

Comparison of percutaneous coronary intervention for previously treated versus de novo culprit lesions in acute myocardial infarction patients: insights from the National Cardiovascular Data Registry

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Background Little is known about percutaneous coronary intervention (PCI) outcomes among patients presenting with an acute myocardial infarction (MI) with a history of prior PCI. Outcomes may differ depending on whether PCI is performed on a previously treated or de novo culprit lesion.

Methods We examined ST-segment elevation myocardial infarction (STEMI) and non-STEMI patients who underwent PCI in the CathPCI Registry from 2009 to 2012. We used multivariable logistic regression to compare adjusted in-hospital mortality between groups.

Results Among 675,587 MI patients, 147,841 (22%) had a history of prior PCI; these patients were older and more frequently had co-morbid conditions yet had lower adjusted mortality compared with patients undergoing their first intervention (OR = 0.73, 95% CI = 0.70-0.76). Among patients with prior PCI, 50,744 (34%) received intervention to a culprit lesion in a previously treated segment. Compared with patients with de novo culprit lesions, those with previously treated culprits were more likely to present with STEMI, but had lower mortality risk (OR = 0.88, 95% CI = 0.82-0.95) regardless of STEMI or non-STEMI presentation. Among previously treated patients, in-hospital mortality was not significantly different between those with prior drug-eluting versus bare metal stent-treated culprit lesions (OR = 0.95, 95% CI = 0.81-1.12).

Conclusion Despite greater co-morbidity burden, MI patients with prior PCI had lower mortality compared with patients undergoing their first intervention. Among patients with prior PCI, patients undergoing PCI to a previously treated culprit lesion were associated with lower mortality than those being intervened for a de novo culprit. A better understanding of these differences will help improve procedural strategies and outcomes of patients undergoing PCI of a previously treated lesion. (Am Heart J 2014;167:393-400.e1)

Percutaneous coronary intervention (PCI) with stenting is an established revascularization strategy for patients with both stable and acute coronary syndromes.¹ Previously stented coronary lesions are at risk of in-stent restenosis or stent thrombosis, with pathophysio-

logic underpinnings that are distinct from each other and from de novo coronary lesions.^{2,3} Yet little is known about PCI outcomes for patients with prior PCI who present with acute myocardial infarction (MI). We hypothesized that treatment strategies and outcomes may differ depending on whether PCI is performed on a previously treated or de novo lesion, and whether the lesion was previously treated with a drug-eluting stent (DES) or bare metal stent (BMS). Any such differences have not been previously characterized.

Focusing on patients presenting with either ST-segment elevation myocardial infarction (STEMI) or non-STEMI (NSTEMI) in the National Cardiovascular Data Registry CathPCI Registry, we compared outcomes between: (1) PCI of patients with and without prior PCI; (2) PCI treating a previously treated versus de novo culprit lesion among patients with prior PCI; and (3) PCI treating a

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Mauricio G. Cohen, MD, served as guest editor for this article.

Submitted October 1, 2013; accepted December 5, 2013.

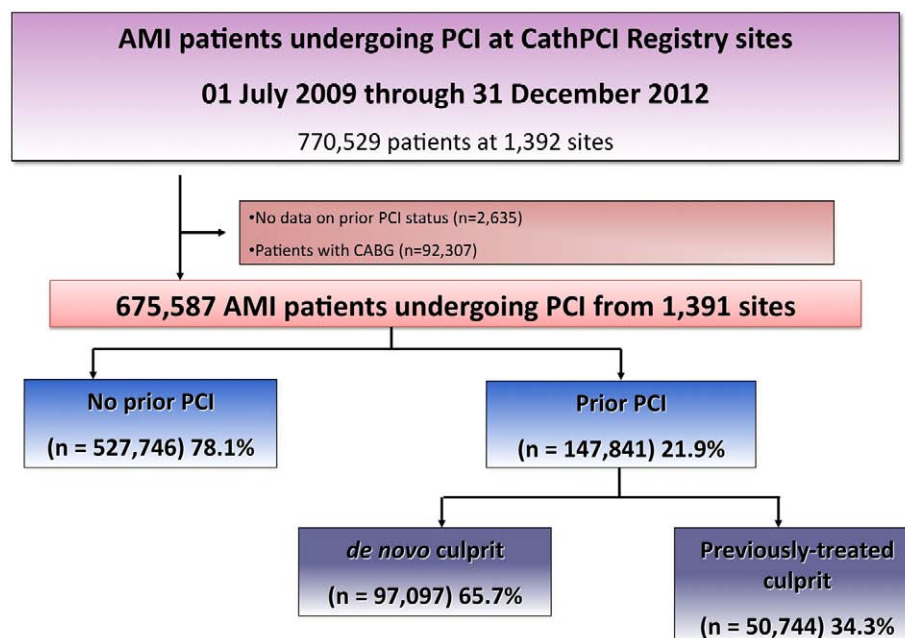
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0002-8703/\$ - see front matter

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<http://dx.doi.org/10.1016/j.ahj.2013.12.005>

Figure 1

Study population. Flowchart showing, after study inclusions and exclusions, the final study population of 675,587 MI patients undergoing PCI at 1,391 sites.

culprit lesion previously stented with DES versus BMS among MI patients with previously treated lesions.

Methods

Data source

The CathPCI Registry is the largest registry of patients undergoing PCI in the United States. Co-sponsored by the American College of Cardiology and the Society for Cardiovascular Angiography and Interventions, the registry has been well described previously (<https://www.ncdr.com/webncdr/DefaultCathPCI.aspx>).^{4,5} Briefly, participating centers submit complete information from consecutive PCI cases performed. As patient information was collected anonymously without unique patient identifiers, individual informed consent was not required. Participation in the CathPCI Registry was subject to the approval of the institutional review board of each hospital. Patient characteristics, presentation features, angiographic and procedural details, and in-hospital outcomes were collected using standardized data elements and definitions, as described previously.⁵ Measures such as rigorous and uniform data abstraction training, point-of-entry data quality threshold verification, site feedback reports, independent auditing, and data validation ensure that data quality is maintained.

Study population

Our starting population included 770,529 STEMI and NSTEMI patients treated with PCI at 1,392 United States hospitals in the CathPCI Registry from July 1, 2009, through December 31, 2012. We excluded patients with previous coronary artery

bypass graft surgery (n = 94,942). For MI patients with multiple catheterization laboratory visits during the MI hospitalization, we analyzed only the first PCI after admission as this initial PCI most likely involved the culprit lesion. This yielded a final study population of 675,587 patients with native coronary artery disease undergoing PCI for acute MI.

Data definitions

We defined MI patients as all patients who presented with STEMI or NSTEMI. The CathPCI Registry data collection form captures the culprit lesion for the MI. If no culprit was designated, then the first lesion treated was considered the culprit lesion. The data collection form also captured whether the intervened lesion was stented during a previous PCI procedure, and whether DES or BMS was used in the prior stenting procedure. We examined outcomes of in-hospital mortality and PCI procedural success. Procedural success was defined as successful dilation of all lesions attempted during the same setting with post-procedure TIMI 3 flow, post-procedure stenosis $\leq 50\%$, and a decrease between pre- and post-procedure percent stenosis $\geq 20\%$. All data element definitions used by the CathPCI Registry are available at <http://www.ncdr.com/webncdr/elements.aspx>. This work was supported by funding from the American College of Cardiology National Cardiovascular Data Registry.

Statistical methods

We first divided the study population into PCI patients with and without a history of prior PCI. Among prior PCI patients, we then divided patients into those undergoing PCI of a previously

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