Coronary CT angiography detects twice as much atherosclerotic burden compared to invasive angiography

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Purpose: Despite widespread use of Coronary CT Angiography (CCTA) and Invasive Coronary Angiography (ICA) for coronary plaque burden assessment, few studies have compared coronary CCTA and ICA regarding semi-quantitative plaque burden measurements.

Methods: We enrolled 71 consecutive patients (mean age 60.8±11.7 years, 36.6% women), who underwent 256-slice CCTA and conventional ICA. A total of 1016 coronary segments were imaged by both modalities. The images were analyzed according the modified 18-segment AHA classification. We excluded 16 segments treated with coronary stents. We calculated the segment stenosis score (SSS), which describes the amount and severity of the stenosis (0-normal, 1-minimal, 2-mild 3-moderate 4-severe 5-occluded). The presence of plaques was described by the segment involvement score (SIS) (0-intact, 1-plaque). The SSS index (SSSi)=SSS/all assessed segments and SIS index (SISi)=SIS/all assessed segments were also calculated. The CCTA and ICA scores were compared with Wilcoxon rank sum test.

Results: CT detected coronary artery plaques in 48.7% of all assessed segments (487/1000), whereas ICA showed coronary plaques in 23.5% (235/1000) of 1000 segments ($p<0.001$). CCTA detected atherosclerotic plaques in 34.8% (266/765) of coronary segments where the ICA was negative. We found significant differences between the two methods for segment involvement and luminal stenosis, CCTA versus ICA; SISi: 0.49±0.22 vs. 0.24±0.14 ($p<0.001$); SSSi: 1.17±0.64 vs. 0.67±0.50 ($p<0.001$).

Conclusion: CCTA detected approximately twice as many coronary segments with atherosclerotic plaques than ICA. Using CCTA for atherosclerotic plaque burden assessment may allow for better risk stratification and treatment of patients with coronary atherosclerosis.