10005

Impact of Post-intervention Minimal Stent Area on Long-term Patency of Paclitaxel-Eluting Stents: An Intravascular Ultrasound Analysis from the TAXUS trials

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We investigated the predictive value of the intravascular ultrasound (IVUS) measured post-intervention minimum stent area (MSA) on long-term paclitaxel-eluting stent (PES) patency compared to bare metal stents (BMS). Background: Stent underexpansion is a strong predictor for restenosis after sirolimus-eluting stent implantation, but the implication of underexpansion in PES is still unknown. Methods: From the combined TAXUS IV, V, and VI and TAXUS ATLAS WH, LL, and DS trials, 1580 patients (PES: 1098, BMS: 482) in IVUS substudies were analyzed. The MSA that best predicted angiographic in-stent restenosis (ISR; % diameter stenosis >50%) was determined. Results: The post-intervention IVUS MSA was similar in PES and BMS (6.6±2.5mm^2 vs. 6.7±2.3 mm^2, p=0.92). At 9-month follow-up, angiographic ISR was lower in the PES-treated group versus the BMS-treated group (10% vs. 31%, p<0.0001). Using multivariable logistic regression analysis, post-intervention IVUS MSA was the independent predictor of subsequent ISR in both PES and BMS groups (Odds Ratio 0.77 [0.67, 0.89], p=0.0002 for PES, and Odds Ratio 0.77 [0.67, 0.89], p=0.0002 for BMS). The ability of the post-intervention IVUS MSA to predict ISR was further assessed using receiver operating characteristic analysis. The post-intervention IVUS MSA was found to be a fair discriminator between patients with and without ISR in both PES (c=0.6382) and BMS (c=0.6373). Finally, the optimal thresholds of post-intervention IVUS MSA that best predicted stent patency at 9 months were 5.7mm^2 for PES and 6.4mm^2 for BMS. Conclusion: Post-intervention MSA measured by IVUS can predict long-term stent patency after both PES and BMS implantation.