

routine use of this technology has not demonstrated a mortality advantage in this population, at least it does not increase in-hospital morbidity.

Our conclusions are limited because all data is extracted from an administrative database that is subject to coding errors and lacks many granular details of procedure-related metrics. Our study suggests that although the use of intravascular imaging for PCI in patients with STEMI remains low, there has been a subtle increase over the past 10 years.

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Outcomes With Intravascular Ultrasound-Guided Drug Eluting Stent Implantation for Unprotected Left Main Coronary Lesions: A Meta-analysis

Randomized controlled trials (RCTs) have demonstrated that intravascular (IVUS) guidance improves outcomes after drug-eluting stent (DES) implantation.^{1,2} However, left main coronary artery (LMCA) lesions were excluded or under-represented in these trials. With the projected increase in the rates of LMCA percutaneous coronary intervention (PCI) procedures after the publication of recent DES versus bypass surgery trials,³ we sought to perform a meta-analysis examining the effect of IVUS-guidance on individual outcomes after DES implantation for LMCA lesions.

Electronic databases were searched from 2005 until April 2019 for published RCTs and propensity-matched or propensity-adjusted observational studies comparing IVUS-guided PCI versus angiography-guided PCI for DES LMCA implantation. Details for the keywords and databases searched have been described previously.² The outcomes of interest included all-cause mortality, cardiovascular mortality, myocardial infarction (MI), stent thrombosis, and target lesion revascularization. Summary estimates were calculated using the adjusted hazard ratio (HR) reported by each study. If a study did not report the HR, we used a previously validated formula to calculate the log HRs and variance log-HRs.⁴ Statistical heterogeneity was evaluated using I^2 , and publication bias was assessed using Egger's test. A subgroup analysis was performed to compare RCTs versus observational studies. The analysis for interaction was evaluated using random effects analysis. This meta-analysis was performed according to the PRISMA guidelines and was prospectively registered in the PROSPERO database (CRD42019132938).



A total of 9 studies (2 RCTs and 7 propensity-matched or propensity-adjusted observational studies) with 4,971 patients (2,612 in the IVUS-guided group and 2,359 in the angiography-guided group) were included. All of the included studies were specific to LMCA lesions except for one study which reported a subgroup analysis of LMCA lesions for cardiovascular mortality.⁵ IVUS-guidance was associated with more frequent postdilation (70.1% vs 65.2%, $p < 0.001$). Only 2 studies reported data pertinent to postintervention minimum lumen diameter so a meta-analysis for this outcome was not performed. The follow-up ranged from 1 to 10 years. IVUS-guidance was associated with lower incidence of all-cause mortality (HR 0.53, 95% confidence interval [CI] 0.40 to 0.70, $I^2 = 0\%$), cardiovascular mortality (HR 0.40, 95% CI 0.28 to 0.59, $I^2 = 44\%$), MI (HR 0.69, 95% CI 0.50 to 0.96, $I^2 = 0\%$), and stent thrombosis (HR 0.47, 95% CI 0.32 to 0.70, $I^2 = 0\%$; Figure 1). There was also a trend toward lower target lesion revascularization with IVUS-guidance (HR 0.76, 95% CI 0.50 to 1.16, $I^2 = 0\%$). There was no evidence of publication bias for any of the clinical outcomes using Egger's test. The benefit of IVUS-guidance was seen for both RCTs and observational studies on all the outcomes (all $P_{\text{interaction}} > 0.05$).

A consensus statement from the European Bifurcation Club has concluded that IVUS-guidance is beneficial in guiding revascularization decisions for LMCA lesions.⁶ Our meta-analysis of 2 RCTs and 7 propensity-matched or adjusted observational studies with 2,612 patients in the IVUS-guided group and 2,359 in the angiography-guided group supports this consensus document indicating that IVUS-guidance of LMCA PCI with DES is associated with a lower incidence of hard outcomes—all-cause mortality, cardiovascular mortality, MI, and stent thrombosis—with no evidence of statistical heterogeneity for most outcomes.

This meta-analysis is limited by the lack of patient-level data, which might help to better identify patient and lesion-related characteristics (e.g., location of LMCA lesion) associated with the most benefit from IVUS guidance. In addition, as most of the included studies are

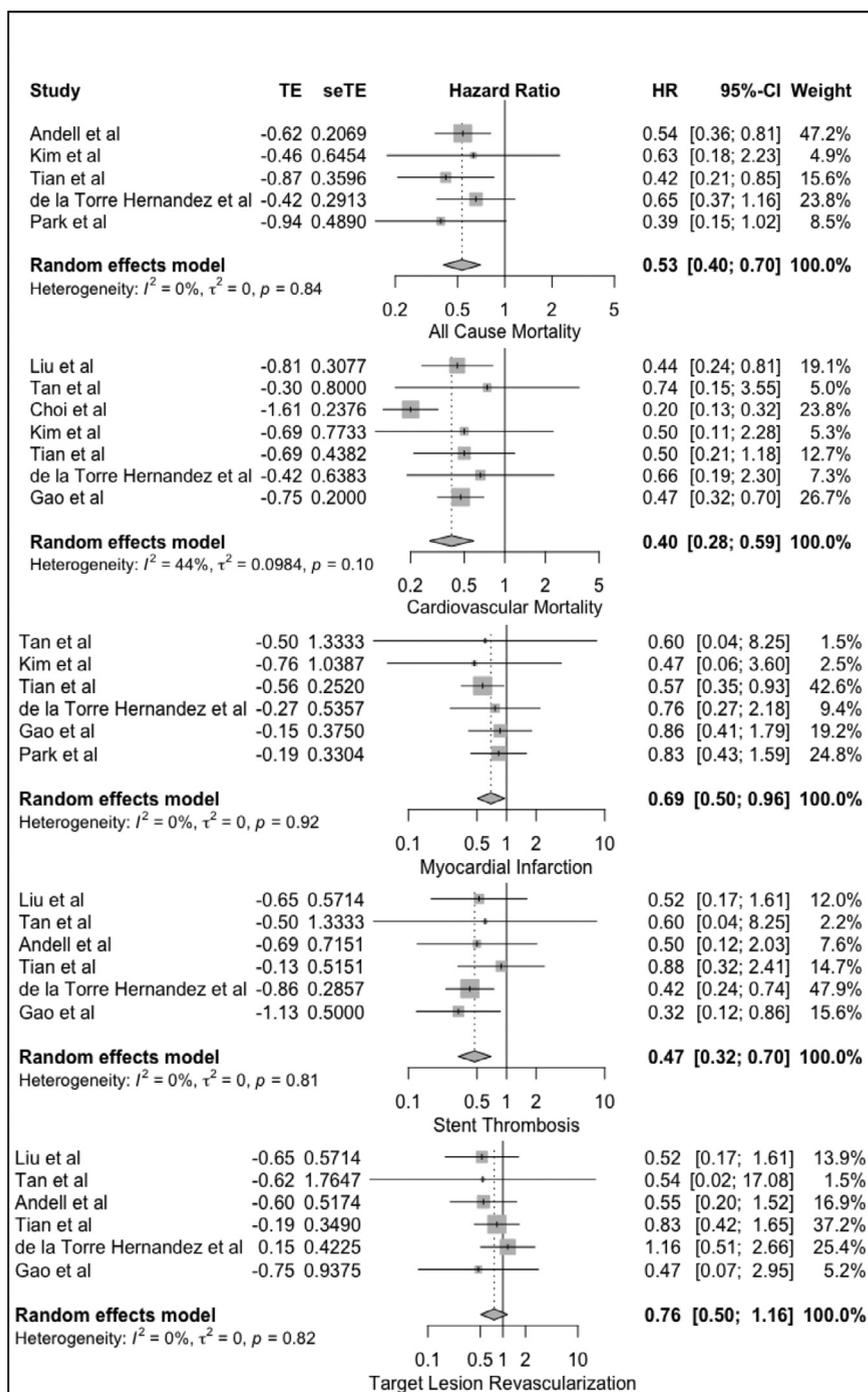


Figure 1. Summary plot for all-cause mortality, cardiovascular mortality, myocardial infarction, stent thrombosis, and target lesion revascularization. CI = confidence interval; HR = hazard ratio.

observational (albeit, with propensity-matching or propensity-adjustments), future RCTs adequately powered for clinical outcomes are encouraged to confirm these findings.

Disclosures

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