal reference lumen.