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Long-Term Safety and Efficacy of Platinum Chromium Everolimus-Eluting Stents in Coronary Artery Disease

5-Year Results From the PLATINUM Trial

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ABSTRACT

OBJECTIVES The authors sought to evaluate the final 5-year safety and effectiveness of the platinum-chromium everolimus-eluting stent (PtCr-EES) in the randomized trial, as well as in 2 single-arm substudies that evaluated PtCr-EES in small vessels (diameter <2.5 mm; n = 94) and long lesions (24 to 34 mm; n = 102).

BACKGROUND In the multicenter, randomized PLATINUM (PLATINUM Clinical Trial to Assess the PROMUS Element Stent System for Treatment of De Novo Coronary Artery Lesions), the PtCr-EES was noninferior to the cobalt-chromium everolimus-eluting stent (CoCr-EES) at 1 year in 1,530 patients undergoing percutaneous coronary intervention.

METHODS Patients with 1 or 2 de novo coronary artery lesions (reference vessel diameter 2.50 to 4.25 mm, length ≤24 mm) were randomized 1:1 to PtCr-EES versus CoCr-EES. All patients in the substudies received PtCr-EES. The primary endpoint was target lesion failure (TLF), a composite of target vessel-related cardiac death, target vessel-related myocardial infarction, or ischemia-driven target lesion revascularization.

RESULTS In the randomized trial, the 5-year TLF rate was 9.1% for PtCr-EES and 9.3% for CoCr-EES (hazard ratio [HR]: 0.97; p = 0.87). Landmark analysis demonstrated similar TLF rates from discharge to 1 year (HR: 1.12; p = 0.70) and from 1 to 5 years (HR: 0.90; p = 0.63). There were no significant differences in the rates of cardiac death, myocardial infarction, target lesion or vessel revascularization, or stent thrombosis. PtCr-EES had 5-year TLF rates of 7.0% in small vessels and 13.6% in long lesions.

CONCLUSIONS PtCr-EES demonstrated comparable safety and effectiveness to CoCr-EES through 5 years of follow-up, with low rates of stent thrombosis and other adverse events. The 5-year event rates were also acceptable in patients with small vessels and long lesions treated with PtCr-EES. (The PLATINUM Clinical Trial to Assess the PROMUS Element Stent System for Treatment of De Novo Coronary Artery Lesions [PLATINUM]; NCT00823212; The PLATINUM Clinical Trial to Assess the PROMUS Element Stent System for Treatment of De Novo Coronary Artery Lesions in Small Vessels [PLATINUM SV]; NCT01498692; The PLATINUM Clinical Trial to Assess the PROMUS Element Stent System for Treatment of Long De Novo Coronary Artery Lesions [PLATINUM LL]; NCT01500434) (J Am Coll Cardiol Intv 2017;10:2392–400)

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In multiple randomized trials, the cobalt chromium everolimus-eluting stent (CoCr-EES) (Abbott Vascular, Santa Clara, California) resulted in lower rates of ischemia-driven revascularization (TLR), stent thrombosis (ST), and myocardial infarction (MI) when compared with first-generation drug-eluting stents (1-7). The platinum-chromium everolimus-eluting stent (PtCr-EES) (Boston Scientific, Marlborough, Massachusetts) uses the same polymer and everolimus concentration and elution rate as the CoCr-EES, but with a denser alloy and modified strut architecture designed to provide greater conformability, radial strength, radiopacity, and fracture resistance (8,9). In the large-scale, randomized PLATINUM (PLATINUM Clinical Trial to Assess the PROMUS Element Stent System for Treatment of De Novo Coronary Artery Lesions), the PtCr-EES was noninferior to CoCr-EES at 1 year with respect to the primary outcome of target lesion failure (TLF) (3.4% for PtCr-EES vs. 2.9% for CoCr-EES, $p_{noninferiority} = 0.001$) in patients undergoing percutaneous coronary intervention (PCI) (10). In 2 concurrent single-arm substudies, the PtCr-EES provided superior outcomes in small vessels (SV) and long lesions (LL) when compared with historical data from studies of platinum-chromium paclitaxel-eluting stents (11). It is important to describe the final long-term outcomes from these trials, because the favorable early safety and effectiveness profile of some coronary stents was not durable at late follow-up. The current report provides the final, 5-year follow-up results from the randomized PLATINUM trial and the single-arm SV and LL substudies.

METHODS

STUDY POPULATION. Patients were eligible for inclusion if they presented with unstable angina, stable angina, or documented silent ischemia, and required PCI of an atherosclerotic lesion with estimated stenosis of 50% to 99% and Thrombolysis In Myocardial Infarction flow grade >1. Patients with 1 or 2 lesions ≤24 mm in length and with reference vessel diameter (RVD) 2.50 to 4.25 mm, as visually assessed, were randomized in the main trial. Patients with a single lesion with RVD ≥2.25 to <2.50 mm and length ≤28 mm were enrolled in the SV study. Patients with a single lesion >24 to ≤34 mm long with RVD 2.5 to 4.25 mm were enrolled in the LL study. General exclusion criteria included acute or recent MI, recent PCI of the target vessel, left ventricular ejection fraction ≤30%, chronic total occlusions, left main or ostial lesions, major bifurcation disease, location of the target lesion in or access through a saphenous vein graft, and presence of thrombus. The studies were approved by the institutional review board at each participating center, and all subjects provided written informed consent.

INTERVENTION AND FOLLOW-UP. In the main trial, patients were randomized 1:1 in open-label fashion after successful target lesion pre-dilatation to PtCr-EES or CoCr-EES. Randomization was stratified by site. The operator was aware of the treatment assignment, but the patient and other providers were blinded. In the SV and LL substudies, all patients received PtCr-EES. Patients were treated with loading doses of aspirin and clopidogrel. The choice of anticoagulant agent (unfractionated heparin, enoxaparin, or bivalirudin) and use of glycoprotein IIb/IIIa inhibitors were left to operator discretion. After PCI, all patients were required to take aspirin indefinitely and clopidogrel for at least 6 months (12 months in the absence of high bleeding risk). Prasugrel was an option for patients outside of the United States. Follow-up was performed at 1, 6, 12, and 18 months, and then annually from 2 to 5 years. Routine angiographic follow-up was not performed. Study monitors verified all case report form data. An independent, blinded clinical events committee adjudicated all death, MI, TLR, target vessel revascularization (TVR), and ST events. An independent core laboratory evaluated all angiographic data. An independent Data Safety and Monitoring Committee oversaw the trial performance and outcomes.

ABBREVIATIONS AND ACRONYMS

CABG = coronary artery bypass grafting
CI = confidence interval
CoCr-EES = cobalt chromium everolimus-eluting stent(s)
HR = hazard ratio
LL = long lesions
MI = myocardial infarction
PCI = percutaneous coronary intervention
PtCr-EES = platinum-chromium everolimus-eluting stent(s)
RVD = reference vessel diameter
ST = stent thrombosis
SV = small vessels
TLF = target lesion failure
TLR = target lesion revascularization
TVF = target vessel failure
TVR = target vessel revascularization

been a speaker for and received consulting fees from Boston Scientific, Abbott, and Medtronic. Dr. Meredith is an employee and shareholder of Boston Scientific. Dr. Dubois serves on Boston Scientific's scientific advisory board. Dr. Feldman has received honoraria from Boston Scientific; is stockholder of Boston Scientific; and serves on their scientific advisory board. Dr. Dens is a consultant for and has received a research grant from Boston Scientific. Dr. Saito is a consultant for and has received honoraria from Abbott Vascular, Boston Scientific, Medtronic, and Terumo. Drs. Allocco and Dawkins are employees and shareholders of Boston Scientific. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

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