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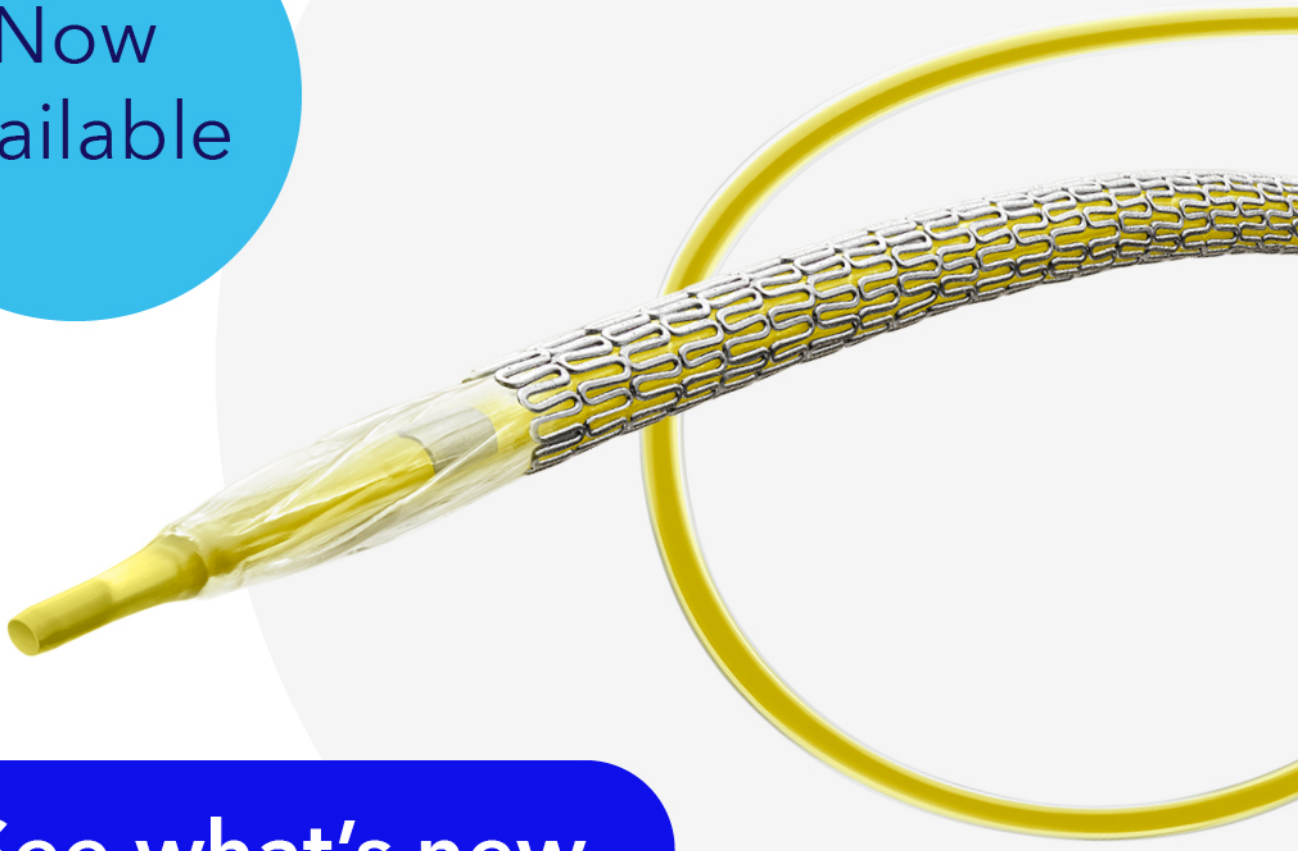

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COMMENTARY

WILEY

Second generation drug eluting stent: The longer, the better?

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Long stented segments were associated with poor outcomes (lower acute success and higher restenosis and thrombosis rates) from the early experience with stent implantation.[1] Drug eluting stents (DES) and especially second-generation DES reduced adverse events, but they remained higher in patients requiring multiple stents.[2] Interventional cardiologists, already reluctant to implant long stents because of their poor deliverability, became suspicious of long stents and kept 38–40 mm stents as the greatest available length on their shelves. Unfortunately, lesions longer than 40 mm may include more than 20% of the complex currently treated PCI lesions. It is with this backdrop that we read with keen interest the study by Gautier et al in this issue of Catheterization and Cardiovascular Interventions, in which the authors provide results of a consecutive series of 268 patients and 276 lesions receiving a 48 mm long everolimus eluting stent (EES) either alone or in combination with other stents.[3] The excellent 1-year outcome (4.1% clinically driven target lesion revascularization (TLR) and 0.8% stent thrombosis with a nearly complete −96.1%- follow-up) is even more remarkable if you consider the high prevalence (34%) after chronic total occlusions (CTO) and of small stents (46.1% smaller than 3.0 mm). Deliverability was also excellent with uneventful aborted attempts occurring in 5.3% of cases, a percentage possibly going to drop even more with the claimed better new iterations of this stent design (Skypoint®, Abbott Vascular).

This is certainly a reassuring confirmation of the high performance of modern second-generation DES but also reflects the careful technique applied in one of the best interventional centers worldwide. In 79.7% of cases, they used post-dilatation which, in long stents, is required not only to ensure expansion in resistant lesions but also to deal with vessel tapering. With the exception of the body of the right coronary artery (RCA) which constituted anyway the majority of the vessels treated (66.3%), the use of larger balloons for proximal post dilatation is essential. This means that the 2.5 mm stent was matching the small distal reference diameter, but the operator obtained a greater than 3.0 or 3.5 mm diameter along most of the stent lengths also in these cases. The ability of the specific design of 3.5 mm XIENCE stents allowed the inclusion of 5.9% left main lesions where a generous Proximal Optimization Technique (POT) could stretch the stent up to 5.63 mm.[4] The authors do not mention the frequency of use of intravascular imaging (IVUS or OCT) but guidance with these tools can facilitate optimization of stent expansion and apposition, especially in segments with rapid tapering such as the mid-LAD. Mechanical stent failure with fractured struts threatened the integrity of old stent designs, especially in arteries subject to repeated extreme bending such as RCA or vein grafts. Again, no intravascular imaging is reported at follow-up during TLR, but its incidence is so low that we must assume great progress has been made also to avoid clinically meaningful stent fractures.

The implantation of overlapping stents is often inevitable to treat long diffuse lesions owing to extreme initial lesion length or edge dissection, or incomplete lesion coverage. The availability of very long stents reduces but does not eliminate this need. More than 50% of the patients in this consecutive registry had two or more stents, with two 48 mm EESs implanted in 13.4% of cases. The group with multiple stents had a numerically worse outcome but in the absence of a sufficiently large randomized trial or of at least a matched comparison it is impossible to say whether the worse apposition and stent coverage of the overlapping segments is responsible. Longer stents have been manufactured, sometimes already built on tapered balloons, and comparison between these devices and overlapping stents may address this question.[2] Data available so far failed to show meaningful differences in outcome despite the possible concerns raised by the slower and less complete endothelialization process in overlapping stents.[5] All these trials, however, indicated that the implantation of a single stent v multiple stents of equivalent length means induces longer fluoroscopy and procedure time, with more contrast volume and, if the stent cost is the same irrespective of length, greater cost. Gautier et al also observed shorter procedure time and reduced contrast volume in single 48 mm EES patients in this study.[3]

This study also addressed a challenging lesion subset: CTOs.[3] After crossing CTOs a complete rapid coverage of all the occluded segments reduces the risk of dissections propagating downstream or expanding laterally, with the possible development of late pseudoaneurysms. Especially after retrograde recanalization when the extracorporeal loop provides excellent support, advancing a longer stent is always feasible. Target lesion was a CTO in 34% of cases, and a single long EES was sufficient in almost one-fourth of CTO cases (23.4%) in this study. In addition to shorter the procedure time, it can prevent the occurrence of luxation which may result in late nonocclusive stent thrombosis.

Some warnings are required to avoid overenthusiastic interpretations of this study. The reported good acute and late performance are certainly helped by a meticulous implantation technique, as highlighted above, and results might be different in the hands of less skilled and less experienced operators. The study still confirms that longer lesions and stented segments are associated with worse outcome so that the low TLR and stent thrombosis in this registry should not encourage unnecessary returns to the dreadful practice of creating a full metal jacket up to the most distal branches. Still, when it is obvious that a very long stent is required, with the exception of extremely tapered or severely angulated and calcified lesions, the longest stent available should be chosen with confidence. The operator should be ready to spend time optimizing its proper expansion but using a single longer stent still spares time, radiation burden and contrast load. Stent enhancement algorithms, available in the newer X-ray suites of most vendors, reduce the risk of long overlapping segments but cannot match the efficacy of a single long stent.

CONFLICT OF INTEREST

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