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Effect of Chronic Kidney Disease in Women Undergoing Percutaneous Coronary Intervention With Drug-Eluting Stents

A Patient-Level Pooled Analysis of Randomized Controlled Trials

Usman Baber, MD, MSc,* Gennaro Giustino, MD,* Samantha Sartori, PhD,* Melissa Aquino, MSc,* Giulio G. Stefanini, MD,† P. Gabriel Steg, MD,‡ Stephan Windecker, MD, PhD,§ Martin B. Leon, MD,‖ William Wijns, MD, PhD,¶ Patrick W. Serruys, MD, PhD,# Marco Valgimigli, MD, PhD,** Gregg W. Stone, MD,‖ George D. Dangas, MD, PhD,* Marie-Claude Morice, MD,†† Edoardo Camenzind, MD,‡‡ Giora Weisz, MD,# Pieter C. Smits, MD, PhD,§§ David Kandzari, MD,‖‖ Clemens Von Birgelen, MD,¶¶ Ioannis Mastoris, MD,* Soren Galatius, MD,## Raban V. Jeger, MD,*** Takeshi Kimura, MD,††† Ghada W. Mikhail, MD,‡‡‡ Dipti Itchhaporia, MD,§§§ Laxmi Mehta, MD,‖‖‖ Rebecca Ortega, MD,¶¶¶ Hyo-Soo Kim, MD,### Adnan Kastrati, MD,**** Alaide Chieffo, MD,†††† Roxana Mehran, MD*

ABSTRACT

OBJECTIVES This study sought to evaluate: 1) the effect of impaired renal function on long-term clinical outcomes in women undergoing percutaneous coronary intervention (PCI) with drug-eluting stent (DES); and 2) the safety and efficacy of new-generation compared with early-generation DES in women with chronic kidney disease (CKD).

BACKGROUND The prevalence and effect of CKD in women undergoing PCI with DES is unclear.

METHODS We pooled patient-level data for women enrolled in 26 randomized trials. The study population was categorized by creatinine clearance (CrCl) <45 ml/min, 45 to 59 ml/min, and ≥60 ml/min. The primary endpoint was the 3-year rate of major adverse cardiovascular events (MACE). Participants for whom baseline creatinine was missing were excluded from the analysis.

RESULTS Of 4,217 women included in the pooled cohort treated with DES and for whom serum creatinine was available, 603 (14%) had a CrCl <45 ml/min, 811 (19%) had a CrCl 45 to 59 ml/min, and 2,803 (66%) had a CrCl ≥60 ml/min. A significant stepwise gradient in risk for MACE was observed with worsening renal function (26.6% vs. 15.8% vs. 12.9%; $p < 0.01$). Following multivariable adjustment, CrCl <45 ml/min was independently associated with a higher risk of MACE (adjusted hazard ratio: 1.56; 95% confidence interval: 1.23 to 1.98) and all-cause mortality (adjusted hazard ratio: 2.67; 95% confidence interval: 1.85 to 3.85). Compared with older-generation DES, the use of newer-generation DES was associated with a reduction in the risk of cardiac death, myocardial infarction, or stent thrombosis in women with CKD. The effect of new-generation DES on outcomes was uniform, between women with or without CKD, without evidence of interaction.

CONCLUSIONS Among women undergoing PCI with DES, CKD is a common comorbidity associated with a strong and independent risk for MACE that is durable over 3 years. The benefits of newer-generation DES are uniform in women with or without CKD. (J Am Coll Cardiol Intv 2016;9:28–38) © 2016 by the American College of Cardiology Foundation.

From *The Zena and Michael A. Wiener Cardiovascular Institute, Icahn School of Medicine at Mount Sinai, New York City, New York; †Division of Clinical and Interventional Cardiology, Humanitas Research Hospital, Rozzano, Milan, Italy; ‡Département Hospitalo Universitaire Fibrose, Inflammation et REmodelage, Assistance Publique-Hôpitaux de Paris, Université Paris Diderot, INSERM U698, Paris, France; §Department of Cardiology, Bern University Hospital, Bern, Switzerland; ‖Division of Cardiology, Columbia University Medical Center, New York City, New York; ¶Cardiovascular Center Aalst, Onze-Lieve-Vrouwziekenhuis Ziekenhuis, Aalst, Belgium; #Thoraxcenter, Erasmus MC, Rotterdam, the Netherlands; **Department of Cardiology, University of Ferrara, Ferrara, Italy; ††Department of Cardiology and Cardiovascular Surgery, Institut Cardiovasculaire Paris Sud, France;

Among patients with coronary artery disease (CAD) undergoing percutaneous coronary intervention (PCI), the presence of even mild chronic kidney disease (CKD) is associated with a strong and independent risk for adverse cardiovascular events (1–4). Moreover, several studies suggest that the safety and efficacy of drug-eluting stent (DES) implantation may be attenuated in the setting of renal dysfunction (5,6). Possible mechanistic linkages between CKD and cardiovascular risk after PCI include accelerated atherosclerosis within and outside of the stented vascular segment and a pro-inflammatory milieu (7). Moreover, enhanced blood thrombogenicity related to renal dysfunction increases risk for myocardial infarction (MI) and stent thrombosis (ST) in patients with CKD (7–9). Impaired renal function is also a common comorbidity among women undergoing PCI and may be a contributor to post-PCI risk in female patients (4,10,11). However, data on clinical outcomes associated with DES implantation in women with CKD are scarce as a result of their restricted inclusion in randomized controlled trials (RCTs).

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In 2011, the Food and Drug Administration issued guidance for assessing sex disparities in RCTs evaluating medical devices (12). In response, the Society for Cardiovascular Angiography and Interventions' Women in Innovation Initiative convened the Gender Data Forum to discuss the outcomes of DES in women, leading to the performance of an individual patient-level data pooled analysis from available randomized trials of DES. The safety and efficacy of DES in women have been previously reported (13). Accordingly, we sought to evaluate, by pooling patient-level data from RCTs, the prognostic effect of various degrees of impaired renal function in women undergoing PCI with DES and the safety and

ABBREVIATIONS AND ACRONYMS

CAD = coronary artery disease
CKD = chronic kidney disease
CrCl = creatinine clearance
DES = drug-eluting stent(s)
MI = myocardial infarction
PCI = percutaneous coronary intervention
RCT = randomized controlled trial
ST = stent thrombosis
TLR = target lesion revascularization

‡‡Institut Lorrain du Coeur et des Vaisseaux (ILCV) University Hospital Nancy—Brabois Vandoeuvre-lès-Nancy France; §§Department of Cardiology, Maasstad Hospital, Rotterdam, the Netherlands; ‖‖Piedmont Heart Institute, Atlanta, Georgia; ¶¶Thoraxcentrum Twente, Enschede, the Netherlands; ##Department of Cardiology, Bispebjerg University Hospital, Copenhagen, Denmark; ***Department of Cardiology, University Hospital Basel, Basel, Switzerland; †††Department of Cardiology, Kyoto University Graduate School of Medicine, Kyoto, Japan; ‡‡‡Department of Cardiology, Imperial College Healthcare NHS Trust, London, United Kingdom; §§§Department of Cardiology, Hoag Memorial Hospital Presbyterian, Newport Beach, California; ‖‖‖Department of Cardiology, Ohio State University Medical Center, Columbus, Ohio; ¶¶¶Society of Cardiovascular Angiography and Interventions, Washington, DC; ###Department of Cardiology, Seoul National University Main Hospital, Seoul, South Korea; ****Herzzentrum, Munich, Germany; and the ††††Interventional Cardiology Unit, San Raffaele Scientific Institute, Milan, Italy.
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