Current Readings on Off-Pump Coronary Artery Bypass

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Historically, the use of cardiopulmonary bypass (CPB) in performing coronary artery bypass grafting (CABG) has been the "gold standard" in coronary revascularization. However, with greater understanding of the inflammatory effects of CPB and the increased risks of strokes in atherosclerotic or calcified aortas, there has been a growing interest in less-invasive approaches to the standard conventional technique. One such approach is performing coronary revascularization without using CPB, also known as off-pump CABG (OPCAB). Several studies have reported that OPCAB is a safe and effective technique that avoids the significant morbidity associated with the use of CPB, whereas other studies report no overall advantage with the avoidance of CPB in coronary revascularization and a trend toward better outcomes in patients undergoing the conventional on-pump technique. The controversial topic of on-pump vs OPCAB has been the subject of ongoing debate for over a decade. This article reviews current literature and hopefully provides an unbiased guide for assessing the values, benefits, and risks of both the techniques.

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OFF-PUMP VS. CONVENTIONAL CORONARY ARTERY BYPASS GRAFTING: EARLY AND 1-YEAR GRAFT PATENCY, COST, AND QUALITY-OF-LIFE OUTCOMES; A RANDOMIZED TRIAL

Puskas JD, Williams WH, Mahoney EM, et al. J Am Med Assoc 291:1841-1849; 2004

In this article, authors reported Emory University's Surgical Management of Arterial Revascularization Therapies (SMART) study graft patency rate, clinical and quality-of-life outcomes, and cost in a randomized controlled trial of 200 patients who were not selected for coronary anatomy, ventricular function, or comorbidities that were planned for complete revascularization of the target vessel before randomization; were enrolled between March 10, 2000 and August 20, 2001; and were operated on at an Emory University–affiliated hospital, with complete follow-up for 197 patients at 30 days (3 patients were withdrawn from the study because of need for mitral procedures after randomization) and 185 at 1 year.

An overall patency rate (FitzGibbon A plus B) of 99.0% for off-pump and 97.7% for on-pump cases ($P = 0.22$) in 184 patients (of 197 enrollees) was reported based on predischarge graft angiography.

At 1 year angiographic follow-up, overall graft patency was similar between the 2 groups; 93.6% patent grafts among off-pump surgery patients vs 95.8% patent grafts among on-pump surgery patients ($P = 0.44$). Graft patency was also similar between the 2 groups in all arterial conduits, all venous conduits, and among grafts to each region of the heart. Thrombolysis in myocardial infarction (MI) flows were also similar between the 2 groups at 1 year, with 27 (5.3%) of 511 grafts studied occluded at 1-year follow-up, of which 16 were in off-pump surgery patients and 11 in on-pump surgery patients.

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Table 1. Early and Late Complications*

Complication	Complications <30 d			Complications 30 d to 1 y†		
	No. (%) of Off-Pump Coronary Artery Bypass Patients, ($n = 98$)	No. (%) of CABG With Cardiopulmonary Bypass Patients, ($n = 99$)	OR (95% CI)	No. (%) of Off-Pump Coronary Artery Bypass Patients, ($n = 89$)	No. (%) of CABG With Cardiopulmonary Bypass Patients, ($n = 93$)	OR (95% CI)
Death (all causes)	1 (1.0)	2 (2.0)	0.50 (0.04-5.61)	3 (34)	2 (2.2)	1.58 (0.26-9.73)
Cardiac						
Reoperation for bleeding	1 (1.0)	2 (2.0)	0.50 (0.04-5.61)	0	0	
Symptomatic graft occlusion	0	1 (1.0)		2 (2.2)	1 (1.1)	2.11 (0.19-23.7)
Angioplasty or stent	0	1 (1.0)		2 (2.2)	0	
New Q wave	1 (1.0)	2 (2.0)	0.50 (0.04-5.61)	1 (1.1)	1 (1.1)	1.05 (0.06-17.0)
Recurrent angina	0	1 (1.0)		3 (3.4)	1 (1.1)	3.21 (0.33-31.5)
New atrial fibrillation	16 (16.3)	22 (22.2)	0.68 (0.33-1.40)	0	1 (1.1)	
Pacemaker placement	0	0		0	0	
Congestive heart failure	0	0		3 (3.4)	5 (5.4)	0.61 (0.14-2.65)
Repeat CABG surgery	0	0		0	0	
Cardiac readmission	1 (1.0)	1 (1.0)	1.0 (0.06-16.4)	11 (12.4)	9 (9.7)	1.32 (0.52-3.35)
Neurologic						
Permanent stroke	1 (1.0)	2 (2.0)	0.50 (0.04-5.61)	1 (1.1)	0	
Transient ischemic attack	1 (1.0)	0		0	1 (1.1)	
Renal						
New renal failure‡	1 (1.0)	2 (2.0)	0.50 (0.04-5.61)	0	1 (1.1)	
New dialysis	2 (2.0)	0		0	1 (1.1)	
Pulmonary						
Pleural effusions requiring thoracentesis	9 (9.2)	17 (17.2)	0.49 (0.21-1.15)	0	0	
Infections						
Deep sternal§	2 (2.0)	1 (1.0)	2.04 (0.18-22.9)		1 (1.1)	
Superficial sternal‖	4 (4.1)	7 (7.1)	0.56 (0.16-1.97)	0	0	
Harvest conduit site‖	9 (9.2)	10 (10.1)	0.90 (0.35-2.32)	0	0	
Other						
Gastrointestinal tract bleed	3 (3.1)	2 (2.0)	1.53 (0.25-9.37)	0	0	
Noncardiac readmission	8 (8.2)	9 (9.1)	0.89 (0.33-2.41)	24 (27.0)	25 (27.0)	1.00 (0.52-1.93)

CI, confidence interval; OR, odds ratio.

*Baseline values have been reported.

†Patients who were alive at 30 days and not withdrawn or lost to follow up at 1 year.

‡Creatinine level higher than 2 mg/dL (176.8 μmol/L) or 50% increase in creatinine level compared with baseline.

§Major surgical debridement or muscle flap closure or both and antibiotic treatment.

‖Antibiotic treatment with or without minor incision and drainage.