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Effect of Increasing Stent Length on 3-Year Clinical Outcomes in Women Undergoing Percutaneous Coronary Intervention With New-Generation Drug-Eluting Stents

Patient-Level Pooled Analysis of Randomized Trials From the WIN-DES Initiative

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ABSTRACT

OBJECTIVES The aim of this study was to examine whether stent length per patient and stent length per lesion are negative markers for 3-year outcomes in women following percutaneous coronary intervention (PCI) with new-generation drug-eluting stents (DES).

BACKGROUND In the era of advanced stent technologies, whether stent length remains a correlate of adverse outcomes is unclear.

METHODS Women treated with new-generation DES in 14 randomized trials from the WIN-DES (Women in Innovation and Drug-Eluting Stents) pooled database were evaluated. Total stent length per patient, which was available in 5,403 women (quartile 1, 8 to 18 mm; quartile 2, 18 to 24 mm; quartile 3, 24 to 36 mm; quartile 4, ≥36 mm), and stent length per lesion, which was available in 5,232 women (quartile 1, 8 to 18 mm; quartile 2, 18 to 20 mm; quartile 3, 20 to 27 mm; quartile 4, ≥27 mm) were analyzed in quartiles. The primary endpoint was 3-year major adverse cardiovascular events (MACE), defined as a composite of all-cause death, myocardial infarction, or target lesion revascularization.

RESULTS In the per-patient analysis, a stepwise increase was observed with increasing stent length in the adjusted risk for 3-year MACE (p for trend <0.0001), myocardial infarction (p for trend <0.001), cardiac death (p for trend = 0.038), and target lesion revascularization (p for trend = 0.011) but not definite or probable stent thrombosis (p for trend = 0.673). In the per-lesion analysis, an increase was observed in the adjusted risk for 3-year MACE (p for trend = 0.002) and myocardial infarction (p for trend <0.0001) but not other individual endpoints. On landmark analysis for late event rates between 1 and 3 years, stent length per patient demonstrated weak associations with target lesion revascularization (p = 0.0131) and MACE (p = 0.0499), whereas stent length per lesion was not associated with higher risk for any late events, suggesting that risk was established early within the first year after PCI.

CONCLUSIONS In this pooled analysis of women undergoing PCI with new-generation DES, increasing stent length per patient and per lesion were independent predictors of 3-year MACE but were not associated with definite or probable stent thrombosis. (J Am Coll Cardiol Intv 2018;11:53–65) © 2018 Published by Elsevier on behalf of the American College of Cardiology Foundation.

ABBREVIATIONS AND ACRONYMS

CI = confidence interval

DAPT = dual-antiplatelet therapy

DES = drug-eluting stent(s)

HR = hazard ratio

MACE = major adverse cardiovascular events

MI = myocardial infarction

PCI = percutaneous coronary intervention

ST = stent thrombosis

TLR = target lesion revascularization

Stent length has previously been determined to be a significant predictor of short- and long-term adverse cardiovascular outcomes with bare-metal stents, particularly target lesion revascularization (TLR) (1,2). Longer stent length is a correlate of extensive atherosclerotic disease, complex anatomic features, and high-risk systemic factors including increased platelet reactivity (3–6). Both increasing stent length per lesion and stent length per patient have been shown to be associated with greater TLR with sirolimus-eluting stents (2). Furthermore, Suh et al. (7) found stent length per lesion >31.5 mm to be associated with greater stent thrombosis (ST) with sirolimus- and paclitaxel-eluting stents. In contemporary percutaneous coronary intervention (PCI), improvements in stent design have resulted in longer and more easily deliverable stents, allowing greater lesion lengths to be successfully treated (8,9). Although very late ST rates with everolimus-eluting and zotarolimus-eluting stents are significantly lower than with first-generation stents (10), few data have systematically investigated the effect of stent length with second-generation drug-eluting stents (DES) (11–14).

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Moreover, these prior studies have included mostly male patients, with <25% enrolled women. Despite fewer adverse angiographic characteristics, women tend to experience higher ischemic event rates following PCI compared with men (15–17). The WIN-DES (Women in Innovation and Drug-Eluting Stents) collaboration is a pooled patient-level dataset of 11,557 women treated with coronary stents from 26 randomized controlled trials, allowing comprehensive evaluation of outcomes in women undergoing PCI (18). To investigate the long-term impact of increasing stent length in women treated with new-generation DES, we analyzed stent length per patient and stent length per lesion in quartiles.

METHODS

STUDY POPULATION. A total of 11,557 women participating in 26 randomized DES trials from 2000 to

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