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Reappraising Evidence for Intravascular Imaging–Guided PCI

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Abstract

Stone et al. reported substantial reductions in mortality, myocardial infarction, stent thrombosis, and revascularization across a network meta-analysis (NMA) of 22 trials including 15,964 patients.[1] While intravascular imaging clearly improves stent optimization, the magnitude and certainty of clinical benefit in this NMA warrant careful reassessment. Several methodological and clinical issues suggest that the apparent precision of risk reductions—especially for mortality and myocardial infarction—may overestimate the robustness of the evidence. First, key outcomes in the NMA are extremely rare.

Fewer than 100 stent thrombosis events occurred across >13,000 patients.[1] When events are this sparse, pooled results become highly dependent on modelling choices, including fixed continuity corrections and exclusion of double-zero trials. Extensive methodological work has shown that standard inverse-variance random-effects models may produce unstable or inflated effects under conditions of rare events.[2–5] Small shifts in assumptions or a few additional events can meaningfully alter results. Second, the NMA combines older trials using first-generation drug-eluting stents (DES) with recent trials using contemporary ultrathin-strut platforms.

Event rates and mechanisms of adverse outcomes differ substantially between these eras. Randomized-only meta-analyses, which avoid this temporal mixing, consistently show robust reductions in stent thrombosis and target-lesion revascularization but more modest or non-significant effects on mortality and myocardial infarction.[6–8] Pooling legacy and contemporary trials without modelling time or DES generation may therefore overstate the incremental value of imaging in current practice. Third, the included studies span diverse clinical settings—left main disease, chronic total occlusion, in-stent restenosis, small-vessel PCI, acute coronary syndromes, and stable angina—across East Asian and Western populations.[1,6–8] Such heterogeneity challenges the transitivity assumptions of NMA and may mask effect modification by lesion complexity, vessel size, operator practices, or background pharmacotherapy.

Finally, many endpoints are composites that heavily weight repeat revascularization or imaging surrogates rather than irreversible hard events. Improvements in minimal stent area or late lumen loss translate inconsistently into reductions in myocardial infarction or death. The most consistent benefits of imaging—across all analyses—remain reductions in stent thrombosis and repeat revascularization.[1,6–8] Intravascular imaging is invaluable for optimizing PCI.

However, given the fragility of rare-event analyses, era-related heterogeneity, and endpoint composition, the magnitude of mortality and myocardial infarction benefit should be interpreted with caution. Future work should incorporate patient-level data, rare-event-appropriate statistical methods, and contemporary trial populations.

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