

Long-Term Outcomes After Off-Pump Versus On-Pump Coronary Artery Bypass Grafting by Experienced Surgeons



Joanna Chikwe, MD,^{a,b} Timothy Lee, MD,^a Shinobu Itagaki, MD, MSc,^a David H. Adams, MD,^a
Natalia N. Egorova, PhD^c

ABSTRACT

BACKGROUND Long-term benefits of off-pump versus on-pump coronary artery bypass grafting (CABG) are controversial.

OBJECTIVES The authors sought to compare long-term survival and morbidity after on-pump versus off-pump CABG.

METHODS Mandatory clinical and administrative registries from New Jersey Department of Health were linked to identify patients who underwent CABG between 2005 and 2011, by surgeons who had performed at least 100 off-pump or on-pump CABG operations. Survival, stroke, myocardial infarction, repeat revascularization, and new dialysis requirement were compared using Cox modeling, propensity scores, and instrumental variable analysis. Median follow-up was 6.8 years (range: 0 to 11.0 years); last follow-up date was December 31, 2015.

RESULTS Among 42,570 CABG patients, 6,950 who underwent off-pump CABG and 15,295 who underwent on-pump CABG met study criteria. Off-pump CABG was associated with higher mortality (33.4% vs. 29.6% at 10 years; hazard ratio [HR]: 1.11; 95% confidence interval [CI]: 1.04 to 1.18; $p = 0.002$) compared with on-pump CABG. Off-pump CABG was associated with a higher risk of incomplete revascularization (15.7% vs. 8.8%; $p < 0.001$), which was a predictor of late mortality (HR: 1.10; 95% CI: 1.03 to 1.17; $p = 0.006$); and higher rates of repeat revascularization (15.4% vs. 14.0% at 10 years; HR: 1.17; 95% CI: 1.01 to 1.37; $p = 0.048$). There were no significant differences in the rate of stroke, myocardial infarction, or new dialysis.

CONCLUSIONS In this mandatory clinical registry, off-pump was associated with increased incomplete revascularization, repeat revascularization, and mortality at 10 years compared with on-pump CABG, suggesting that on-pump CABG may be the appropriate choice for most patients undergoing surgical revascularization. (J Am Coll Cardiol 2018;72:1478-86)
© 2018 Published by Elsevier on behalf of the American College of Cardiology Foundation.

Coronary artery bypass grafting (CABG) is an effective treatment for patients with extensive coronary artery disease (1,2). This operation is one of the most frequently performed worldwide, and is most commonly conducted using cardiopulmonary bypass (on-pump CABG), which enables coronary anastomoses to be carried out on the arrested heart (3,4). Techniques to facilitate CABG

on the beating heart without cardiopulmonary bypass (off-pump CABG) were developed to reduce complications associated with cardiopulmonary bypass and manipulation of the aorta (5). The strategies of off-pump and on-pump CABG have been compared in randomized clinical trials (6-10). Randomized surgical trials are the most effective way to control for unmeasured confounders and selection bias, but usually



Listen to this manuscript's audio summary by JACC Editor-in-Chief Dr. Valentin Fuster.



From the ^aDepartment of Cardiovascular Surgery, Icahn School of Medicine at Mount Sinai, New York, New York; ^bDepartment of Surgery, The State University of New York, Stony Brook, New York, New York; and the ^cDepartment of Population Health Science and Policy, Icahn School of Medicine at Mount Sinai, New York, New York. The Icahn School of Medicine at Mount Sinai receives royalty payments from Edwards Lifesciences for intellectual property related to the development of 2 mitral valve repair rings, and from Medtronic for intellectual property related to the development of a tricuspid valve repair ring. Dr. Chikwe has received speaker honoraria from Edwards Lifesciences. All other authors have reported that they have no relationships relevant to the contents of this paper to disclose.

Manuscript received June 17, 2018; accepted July 2, 2018.

they lack power to analyze patient subgroups, involve highly selected patients and surgeons, and provide limited follow-up, which reduces the generalizability of their findings. Complementary data can be obtained from nonrandomized, clinical registries with long-term follow-up in larger populations more representative of clinical practice. Our objective was to compare long-term outcomes of off-pump and on-pump CABG in patients identified from a contemporary mandatory clinical registry.

SEE PAGE 1487

METHODS

STUDY DESIGN. This retrospective cohort analysis includes patients with coronary disease who underwent off-pump or on-pump CABG between January 1, 2005, and December 31, 2011, in New Jersey. The study was approved by institutional review boards at the New Jersey Department of Health and the authors' institution, including a waiver of informed consent.

REGISTRIES. Patients were identified from a clinical database, the Open Heart Surgery Registry, a mandatory New Jersey registry of cardiac surgery started in 1994. Maintained by the New Jersey Department of Health, the registry collates data collected by trained clinical staff at each participating hospital, conducts data audits quarterly, and employs external medical auditors to verify data annually. All licensed state hospitals are required to submit data on each cardiac surgery patient without exception, and therefore, this clinical registry captures all CABG surgeries occurring in the state.

To obtain long-term clinical outcome data, this clinical registry was linked with 3 databases, each managed by the New Jersey Department of Health. These were the New Jersey Cardiac Catheterization registry, a mandatory clinical database of catheterizations; the New Jersey Discharge Data Collection System, a state-mandated administrative database that prospectively collects data on inpatient visits from 1994 and outpatient visits from 2004; and the New Jersey Vital Statistics deaths registry, which contains all deaths known to any state or federal agency. These databases were linked using probabilistic matching, and patients were matched with a 98% success rate. Additional details are included in the [Online Appendix](#).

STUDY POPULATION. Patients were eligible for inclusion if they underwent isolated CABG. Exclusion criteria were other concomitant or any previous cardiac surgery, hemodynamic instability (pre-

operative shock, cardiopulmonary resuscitation, or inotrope requirement), and emergency status. Additionally, patients with missing personal or surgeon identifiers, and non-New Jersey residents, were excluded to maximize capture of late outcomes.

Off-pump and on-pump CABG was determined using the clinical registry assignment, which provided an indicator of off-pump to on-pump conversions, thus identifying the subgroup of patients intended for off-pump CABG but who underwent on-pump CABG. The study was designed on an intention-to-treat basis, and the off-to-on pump conversion subgroup was considered as off-pump CABG. Incomplete revascularization was defined, using the clinical registry variables, as a greater number of diseased territories than the number of grafts placed. Hybrid procedures were identified as single-vessel off-pump coronary bypass procedures using a minimally invasive approach in patients with more than 1 diseased territory, who underwent elective percutaneous coronary intervention (PCI) within 90 days after surgery.

SURGEON CRITERIA. To reduce the effect of differential expertise bias, we added surgeon-specific criteria used in expertise-based randomized controlled trials (8,11). Patients were only included if their surgeon had performed more than 100 of the relevant procedure. These qualifying criteria were based on procedural data from 1994 onwards. A total of 49 of 83 surgeons performing off-pump CABG, and 71 of 86 surgeons performing on-pump CABG met the surgeon qualifying criteria. The median number of CABGs completed by these surgeons at the time of the index procedure was 905 for off-pump CABG, and 953 for on-pump CABG, respectively, with a median of 79 off-pump and 137 on-pump CABG cases completed during the 365 days immediately before surgery.

STUDY ENDPOINTS. The primary endpoint was all-cause mortality. Patients were followed from the date of the index CABG until December 31, 2015. Deaths were identified from the New Jersey Vital Statistics death registry. Secondary outcomes included stroke, myocardial infarction, repeat revascularization, and new renal failure requiring dialysis. Stroke was defined as a hemorrhagic or ischemic cerebrovascular event during the index admission (but was not present at the time of the index admission) or the primary diagnosis of subsequent admissions; transient ischemic events were excluded. Myocardial infarction was defined as myocardial infarction that occurred during the index admission (but was not

ABBREVIATIONS AND ACRONYMS

CABG = coronary artery bypass grafting

CI = confidence interval

HR = hazard ratio

PCI = percutaneous coronary intervention

Download English Version:

<https://daneshyari.com/en/article/10213742>

Download Persian Version:

<https://daneshyari.com/article/10213742>

[Daneshyari.com](https://daneshyari.com)