Meta-Analysis Comparing the Frequency of Target Lesion Revascularization with Drug-Coated Balloons or Second-Generation Drug-Eluting Stents for Coronary In-Stent Restenosis

Coronary in-stent restenosis (ISR) remains challenging even in the era of second-generation drug-eluting stents (DES).[1] Drug-coated balloons (DCB) have emerged as an appealing modality for treatment of ISR. Randomized trials comparing DCB and second-generation DES for ISR have been underpowered to determine a difference on clinical outcomes. Therefore, we aimed to conduct an updated meta-analysis of randomized trials to compare the impact of both modalities with a focus on clinical outcomes for any ISR (i.e., bare metal stent or DES), and for DES-ISR separately.

Details of the previous meta-analysis have been described.[2] Briefly, randomized trials comparing DCB versus second-generation DES for any ISR were included. Summary estimates were constructed with a random effects model, and standardized mean differences (SMDs) were used for continuous outcomes. The primary outcome for this analysis was target lesion revascularization (TLR); TLR was chosen as the primary outcome since revascularization of other lesions in the same vessel (i.e., target vessel revascularization [TVR]) could dilute the potential differences in the efficacy between the 2 strategies. A subgroup analysis was performed for DES-ISR only. The secondary outcomes included TVR, major adverse cardiac events (MACE), MI, stent thrombosis, all-cause mortality, and the angiographic outcomes (i.e., in-segment minimum luminal diameter [MLD], diameter stenosis [DS], and late lumen loss). The outcomes were reported at the longest available follow-up. For the purpose of this analysis, an updated search for the previously searched data sources was performed from February 2018 to December 2018.

The updated search identified 2 new randomized trials.[3,4] A total of 7 randomized trials with 1,363 patients were included (726 in the DCB arm and 637 in the second-generation DES arm). A paclitaxel-eluting balloon was the DCB utilized whereas the everolimus-eluting stent was the comparator except for one trial[4] which used a second-generation sirolimus-eluting stent. The mean reference vessel diameter ranged from 2.5 to 3.0 mm. At a mean of 8.2 months, DCB was associated with a lower in-segment MLD (1.87 mm vs 2.00 mm; SMD −0.22, 95% confidence interval [CI] −0.35-[−0.11], p <0.01), a higher in-segment DS (31.0% vs 26.6%; SMD 0.23, 95% CI 0.13 to 0.34, p <0.01), but a lower late lumen loss (0.16 mm vs 0.23 mm; SMD −0.16, 95% CI −0.27-[−0.05], p <0.01) (**Figure 1**).

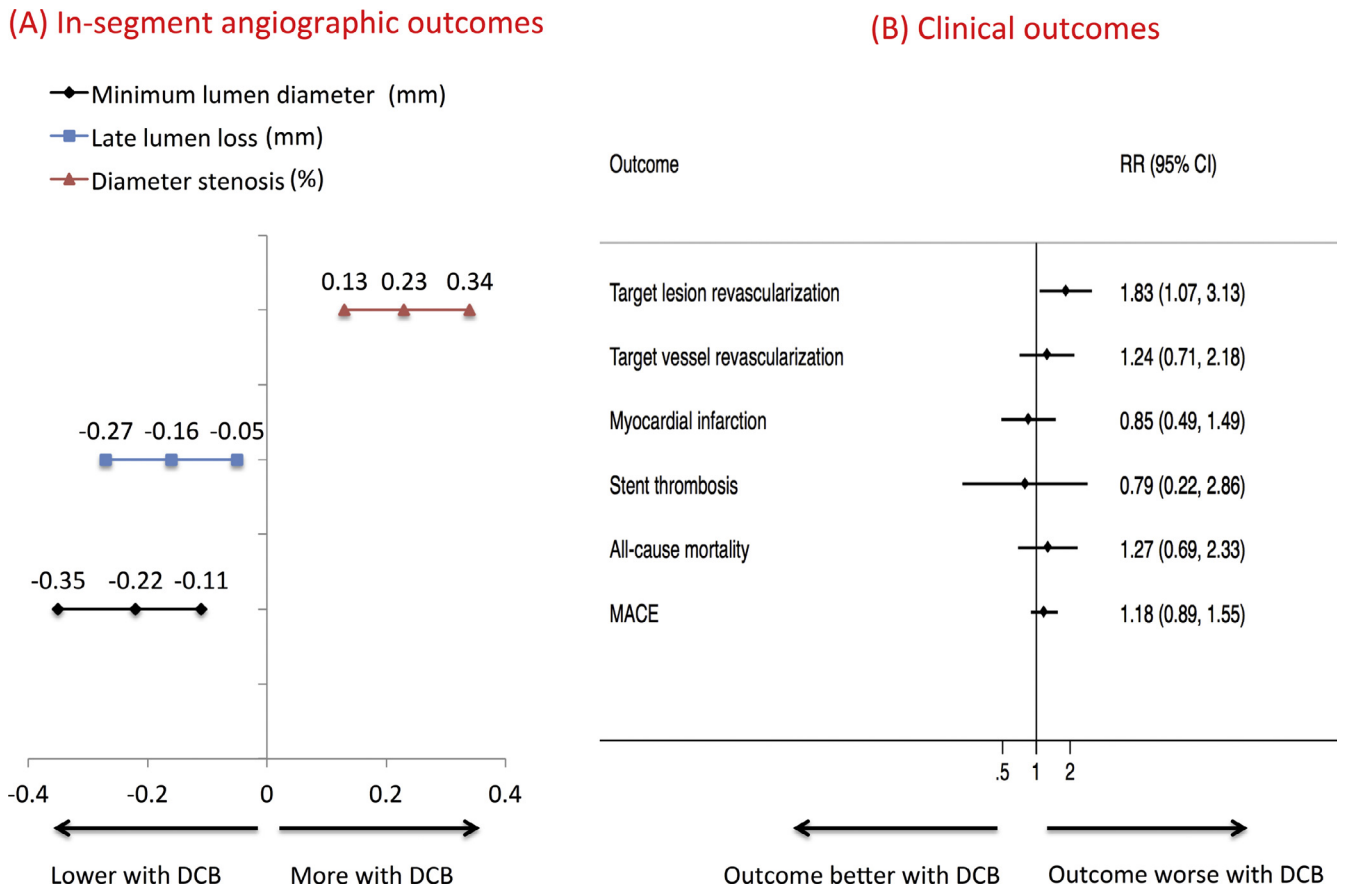

Figure 1. (*A*) Forest plot summary for in-segment angiographic outcomes (p values for all outcomes was <0.01); (*B*) Forest plot summary for clinical outcomes assessed in this meta-analysis (p value for target lesion revascularization = 0.03, but was nonsignificant for the remainder of the outcomes).

DCB was associated with an increased risk of TLR (11.4% vs 5.6%; risk ratio [RR] 1.83, 95% CI 1.07 to 3.13, p = 0.03, I^2 = 14%) at a mean of 27 months. This effect was noted on the analysis limited to DES-ISR only (RR 1.88, 95% CI 1.08 to 3.20, p = 0.02, I^2 = 4%). There was no difference between both strategies in terms of the secondary clinical outcomes (**Figure 1**).

In this updated meta-analysis of 7 randomized trials with 1,363 patients with any ISR (i.e., bare metal stent or DES), we demonstrated that DCB was associated with a higher incidence of TLR at 27 months. This observation was noted even when the analysis was limited to DES-ISR only. The increased incidence of TLR with DCB could be related to the lower in-segment MLD and higher DS at a mean 8.2 months. These findings suggest that optimal late angiographic and clinical outcomes are achieved with second-generation DES. It is reassuring that there were no differences between both strategies on the incidence of MACE, TVR, myocardial infarction, stent thrombosis, and all-cause mortality. Thus, future studies should focus on identifying lesions that might obtain excellent angiographic and clinical outcomes with DCB. This meta-analysis represents the largest meta-analysis of randomized trials to date comparing both strategies, although this analysis might be limited by the methodological heterogeneity due to the different types of paclitaxel-eluting balloons, we noted minimal statistical heterogeneity for TLR.

This meta-analysis of randomized trials demonstrated that second-generation DES is associated with improved late TLR and angiographic outcomes compared with DCB for any ISR. This effect is noted when limited to DES-ISR. Further studies are needed to elucidate on the role of DCB for the management of ISR.

Disclosure

All the authors have no conflicts of interest to disclose.

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Trends in Utilization of Surgical and Transcatheter Mitral Valve Repair in the United States*

Mitral regurgitation (MR) is the most frequent valve disease in the United States (US). Nearly 1 in 10 people aged ≥75 years are estimated to have moderate or severe MR.[1] Surgery with either mitral valve repair (MVr) or replacement is generally recommended for patients with severe MR to improve symptoms and survival.[2] However, ≈50% of patients with severe MR requiring surgery are turned down due increased perioperative risk owing to advanced age, frailty, left ventricular dysfunction, and comorbidities.[3] Due to this unmet need, there has been a dramatic growth in the development of novel transcatheter mitral valve repair (TMVr) technologies. The MitraClip transcatheter edge-to-edge repair (TMVr) system was approved for commercial use by the FDA in October 2013 in the US for use in patients with symptomatic severe degenerative MR who were considered at prohibitive risk for surgery based on safety and efficacy data from the Endovascular Valve Edge-to-Edge Repair II clinical trial.[4,5] Although TMVr utilization in clinical practice has increased dramatically, there are limited data on the relative utilization of TMVr and isolated surgical MVr (SMVr) in the U.S. Although hospitals are required to report TMVr data to the Society of Thoracic Surgeons /American College of Cardiology (ACC) Transcatheter Valve Therapy Registry by the Centers for Medicare and Medicaid services national coverage determination, data entry is voluntary making it subject to selective reporting and there is potential underreporting of non-Medicare patients since follow-up data are linked to Medicare databases.[6] Lastly, data on SMVr utilization are not available. Therefore, in this study, we utilized the publicly available National Inpatient Sample database to examine the national practice patterns in parallel utilization of TMVr and isolated SMVr following FDA approval of TMVr in October 2013.[7]

We queried the NIS databases from October 2013 to September 2015 to identify all patients aged ≥65 years undergoing TMVr (ICD-9-CM code 35.97) or SMVr (ICD-9-CM code 35.97). In the SMVr group, those undergoing concomitant coronary bypass grafting or other valvular surgery were excluded to identify those undergoing isolated SMVr. Survey specific techniques accounting for the multilevel nature of the data were used for weighting to obtain national estimates.[8] For trend analyses, the study period was divided into quarterly (Q) time intervals. Poisson regression analyses were used to examine the changes in the number of MVr procedures over time in the overall study population and in prespecified age subgroups (65 to 74 years, 75 to 84 years, and ≥85 years). Statistical analysis was conducted using SPSS version 23.0 (IBM Corp., Armonk, New York). All p

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