JOURNAL OF THE AMERICAN COLLEGE OF CARDIOLOGY
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PUBLISHED BY ELSEVIER INC.

VOL. 66, NO. 19, 2015
ISSN 0735-1097/$36.00
http://dx.doi.org/10.1016/j.jacc.2015.08.873

Impact of Multivessel Revascularization on Health Status Outcomes in Patients With ST-Segment Elevation Myocardial Infarction and Multivessel Coronary Artery Disease

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ABSTRACT

BACKGROUND Up to 65% of patients with ST-segment elevation myocardial infarction (STEMI) have multivessel coronary artery disease (MVCAD). Long-term health status of STEMI patients after multivessel revascularization is unknown.

OBJECTIVES This study investigated the relationship between multivessel revascularization and health status outcomes (symptoms and quality of life [QoL]) in STEMI patients with MVCAD.

METHODS Using a U.S. myocardial infarction registry and the Seattle Angina Questionnaire (SAQ), we determined the health status of patients with STEMI and MVCAD at the time of STEMI and 1 year later. We assessed the association of multivessel revascularization during index hospitalization with 1-year health status using multivariable linear regression analysis, and also examined demographic, clinical, and angiographic factors associated with multivessel revascularization.

RESULTS Among 664 STEMI patients with MVCAD, 251 (38%) underwent multivessel revascularization. Most revascularizations were staged during the index hospitalization (64.1%), and 8.0% were staged after discharge, with 27.9% performed during primary percutaneous coronary intervention. Multivessel revascularization was associated with age and more diseased vessels. At 1 year, multivessel revascularization was independently associated with improved symptoms (4.5 points higher SAQ angina frequency score; 95% confidence interval [CI]: 1.0 to 7.9) and QoL (6.6 points higher SAQ QoL score; 95% CI: 2.7 to 10.6). One-year mortality was not different between those who did and did not undergo multivessel revascularization (3.6% vs. 3.4%; log-rank test $p = 0.88$).

CONCLUSIONS Multivessel revascularization improved angina and QoL in STEMI patients with MVCAD. Patient-centered outcomes should be considered in future trials of multivessel revascularization.
(J Am Coll Cardiol 2015;66:2104–13) © 2015 by the American College of Cardiology Foundation.

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Manuscript received August 1, 2015; revised manuscript received August 21, 2015, accepted August 25, 2015.

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Among ST-segment elevation myocardial infarction (STEMI) patients, 40% to 65% have 1 or more significant coronary stenoses in addition to their culprit vessels (1). When and how to treat these nonculprit vessels is controversial (2). Options include revascularization at the time of primary percutaneous coronary intervention (PCI), later during the acute myocardial infarction (AMI) hospitalization, or medical therapy with or without subsequent elective revascularization after discharge. Current guidelines recommend that only the culprit vessel be treated during index PCI in the absence of hemodynamic instability after opening the culprit artery (3,4), with staged procedures being considered in case of symptoms or ischemia within days to weeks after primary PCI (5).

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Recently, several observational studies have been published with conflicting results about the benefits of nonculprit PCI (6–8). These observational studies have been supplemented with randomized trials, including PRAMI (Preventive Angioplasty in Acute Myocardial Infarction) (9) and CvLPRIT (Complete versus Lesion only Primary-PCI Trial) (10), that have reported better composite outcomes in STEMI patients treated with complete revascularization at the time of primary PCI or during the index hospitalization. Importantly, these studies did not examine patient-reported outcomes, and there have been no data reported on the long-term health status outcomes of culprit-only or multivessel revascularization. This is particularly important as reduced angina and improved quality of life (QoL) could be important potential benefits of treating nonculprit flow-limiting lesions, similar to the results of studies in population of patients with stable coronary artery disease (11,12). To define the potential patient-centered benefits of complete revascularization, we sought to describe the patterns of treating noninfarct vessels, patient characteristics associated with multivessel revascularization, variation in practice across hospitals, and the independent association of multivessel revascularization with 1-year health-related QoL and mortality.

METHODS

STUDY PROTOCOL AND POPULATION. The TRIUMPH (Translational Research Investigating Underlying Disparities in Acute Myocardial Infarction Patients' Health Status) study is a prospective, multicenter cohort study of 4,340 AMI patients enrolled at 24 U.S. centers between April 2005 and December 2008. Patients were eligible for inclusion if they were ≥18 years of age and had an AMI, and elevated biomarkers with either electrocardiographic changes or symptoms consistent with the diagnosis (13). TRIUMPH was approved by the institutional research board at each participating site and written informed consent was obtained from all participants.

From the overall TRIUMPH cohort, we first identified patients with STEMI and multivessel coronary artery disease (MVCAD), which was defined as having at least 2 of 3 epicardial vessels with a stenosis ≥70% or left main stenosis ≥50%. Given the goal of examining practice patterns and long-term outcomes in STEMI patients with MVCAD, we excluded those with non–ST-segment elevation myocardial infarction (NSTEMI), prior coronary artery bypass grafting (CABG), and those who died during hospitalization.

DEFINITION OF MULTIVESSEL REVASCULARIZATION. Multivessel revascularization was defined as revascularization of all major coronary stenoses during the index hospitalization or within 6 weeks of discharge with either PCI or CABG, such that there was no residual stenosis ≥70% in any major epicardial coronary artery. This definition included simultaneous nonculprit PCI during the index primary PCI, staged revascularizations during the index admission, and elective procedures performed within 6 weeks of discharge. For patients undergoing CABG during the index hospitalization or within 6 weeks of discharge, we assumed that complete revascularization had been performed. Conversely, we defined culprit-only revascularization as PCI to the culprit vessel only during the index hospitalization or multivessel PCI with residual untreated or unsuccessfully treated noninfarct artery stenoses ≥70% after the index primary PCI.

OUTCOMES. Disease-specific health status was prospectively assessed using the Seattle Angina Questionnaire (SAQ) at the time of patients' index hospitalizations and at 1-year follow-up. The SAQ is a 19-item patient-reported health status instrument with a recall period of 4 weeks that quantifies 5 clinically relevant domains of coronary disease, including angina frequency (SAQ AF) and quality of life (SAQ QoL). Scores in these domains range from 0 to 100, with higher scores indicating fewer symptoms and better QoL (14). The SAQ has been demonstrated to be valid, reliable, and sensitive to clinical changes (14–17) and is also associated with subsequent rehospitalization and health care costs (18–20). As a secondary outcome of interest, we assessed all-cause mortality for a period of 1 year after the index

ABBREVIATIONS AND ACRONYMS

AF = angina frequency

AMI = acute myocardial infarction

CABG = coronary artery bypass grafting

LAD = left anterior descending

MRR = median rate ratio

MVCAD = multivessel coronary artery disease

PCI = percutaneous coronary intervention

QoL = quality of life

SAQ = Seattle Angina Questionnaire

STEMI = ST-segment elevation myocardial infarction