

Review: PCI has lower risk for procedural stroke but higher risks for angina and repeated revascularization than CABG

Bravata DM, Gienger AL, McDonald KM, et al. Systematic review: the comparative effectiveness of percutaneous coronary interventions and coronary artery bypass surgery. *Ann Intern Med.* 2007;147:703-16.

Clinical impact ratings: GIM/FP/GP ★★★★★☆ Hospitalists ★★★★★☆ Cardiology ★★★★★☆

QUESTION

In patients requiring coronary revascularization who are eligible for both percutaneous coronary intervention (PCI) and coronary artery bypass graft (CABG) surgery, how do both interventions compare?

METHODS

Data sources: MEDLINE, EMBASE/Excerpta Medica, and Cochrane databases (1966 to August 2006); conference abstracts; and reference lists.

Study selection and assessment: Randomized controlled trials (RCTs) comparing PCI with CABG and observational studies of ≥ 1000 patients. Studies comparing PCI or CABG with medical therapy, different types of PCI, or different types of CABG were excluded. Criteria for quality assessment of individual studies included treatment allocation, completeness of follow-up, and use of intention-to-treat analysis. 23 RCTs (*n* = 9963, mean age 61 y, 73% men) met the selection criteria; 21 had high quality.

Outcomes: Survival, myocardial infarction (MI), stroke, angina, and repeated revascularization.

MAIN RESULTS

Meta-analysis showed that PCI led to fewer procedural strokes but higher rates of angina

and repeated revascularization than CABG (Table). Groups did not differ for procedural MI or 10-year survival. Observational studies showed that CABG–PCI hazard ratios (HRs) for death across disease severities ranged from 0.48 to 0.86. In 1 registry, PCI reduced deaths in patients with least severe disease (HR 2.1), and CABG reduced deaths in patients with most severe disease (HR 0.45). In a subgroup of patients with diabetes (6 RCTs, *n* = 499), PCI and CABG did not differ for 5-year survival.

CONCLUSION

Percutaneous coronary intervention had lower risk for procedural stroke but higher risks for angina and repeated revascularization than did coronary artery bypass graft surgery in patients requiring coronary revascularization who were eligible for both interventions.

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For correspondence: Dr. D.M. Bravata, Center for Primary Care and Outcomes Research, Stanford, CA, USA. E-mail dbravata@stanford.edu. ■

Percutaneous coronary intervention (PCI) vs coronary artery bypass grafting (CABG) in patients requiring coronary revascularization*

Outcomes	Number of trials (n)	Follow-up	PCI	CABG	RRR (95% CI)	NNT (CI)
Procedural stroke	15 (7264)	–	0.5%	1.2%	54% (23 to 73)	155 (91 to 441)
					RRI (CI)	NNH (CI)
Angina	12 (5218)	1 y	25%	16%	56% (40 to 74)	11 (9 to 15)
	7 (2269)	3 y	18%	11%	59% (29 to 95)	15 (11 to 27)
	7 (3308)	5 y	21%	16%	32% (14 to 53)	20 (13 to 42)
Repeated revascularization	12 (5108)	1 y	26%	3.8%	599% (470 to 758)	4 (4 to 5)
	4 (1420)	3 y	38%	8.4%	356% (257 to 485)	3 (3 to 4)
	9 (4686)	5 y	46%	9.8%	370% (314 to 434)	3 (3 to 3)

*Abbreviations defined in Glossary. RRR, NNT, and CI calculated from data in article and data provided by author using a random-effects model. RRI, NNH, and CI calculated from data provided by author.

COMMENTARY

The systematic review of major clinical trials by Bravata and colleagues compared CABG with PCI. The work was commissioned by the US Agency for Healthcare Quality and Research and has been vetted by an extensive panel of reviewers. The findings are consistent with previous reviews showing no difference in mortality, reduced strokes with PCI, and reduced angina and repeated revascularization with CABG.

This review raises 2 key issues: the absence of a survival difference in patients with diabetes, and the question of whether the included trials truly represent the spectrum of risk in clinical practice. For survival, the first large RCT comparing CABG with PCI in the United States, the Bypass Angioplasty Revascularization Investigation trial (1), found an unexpected interaction between treatment assignment and mortality, with an apparent benefit of CABG for patients with diabetes. Subsequent RCTs have not replicated this finding, and clinical judgment on the issue should be reserved until the large Future Revascularization Evaluation in Patients with Diabetes Mellitus: Optimal Management of Multivessel Disease trial is completed. This RCT directly addresses this issue in patients with diabetes and multivessel coronary disease in the era of bypass grafting.

The issue of generalizability is more complex, because screening and consent for random assignment to such intensive procedures require substantial commitment by investigators and patients. The population

in which equipoise exists probably varies considerably from center to center. Many observational studies (2, 3) have found a modest survival benefit for CABG over PCI in high-risk patients, particularly those with 3-vessel coronary disease and left ventricular dysfunction. As more results accrue, clinicians can rest assured that in candidates for both procedures, differences in outcome are small, such that patient preferences become paramount. For higher-risk patients with severe multivessel coronary disease, CABG is preferred except when patient preferences are strong or when opportunities arise to enroll in RCTs.

*Robert M. Califf, MD
Duke University
Durham, North Carolina, USA*

References

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