All Drug-Eluting Stents Are Equal, But Some Drug-Eluting Stents Are More Equal Than Others*

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The first battle fought by drug-eluting stents (DES) was with bare-metal stents. The 2 DES approved by the U.S. Food and Drug Administration, sirolimus drug-eluting stents (S-DES) and paclitaxel drug-eluting stents (P-DES), showed superiority in significantly reducing restenosis rates and target lesion revascularization rates compared with bare-metal stents in a wide range of patient and lesion subsets. In the past 2 years, we have been witnessing the 2 DES “taking on” each other. In this issue of the Journal, Elezi et al. (1) compare the angiographic and clinical outcomes according to vessel size in >2000 consecutive patients at 2 German sites treated with either S-DES or P-DES. Overall, there were no differences in death and myocardial infarction rates with respect to vessel size or specific DES stent type. However, there were significantly higher binary restenosis rates and target lesion revascularization (TLR) rates in small vessels (≥2.41 mm) compared with moderate and large vessels. The adverse outcomes in the lower tertile were DES-type specific with a significant reduction in TLR rates favoring S-DES, (8.4% vs. 16.4%). Thus, the adaptation of George Orwell’s classic commandment from Animal Farm seems to nicely reflect the current study’s assessment of the appropriate vessel characteristics in choosing between the 2 approved DES.

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Although this is a retrospective study and therefore is potentially subject to bias in specific type of DES selected, the results are an important addition to the literature. The sheer size of the trial and high angiographic follow-up rates provide compelling evidence in support of the superiority of S-DES in small vessels.

There are several issues that should be considered in determining the generalizability of the study findings to routine clinical practice.

First, are the data consistent across the tertiles for the various DES types? Certainly the late lumen loss is remark-

*Editorials published in the Journal of the American College of Cardiology reflect the views of the authors and do not necessarily represent the views of JACC or the American College of Cardiology.

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P-DES (0.19 vs. 0.32 mm), lower binary restenosis rates (6.6% vs. 11.7%), and lower TLR rates (4.8% vs. 8.3%) (4).

Based on the findings in the current study, should interventional cardiologists now restrict small-vessel stenting (<2.50 mm) to S-DES? There is no doubt that S-DES is superior to P-DES in terms of smaller late lumen loss, and several trials (randomized and nonrandomized) have shown that this benefit in late lumen loss was associated with lower binary restenosis rates and TLR rates. However, there is one important randomized study that is contrary to this position. The REALITY trial also showed significant reduction in late lumen loss in S-DES compared with P-DES (0.09 vs. 0.31 mm), but no significant differences in either binary restenosis rates (7% vs. 8.3%) or TLR rates (6% vs. 6.1%) (5). Of particular relevance to the current study, the REALITY trial is also a small-vessel study because the mean reference diameter was only 2.4 mm.

How can we explain such disparate results in binary restenosis rates and target vessel revascularization in spite of consistent differences in late loss favoring S-DES? A peculiar finding in the REALITY trial was a significantly smaller postprocedural minimal luminal diameter in S-DES group compared with P-DES (2.08 vs. 2.16), which mitigated the benefit of the subsequent reduction in late lumen loss. Secondly, although mean late loss is correlated with angiographic and clinical restenosis (6), this relationship is characterized by a curvilinear function (7). This means that a similar difference in late lumen loss between the 2 DES will have a much a smaller incremental effect on restenosis rates at low values of late lumen loss (e.g., 0.9 and 0.31 mm in the REALITY study) than at higher values (e.g., 0.25 and 0.50 mm in the current study).

Thus, the bulk of the evidence in the literature, including the current study, supports the use of S-DES as first-line therapy for treating small vessels. Although there are conflicting data supporting S-DES superiority or equivalence of the 2 DES types with respect to clinical restenosis and TLR rates, there are no published studies showing better results with P-DES compared with S-DES in this particular subgroup. The magnitude of the clinical benefit of S-DES over P-DES varies in different studies according to the absolute magnitude of late lumen loss in each group and the absolute difference of late lumen loss between the 2 DES types. Although late lumen loss is always lower in S-DES, this does not invariably mean lower clinical restenosis rates and TLR rates, especially when both stents show relatively low levels of late lumen loss as seen in the REALITY trial. Overall, the evidence is strongly tilted toward favoring S-DES in small vessels, although the inconsistencies in the currently available data can be used by clinicians to justify use of either DES. There is still a need for corroborative support from prospective, randomized, multicenter studies or other large single-center experiences before S-DES can be universally accepted as the primary choice for small-vessel stenting.

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