CATEGORIES IMAGING AND PHYSIOLOGY: Physiologic Lesion Assessment

TCT-222

Intravascular Ultrasound Guided Percutaneous Coronary Intervention Is Associated With a Longer Stented Segment and Less Residual Ischemic Burden in Treating Diffuse Coronary Artery Disease

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BACKGROUND Previous studies have demonstrated that functional percutaneous coronary intervention (PCI) result is suboptimal in the majority of patients treated with long drug-eluting stents, and a significant proportion of patients remain ischemic (fractional flow reserve [FFR] ≤0.8) after PCI. We sought to investigate whether the use of intravenous ultrasound (IVUS) has an impact on the stent length and functional PCI result in treating long (≥30 mm) coronary artery lesions.

METHODS A total of 154 patients with stable angina or non-ST-segment elevation acute coronary syndrome with a functionally significant coronary artery lesion (FFR ≤0.8) requiring stent length ≥30 mm were enrolled in the study; 74 patients underwent angiography and FFR-guided PCI (angiography/FFR group), and in 80 patients PCI was guided with the use of IVUS (IVUS group). IVUS was performed before PCI and was used to select stent implantation sites (optimally with a plaque burden <50%) and stent diameter (distal external elastic membrane diameter − 0.25 mm). Operators were trying to reach optimal PCI results according to IVUS of 1) good stent position, 2) good stent expansion (minimal stent area [MSA] >90% of distal reference lumen area and/or MSA ≥5.5 mm^2); 3) plaque burden 5 mm proximal and distal to the stent <50%); and 4) no stent edge dissection.

RESULTS Results are presented in the Table. Baseline clinical characteristics were similar in both groups. The target vessel in the majority of cases was the left anterior descending coronary artery. The stented segment was longer in the IVUS group compared with the angiography/FFR group (62.5 [IQR: 48.0-76.0] mm vs 49.0 [36.0-60.3] mm; $P = 0.001$). Although the median of baseline and post-PCI FFR values did not differ significantly between the groups, 11% of the angiography/FFR group patients had a post-PCI FFR ≤0.8, whereas there were no such patients in the IVUS group ($P = 0.01$). In addition, there were more patients with post-PCI FFR >0.9 in the IVUS group; however, this difference did not reach statistical significance.

Characteristics, mean ± SD, n (%), or median (IQR)	Angiography/FFR Group (n = 74)	IVUS Group (n = 80)	*P* Value
Age, years	66.3 ± 9.6	66.2 ± 9.0	0.95
Male sex	54 (73.0)	57 (71.3)	0.81
Target vessel LAD	61 (82.4)	66 (82.5)	0.83
Total stent length, mm	49.0 (36.0-60.3)	62.5 (48.0-76.0)	<0.001
Baseline FFR	0.63 (0.52-0.69)	0.66 [0.59-0.71]	0.08
FFR after PCI	0.88 (0.84-0.91)	0.88 (0.85-0.92)	0.60
FFR after PCI ≤0.8	8 (11.0)	0 (0)	0.01
FFR after PCI 0.81-0.9	45 (61.6)	55 (68.8)	NS
FFR after PCI >0.9	20 (27.4)	25 (31.2)	NS

CONCLUSION The use of IVUS in treating diffuse coronary artery disease resulted in longer stented segments and less ischemic burden after PCI.

CATEGORIES IMAGING AND PHYSIOLOGY: Imaging: Intravascular

TCT-223

The Coronary CT–Derived Plaque Burden and Low-Attenuation Plaque According to Fractional Flow Reserve Range in Diabetic Patients With Deferred Vessels and Its Prognostic Implication

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BACKGROUND The relationship between plaque characteristics and long-term outcome according to the fractional flow reserve (FFR) range in patients with or without diabetes mellitus (DM) who had deferred vessels remains unknown. The aims of this study were to 1) compare the coronary CT angiography (CTA)-derived plaque characteristics and 2) investigate the impact of plaque characteristics on long-term clinical outcome according to FFR range in patients with or without DM with deferred vessels.

METHODS This is a substudy of the CCTA-FFR registry and a per-vessel-based analysis. Of the 1,231 vessels with FFR measurement and available coronary CTA, 515 FFR-guided deferred vessels were included in this study. Deferred vessels were stratified into 2 categories for analysis based on FFR value: 0.90 < FFR ≤ 1.00 and 0.80 < FFR ≤ 0.90. The qualitative or quantitative coronary plaque features were analyzed on a per-vessel basis for comparison of vessel-specific clinical outcomes. Vessel-oriented composite outcome (VOCO), defined as the composite of cardiac death, vessel-related myocardial infarction, and vessel-related ischemia-driven revascularization, at 5 years was evaluated as primary end point.

RESULTS In deferred vessels with 0.80 < FFR ≤ 0.90, patients with DM had a significantly higher plaque burden than those without DM (24.1% [IQR: 12.9%-31.3%] vs 19.8% [IQR: 10.1%-27.2%]; $P = 0.045$). In patients with DM, the plaque burden significantly increased in deferred vessels with low-attenuation plaque (LAP) compared with those without LAP (31.1% [IQR: 23.6%-39.6%] vs 22.6% [IQR: 10.9%-29.5%]; $P = 0.045$). The patients with DM showed a higher risk of 5-year VOCO than those without DM (adjusted HR: 7.3; 95% CI: 2.0-27.0; $P = 0.003$), and there was a significant interaction between plaque burden and the presence of LAP regarding the risk of VOCO (P interaction = 0.01). LAP and lesion location in proximal are independent predictors of VOCO in patients with DM.

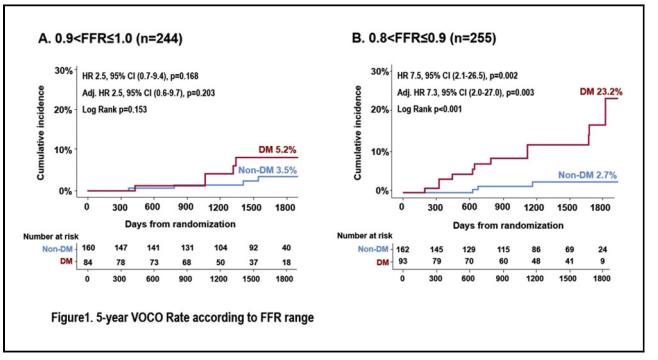

Figure1. 5-year VOCO Rate according to FFR range

CONCLUSION The risk of VOCO was significantly increased with FFR of 0.81-0.90, and plaque burden and LAP were associated with 5-year VOCO risk in patients with DM who had deferred vessels.

CATEGORIES IMAGING AND PHYSIOLOGY: Physiologic Lesion Assessment