

BACKGROUND There is lack of established stent expansion criteria to predict long-term outcomes following percutaneous coronary intervention (PCI) in calcified coronary lesions. The aim of this study was to evaluate the relationship between various stent expansion indices and clinical outcomes including target lesion failure (TLF) following PCI in patients with calcified coronary lesions.

METHODS This study was a retrospective single center study. Patients with native calcified coronary artery lesions treated with imaging guided PCI and the availability of final intravascular ultrasound or optical coherence tomography images were included. The association between six stent expansion indices and long-term TLF was evaluated.

RESULTS A total of 280 lesions from 221 patients were analyzed. The median patient age was 71 years (Interquartile Range: 63-77), and 155 (70.1%) were male. The median follow-up duration was 282 days (IQR: 415-1222 days). Among the six stent expansion indices, achieving a minimum stent area (MSA) >100% of the distal reference lumen area (adjusted HR 0.29; 95% CI 0.13-0.65; $p = 0.003$) and meeting the criterion of MSA >5.0 mm² or >90% of the distal reference lumen area (adjusted HR 0.41; 95% CI 0.22-0.75; $p = 0.004$) were both associated with significantly lower risk of long-term TLF. In contrast, other criteria—including MSA, conventional stent expansion, MSA/Vessel Area at MSA, MSA of the proximal segment ≥90% of proximal reference lumen area and MSA of the distal segment ≥90% of distal reference lumen area—were not significantly associated with TLF. A subgroup analysis showed a greater impact of MSA >100% of distal reference lumen area criterion to predict outcomes in severely calcified lesions than in moderately or mildly calcified coronary lesions.

CONCLUSION In the present retrospective analysis, a final MSA >100% relative to the distal reference lumen area and MSA >5.0 mm² or >90% of distal reference lumen area criteria were most accurate in predicting TLF after PCI of calcified coronary lesions.

CATEGORIES IMAGING AND PHYSIOLOGY: Imaging: Intracoronary

TCT-157

The EMPOWER CAD Study of Women with Calcified Coronary Arteries: Insights into the Use of Optical Coherence Tomography with Intravascular Lithotripsy



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BACKGROUND Treatment of calcified lesions in women is associated with poor outcomes and higher mortality. Calcium modification with atherectomy is associated with higher rates of dissection, major adverse events (MACE) and bleeding for women, whilst intravascular lithotripsy has shown low rates of serious angiographic complications, and MACE regardless of sex. Using optical coherence tomography (OCT) to guide treatment decision making during PCI has been associated with improved outcomes.

METHODS The EMPOWER CAD study (NCT05755711) is a prospective, multi-center, single-arm observational study of a “real-world” female population with calcified CAD treated with intravascular lithotripsy (IVL). Of the total 399 women enrolled, 103 were included in a pre-specified sub-study to assess PCI outcomes with OCT guidance. Procedural success, angiographic complications, and target lesion failure (TLF) were assessed.

RESULTS Of the 103 women receiving OCT guidance during IVL-assisted PCI, the mean age was 72.9±9.2 years, 40.8% had diabetes, and mean Age, Creatinine, and Ejection Fraction (ACEF) score was 1.38±0.31. Most lesions were in the LAD (61%), maximum calcium thickness was 0.87±0.22mm and calcium arc was 247±89°. Overall procedural success was 95.0% and TLF was low (4.9%). Calcium fractures were seen in 59% of lesions, with mean fracture per lesion of 2.23±2.89 and mean length of 5.43±4.31mm. After stenting, there was significant improvement in minimal lumen area (1.96±0.84 mm² vs. 5.27±1.67 mm²; $p < 0.0001$) and area stenosis (67.5±12.6% vs. 22.7±16.2%; $p < 0.0001$), with a 101±25% mean stent expansion at the site of maximum calcification.

CONCLUSION The EMPOWER CAD OCT sub study is one of the largest series of severely calcified lesions in an all-comers population of women. OCT guided IVL PCI confirmed successful calcium modification and resulted in high procedure success and low TLF. The EMPOWER OCT sub analysis further confirms the benefit and utility of IVL during PCI in women with complex disease and heavy calcification.

CATEGORIES IMAGING AND PHYSIOLOGY: Imaging: Intracoronary

TCT-158

IVUS but not Angiographically Derived Stent Enhancement Tools Can Differentiate the Scoring Mechanisms of Calcified Coronary Lesions



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BACKGROUND Calcified lesions hinder stent deployment and remain challenging. Differential effects and clinical utility of lesion preparation using a scoring balloon are important to characterize. We sought to compare the performance of an X-ray stent enhancement visualisation (StEV) tool versus IVUS.

METHODS The WEDGES trial randomized patients from 5 Belgian centres with de novo calcified lesions to either predilatation using a conventional semi-compliant (SC) balloon or the Brosmed WEDGE™ scoring balloon (W). IVUS was recorded before pre-dilatation, post, and after stenting in a subgroup of 31 patients among the 78 randomized patients. Stent expansion (SE) was measured by StEV (Stent Enhancer, Pie Medical). By IVUS, two SE could be assessed, the minimal one, similar to StEV, and a second at the cross-section with the highest initial burden of calcium. SE was calculated as the StEV diameter, or the diameter derived from the IVUS area, divided by the chart table diameter of the stent or balloon at the implanted pressure.

RESULTS Predilatation was performed with 46 W among 95 lesions treated. The mean patient age was 70±9 years; 71% were males, 74% were hypertensive, 76% were dyslipidemic, and 37% were diabetic. Successful balloon crossing was achieved in 88% and 89% of the SC and W arms, respectively. Additional noncompliant (NC) balloons were needed in 30% of the SC arm and 7% of the W arm ($p < 0.05$). StEV diameter measurements were possible for 91 stents and 61 after postdilatation. After implantation, the mean stent diameter (3.0±0.5 vs 3.0±0.5 mm), residual diameter stenosis (19±8 vs 18±8%) did not differ between the 2 groups, nor after postdilatation. SE was similar (95±8% vs 98±9% for the SC and W arms, respectively, $p = 0.77$). By IVUS, minimal SE was 84±7% in the 15 lesions treated by SC, and 88±8% in the 16 lesions by W. However, at the level of the most calcified cross-section in the lesion (average Ca arc was 315°, whereas it was 185° at the MLA), SE was significantly lower after SC than after W: 90±9 vs 98±15% respectively.

CONCLUSION IVUS remains key in understanding plaque modification mechanisms in calcified lesions, demonstrating a beneficial scoring effect at the highest calcified burden.

CATEGORIES IMAGING AND PHYSIOLOGY: Imaging: Intracoronary

TCT-159

Effect of Evolocumab on coronary segments with calcified nodules: Insights from the YELLOW III study



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