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Temporal Trends and Outcomes of Patients Undergoing Percutaneous Coronary Interventions for Cardiogenic Shock in the Setting of Acute Myocardial Infarction

A Report From the CathPCI Registry

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ABSTRACT

OBJECTIVES The purpose of this study was to examine the temporal trends in demographics, clinical characteristics, management strategies, and in-hospital outcomes in patients with acute myocardial infarction complicated by cardiogenic shock (CS-AMI) who underwent percutaneous coronary intervention (PCI) from the Cath-PCI Registry (2005 to 2013).

BACKGROUND The authors examined contemporary use and outcomes of PCI in patients with CS-AMI.

METHODS The authors used the Cath-PCI Registry to evaluate 56,497 patients (January 2005 to December 2013) undergoing PCI for CS-AMI. Temporal trends in clinical variables and outcomes were assessed.

RESULTS Compared with cases performed from 2005 to 2006, CS-AMI patients receiving PCI from 2011 to 2013 were more likely to have diabetes, hypertension, dyslipidemia, previous PCI, dialysis, but less likely to have chronic lung disease, peripheral vascular disease, or heart failure within 2 weeks ($p < 0.01$). Between 2005 and 2006 to 2011 and 2013, intra-aortic balloon pump use decreased (49.5% to 44.9%; $p < 0.01$), drug-eluting stent use declined (65% to 46%; $p < 0.01$), and the use of bivalirudin increased (12.6% to 45.6%). Adjusted in-hospital mortality; increased (27.6% in 2005 to 2006 vs. 30.6% in 2011 to 2013, adjusted odds ratio: 1.09, 95% confidence interval: 1.005 to .173; $p = 0.04$) for patients who were managed with an early invasive strategy (<24 h from symptoms).

CONCLUSIONS Our study shows that despite the evolution of medical technology and use of contemporary therapeutic measures, in-hospital mortality in CS-AMI patients who are managed invasively continues to rise. Additional research and targeted efforts are indicated to improve outcomes in this high-risk cohort. (J Am Coll Cardiol Intv 2016;9:341–51) © 2016 by the American College of Cardiology Foundation.

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ABBREVIATIONS AND ACRONYMS

ACS = acute coronary syndrome(s)

BMI = body mass index

CS-AMI = cardiogenic shock in the setting of acute myocardial infarction

IABP = intra-aortic balloon pump

LAD = left anterior descending

MI = myocardial infarction

NSTEMI = non-ST-segment elevation myocardial infarction

NYHA = New York Heart Association

PCI = percutaneous coronary intervention

STEMI = ST-segment elevation myocardial infarction

TIMI = Thrombolysis In Myocardial Infarction

Cardiogenic shock (CS) is a leading cause of in-hospital mortality associated with acute myocardial infarction (AMI) with prevalence between 5% and 15% (1,2). Data regarding temporal trends in incidence, clinical characteristics, management strategy, and outcomes of patients with cardiogenic shock after myocardial infarction (CS-AMI) are limited (3,4). In the past decade, there has been an increased emphasis on timely revascularization, mechanical hemodynamic support, and optimal medical therapy in patients with CS-AMI. These interventions are being aggressively used in hopes of favorably affecting high morbidity and mortality rates associated with CS-AMI. Studies have shown that an early revascularization strategy (coronary artery bypass graft surgery or percutaneous coronary intervention [PCI]) is beneficial in such patients (5). Based on these findings, the American College of Cardiology (ACC) and the American Heart Association (AHA) have recommended early revascularization for cardiogenic shock with ST-segment elevation or new left bundle-branch block AMI as a Class I indication for patients younger than 75 years (Class IIA for age >75 years) in their revised guidelines for the management of AMI (6).

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Recently, a study derived from three nationwide registries in France (1999 to 2005) has demonstrated that although early mortality in such patients has been reduced concomitant with broader use of revascularization and medical treatment, the 1-year survival rate has not changed (7). Data for the United States thus far has been limited to few studies that allude to similar favorable results with respect to mortality with an invasive strategy (8–10). However, none of these studies dealt exclusively with data on CS-AMI patients treated with PCI. With the dynamic changes in the management of cardiogenic shock, there is a need to obtain a real-world perspective regarding this high-risk subset of CS-AMI patients with the help of a nationwide registry in the United States. Additionally, results of the IABOP-SHOCK II (Intraaortic Balloon Pump in Cardiogenic Shock II) trials have raised questions regarding the benefit of using devices such as the intra-aortic balloon pump (IABP) in this high-risk subset of patients (11). Hence, it would be interesting to evaluate whether trials such as these have impacted operator practice in the contemporary era.

Hence, this study has examined the temporal trends from the Cath-PCI registry (2005 to 2013) in demographics, clinical characteristics, management strategies, and in-hospital outcomes in patients with CS-AMI who underwent PCI. We hypothesized that in-hospital mortality from cardiogenic shock in myocardial infarction (MI) patients who are managed invasively is decreasing with improved use of timely revascularization, mechanical ventricular support, and advanced medical treatment.

METHODS

REGISTRY. The National Cardiovascular Database Registry (NCDR) Cath-PCI registry, co-sponsored by the American College of Cardiology (ACC) and the Society for Cardiovascular Angiography and Interventions (SCAI), has been previously described elsewhere (12,13). The registry catalogs data on patient and hospital characteristics, clinical presentation, treatments, and outcomes associated with PCI from >1,000 sites across the United States. The data are entered into ACC-certified software at participating institutions. There is a comprehensive data quality program, including both data quality report specifications for data capture and transmission and an auditing program (14). The data collected are exported in a standard format to the ACC Heart House (Washington, DC).

PATIENTS. Men and women age ≥18 years who underwent PCI between January 2005 and December 2013 for cardiogenic shock after AMI (CS-AMI-ST-segment elevation myocardial infarction [STEMI] and non-ST-segment elevation myocardial infarction [NSTEMI]) were included (n = 105,171, sites = 1463). To assess the temporal trends in demographic,

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