

ORIGINAL INVESTIGATIONS

Coronary Artery Bypass Graft Surgery Versus Drug-Eluting Stents for Patients With Isolated Proximal Left Anterior Descending Disease



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ABSTRACT

BACKGROUND Few recent studies have compared the outcomes of coronary artery bypass graft (CABG) surgery with percutaneous coronary interventions (PCIs) in patients with isolated (single vessel) proximal left anterior descending (PLAD) coronary artery disease in the era of drug-eluting stents (DES).

OBJECTIVES The goal of this study was to compare outcomes in patients with PLAD who underwent CABG and PCI with DES.

METHODS New York's Percutaneous Coronary Interventions Reporting System was used to identify and track all patients who underwent CABG surgery and received DES for isolated PLAD disease between January 1, 2008 and December 31, 2010, and who were followed-up through December 31, 2011. A total of 5,340 of 6,064 (88%) patients received DES. Patients were matched to vital statistics data to obtain mortality after discharge and matched to New York's administrative data to obtain readmissions for myocardial infarction (MI) and stroke. To minimize selection bias, patients were propensity matched into 715 CABG and/or DES pairs, and 3 outcome measures were compared across the pairs.

RESULTS Kaplan-Meier estimates for CABG and DES did not significantly differ for mortality or mortality, MI, and/or stroke, but repeat revascularization rates were lower for CABG (7.09% vs. 12.98%; $p = 0.0007$). After further adjustment with Cox proportional hazards models, there were still no significant differences in 3-year mortality rates (CABG and/or DES adjusted hazard ratio (AHR): 1.14; 95% confidence interval [CI]: 0.70 to 1.85) or mortality, MI, and/or stroke rates (AHR: 1.15; 95% CI: 0.76 to 1.73), and the repeat revascularization rate remained significantly lower for CABG patients (AHR: 0.54; 95% CI: 0.36 to 0.81).

CONCLUSIONS Despite the higher rating in current guidelines of CABG (Class IIa vs. Class IIb) for patients with isolated PLAD disease, there were no differences in mortality or mortality, MI, and/or stroke, although CABG patients had significantly lower repeat revascularization rates. (J Am Coll Cardiol 2014;64:2717-26) © 2014 by the American College of Cardiology Foundation.



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ABBREVIATIONS AND ACRONYMS

ACCF = American College of Cardiology Foundation

AHA = American Heart Association

AHR = adjusted hazard ratio

AUC = appropriate use criteria

CABG = coronary artery bypass graft

CAD = coronary artery disease

CI = confidence interval

CSRS = Cardiac Surgery Reporting System

DES = drug-eluting stent(s)

MI = myocardial infarction

PCI = percutaneous coronary intervention

PCIRS = Percutaneous Coronary Interventions Reporting System

PLAD = proximal left anterior descending

RCT = randomized controlled trial

SCAI = Society for Cardiovascular Angiography and Interventions

SPARCS = Statewide Planning and Research Cooperative System

Patients with severe coronary artery disease (CAD) are generally recommended for either coronary artery bypass graft (CABG) surgery or percutaneous coronary intervention (PCI). Most patients with severe CAD have multivessel disease (at least 2 major coronary arteries with stenosis $\geq 70\%$). Many randomized controlled trials (RCTs) and observational studies have examined relative outcomes for these procedures in an effort to determine which procedure is preferable for specific patients (1-15).

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However, patients with single-vessel proximal left anterior descending (PLAD) artery disease are regarded as high risk compared to other patients with single-vessel disease, and revascularization is frequently considered for these patients as well. There were at least 9 RCTs (forming the basis for 17 studies) that compared CABG surgery and PCIs in these patients (16-32). However, the total number of patients enrolled in these trials was quite modest ($n = 1,210$); 7 of the 9 trials were single-center studies, and most were conducted in Europe. Furthermore, only 1 trial was conducted in the era of drug-eluting stents (DES). A single

study enrolled patients as late as 2003, and all of the other studies enrolled patients in 2001 or earlier, with 8 studies of patients enrolled before 2000. Thus, there is good reason to learn more about the comparative outcomes for CABG surgery and PCIs in these patients in the era of DES.

The latest guidelines (2011) issued by the American College of Cardiology Foundation (ACCF)/American Heart Association (AHA)/Society for Cardiovascular Angiography and Interventions (SCAI) rates CABG surgery as class IIa (benefit exceeds risk) when done with a left internal mammary artery graft (33-37). The latest (2012) Appropriate Use Criteria (AUC) published by the ACCF and a few other professional societies consider revascularization (PCI or CABG surgery) to be

appropriate for patients with single-vessel PLAD disease for 12 of the 18 combinations of noninvasive test result findings (low, intermediate, and high risk), medical therapy use (none and/or minimal, maximal), and Canadian Cardiovascular Class angina (none, class I or II, class III or IV) (33,35,38-40). However, the AUC do not rate CABG surgery versus PCI in patients with single-vessel PLAD disease, although these criteria do compare the 2 procedures for many combinations of patients with multivessel CAD (41).

The main purpose of this study was to compare 3-year outcomes for CABG surgery and DES in patients with isolated single-vessel PLAD disease. Outcomes included all-cause mortality, the combined outcome of mortality, myocardial infarction (MI), and/or stroke, and repeat revascularization.

METHODS

ENDPOINTS. Endpoints in the study included 3-year mortality, mortality, MI, and/or stroke, and repeat revascularization. The mean follow-up was 2.5 years because all procedures between January 1, 2008 and December 31, 2010 were followed for 3 years or until December 31, 2011.

DATABASES. The primary databases used for the study were New York State's clinical registries for PCI and for CABG surgery, the Percutaneous Coronary Interventions Reporting System (PCIRS) and the Cardiac Surgery Reporting System (CSRS), respectively. These registries contain detailed information on patient demographic characteristics, risk factors, hemodynamic state, left ventricular function, the number of diseased coronary vessels and the number of vessels treated, complications, procedure choices, provider identifiers, discharge status, and in-hospital adverse outcomes. PCIRS also contains information on the type(s) of device(s) used for each attempted lesion, including the type and brand of stent used.

Completeness of data reporting is monitored by matching PCIRS to New York's acute care hospital discharge database, the Statewide Planning and Research Cooperative System (SPARCS), and to the Department of Health's Ambulatory Surgery Database, and identifying any cases reported in those databases

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