Intravascular Ultrasound for Assessment of Coronary Drug-Eluting Stent Deployment

An Evolving Field in Need of New Criteria

We read the report by Doi et al. (1) and the accompanying editorial by Honda and Fitzgerald (2) with great interest, and we congratulate the investigators for analyzing such a large dataset to enhance our understanding of intravascular ultrasound (IVUS)-guided stent deployment. The results of their study confirm the predictive value of post-intervention minimal stent area for midterm stent patency following implantation of paclitaxel-eluting stents, as has previously been shown in bare-metal stents and sirolimus-eluting stents (3–5). As the investigators allude to in their discussion, whereas these data demonstrate a relationship between post-paclitaxel-eluting stent minimal stent area and angiographic restenosis, it is unlikely that a single minimal stent area cutoff value becomes clinically useful in guiding drug-eluting stent (DES) percutaneous coronary intervention. There are several potential reasons for this: 1) the diverse presenting clinical syndromes and lesion characteristics of the patient population that determine the unpredictable robustness of the neointimal response; 2) the varying luminal diameter of the stented segment resulting from vessel tapering; 3) the inconsistent angiographic and IVUS definitions for in-stent restenosis used in the studies (including ≥50% diameter stenosis at 6 months [3], 9 months [1], or 12 months [4], and IVUS minimal lumen area ≤4 mm² at 8 months [5]), with a distinct lack of clinically more relevant physiologically defined restenosis; and 4) the differing stent and polymer design as well as pharmacokinetics of drugs eluted from the various DES platforms.

Clearly, interventionalists are cognizant of the aforementioned complexities of predicting DES restenosis as well as risk factors for stent thrombosis in an individual patient. In this context, it is reasonable to ask whether the incremental imaging data provided by IVUS-guided stent deployment using our current “IVUS guidelines” is valuable enough to justify its use in the DES era. We have shown that, in contrast to bare-metal stents, overexpansion does not play an important role in creating neointimal hyperplasia and subsequent ischemic end points following sirolimus- and paclitaxel-eluting stent implantation (6), suggesting that a more aggressive DES deployment strategy would be desirable, provided it can be performed safely. Indeed, the ongoing randomized multicenter AVIO (Angiography Versus IVUS Optimization) trial may shed light on the value of IVUS-guided percutaneous coronary intervention in the DES era using an aggressive IVUS deployment strategy. This European study is using as target stent cross-sectional area ≥70% of the media to media diameter, measured after initial stent deployment and averaged between the proximal and distal part of the stent. The investigators have previously found these IVUS-guided stent deployment criteria to be safe and feasible in a single center study (7). Until the results of these ongoing investigations are available, interventionalists will continue to individualize IVUS criteria for bare-metal stent and DES deployment based on patient, lesion, and anticipated stent characteristics focusing on adequate strut apposition and stent expansion.

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REFERENCES