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New generation stents for primary percutaneous coronary intervention in patients with acute myocardial infarction: evidence from an individual patient data network meta-analysis of randomized clinical

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Background: Drug-eluting stents have shown their superiority in primary percutaneous intervention in patients with ST-segment elevation myocardial infarction (STEMI). No specific stent type has fully proven its superiority over others.

Purpose: We sought to compare the safety and efficacy of coronary artery stents in STEMI patients undergoing primary PCI through comprehensive network meta-analysis (NMA).

Methods: We performed an individual patient data (IPD) NMA of dedicated randomized trials in STEMI patients treated with coronary stents. The primary endpoint of interest was the composite outcome of cardiac death, any myocardial infarction (MI) or target lesion revascularization (TLR). Secondary outcomes were the individual component of the primary endpoint and definite or probable stent thrombosis. Outcomes were analyzed at the longest available follow-up. The primary analysis was performed using a one-stage random-effects meta-analysis.

Results: IPD from 15 randomized trials in STEMI patients were obtained including a total of 10,979 patients. Six different stent types were studied including bare metal stents (BMS), durable-polymer paclitaxel-eluting stents (DP-PES), durable-polymer sirolimus-eluting stents (DP-SES), durable-polymer zotarolimus-eluting stents (DP-ZES), durable-polymer everolimus-eluting stents (DP-EES) and biodegradable-polymer biolimus-eluting stent (BP-BES).

Mean patient age was 60.7±11.9 years; 22.7% were female and 16.1% were diabetic. Median symptom onset to balloon time was 210 min.

At a median follow-up of 3 years (interquartile range 2–4.9 years), patients treated with second-generation (DP-EES and BP-BES) or first-generation DES (DP-PES, DP-SES and DP-ZES) had significantly lower risk of the primary endpoint than patients treated with BMS (BMS vs. second-generation DES; HR 0.69, 95% CI 0.57–0.82, BMS vs. first-generation DES; HR 0.70, 95% CI 0.61–0.80). The differences were driven by the significant reduction of TLR associated with first- and second-generation DES compared with BMS. A trend towards lower risk of MI with second-generation DES compared with BMS or first-generation DES was observed (BMS vs. second-generation DES; HR 0.79, 95% CI 0.58–1.06, first- vs. second-generation DES; HR 0.75, 95% CI 0.54–1.03). Second-generation DES was associated with a significantly lower risk of definite or probable stent thrombosis compared with BMS (HR 0.62, 95% 0.40–0.97) and first-generation DES (HR 0.55, 95% CI 0.34–0.91). DP-EES and BP-BES had a similar risk of the primary endpoint, individual components of the primary endpoint, and definite or probable stent thrombosis.

Conclusions: In this larger-scale IPD NMA in STEMI patients, second-generation DES were superior to BMS with respect to long-term efficacy and safety outcomes. Second-generation DES were associated with a significant reduction of stent thrombosis compared with BMS and first-generation DES. Similar long-term outcomes were observed between DP-EES and BP-BES.