JACC: CARDIOVASCULAR INTERVENTIONS
VOL. 10, NO. 14, 2017

ISSN 1936-8798/$36.00
http://dx.doi.org/10.1016/j.jcin.2017.04.037

Comparison of Stenting Versus Bypass Surgery According to the Completeness of Revascularization in Severe Coronary Artery Disease

Patient-Level Pooled Analysis of the SYNTAX, PRECOMBAT, and BEST Trials

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ABSTRACT

OBJECTIVES The aim of this study was to compare long-term survival between patients with severe coronary artery disease undergoing coronary artery bypass grafting (CABG) and those undergoing percutaneous coronary intervention (PCI) achieving complete revascularization (CR) or incomplete revascularization.

BACKGROUND The importance of CR in decision making regarding revascularization strategy in patients with severe coronary artery disease is unknown.

METHODS Data were pooled from the SYNTAX (Synergy Between PCI With Taxus and Cardiac Surgery), PRECOMBAT (Premier of Randomized Comparison of Bypass Surgery Versus Angioplasty Using Sirolimus-Eluting Stent in Patients With Left Main Coronary Artery Disease), and BEST (Randomized Comparison of Coronary Artery Bypass Surgery and Everolimus-Eluting Stent Implantation in the Treatment of Patients With Multivessel Coronary Artery Disease) trials. The primary outcome was death from any cause and was compared in an as-treated analysis.

RESULTS The rate of CR was 61.7% (57.2% with PCI and 66.8% with CABG). During a median 4.9-year follow-up period (interquartile range: 4.5 to 5.0 years), compared with patients undergoing CABG with CR, those undergoing PCI with incomplete revascularization had a higher risk for death from any cause (adjusted hazard ratio [aHR]: 1.43; 95% confidence interval [CI]: 1.03 to 2.00; $p = 0.036$) and the composite of death, myocardial infarction, and stroke (aHR: 1.48; 95% CI: 1.14 to 1.92; $p = 0.003$). However, there was no significant difference between patients undergoing CABG with CR and those undergoing PCI with CR regarding the risk for death from any cause (aHR: 1.16; 95% CI: 0.83 to 1.63; $p = 0.39$) and the composite of death, myocardial infarction, and stroke (aHR: 1.14; 95% CI: 0.87 to 1.48; $p = 0.35$). Subgroup analysis of multivessel coronary disease, high SYNTAX score (>32), and diabetes showed consistent findings.

CONCLUSIONS For the treatment of left main or multivessel coronary artery disease, PCI resulting in CR was associated with a similar long-term survival rate to CABG resulting in CR. Therefore, the ability to achieve CR should enter into the decision algorithm for choice of revascularization strategy. (J Am Coll Cardiol Intv 2017;10:1415–24)

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Manuscript received December 7, 2016; revised manuscript received April 13, 2017, accepted April 17, 2017.

ABBREVIATIONS AND ACRONYMS

CABG = coronary artery bypass grafting

CR = complete revascularization

IR = incomplete revascularization

MI = myocardial infarction

PCI = percutaneous coronary intervention

Coronary artery bypass grafting (CABG) offers a better survival rate compared with percutaneous coronary intervention (PCI) in patients with severe coronary artery disease (1), multivessel disease (2,3), and diabetes (4). Therefore, CABG has been considered the standard revascularization strategy in the treatment of severe coronary artery disease (5,6). However, previous studies were limited by the high prevalence of incomplete revascularization (IR). Although randomized trials intended to enroll patients with anatomy amenable to both CABG and PCI by protocol, a significant proportion of patients did not achieve complete revascularization (CR), particularly in patients undergoing PCI. IR has been known to have a negative impact on outcomes (7–9). In addition, a recent study demonstrated that inferior outcomes of PCI compared with CABG were observed only in patients with IR, whereas patients achieving CR showed similar outcomes between PCI and CABG, suggesting the importance of the completeness of revascularization in decision making regarding revascularization strategy in patients with multivessel coronary artery diseases (10).

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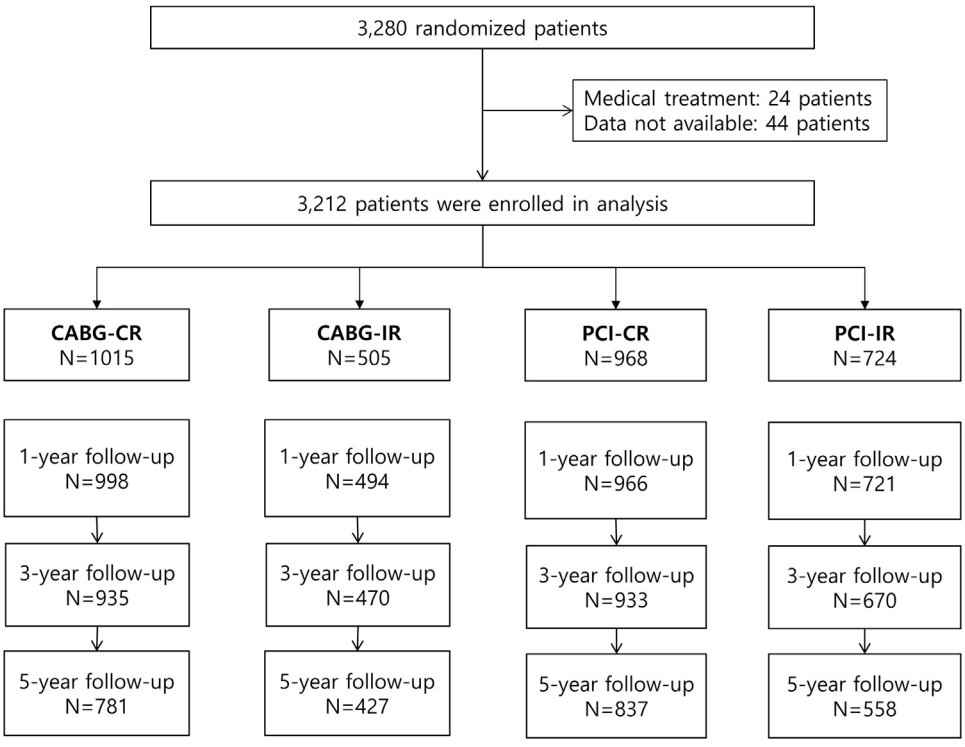
In the present study, we hypothesized that when severe coronary artery disease was completely revascularized by either revascularization strategy, PCI and CABG would show similar long-term survival. Based on a patient-level pooled database from 3 randomized trials enrolling patients with left main and multivessel disease, we compared CABG versus PCI with drug-eluting stent implantation according to the completeness of revascularization with respect to long-term survival.

METHODS

STUDY PATIENTS. The study designs, detailed entry criteria, and outcomes of individual trials have been described previously (11–13). In brief, these trials were multicenter and multinational; SYNTAX (Synergy Between PCI With Taxus and Cardiac Surgery)

FIGURE 1 Study Flow



CABG = coronary artery bypass grafting; CR = complete revascularization; IR = incomplete revascularization; PCI = percutaneous coronary intervention.