

Reducing Cardiovascular Mortality in Treating Acute STEMI

Adrianna Picicco, PA-S

Background and Purpose

Cardiovascular disease is the leading cause of death not only in the US, but worldwide.¹ CAD specifically is the most common type of heart disease killing 375,476 people in 2021 with about one in every 20 adults ages twenty and older having coronary disease. There are two procedural treatments for establishing blood flow back to the blocked coronary arteries: percutaneous coronary intervention (PCI) or coronary artery bypass grafting (CABG).²

This research aims to evaluate the superior method of management in most effectively reducing cardiovascular mortality to treat acute STEMIs.

PICOT

In adults ages 50 years or greater, what is the effect of CABG when compared to PCI in treating acute STEMI to reduce further cardiovascular mortality?

Designs and Methods

Keywords: STEMI, CABG, PCI, acute, cardiovascular mortality, revascularization, recurrent, myocardial infarction, stroke, MACCE

Inclusion: patients >50 years of age, coronary artery disease, CABG, PCI, 2018-current, full text available, and published in English

Exclusion: <50 years of age, before 2018, not in English, full text not available, and patients with CAD undergoing PCI or CABG unrelated to STEMI

Summary of Evidence Search			
Database	Yielded	Reviewed	Included
PubMed	622	9	6
Google Scholar	10600	10	0
Summon	6678	5	0
Total:	17900	24	6

Synthesis of Evidence

Primary endpoint is the overall mortality rate when comparing PCI to CABG in treating patients with a STEMI throughout their entire lifetime. Secondary endpoints include MACCE which include stroke, revascularization, and recurrent myocardial infarction. Five meta-analyses of randomized controlled trials and one retrospective analyses were reviewed.

Results

- PCI was associated with a higher rate of all-cause mortality, cardiac mortality, and non-cardiac mortality in a study comparing all three outcomes with each treatment modality.³
- In multivessel disease, left main disease, or both, the risk of mortality was higher in patients treated with PCI versus CABG, but no significant difference was seen when comparing cardiovascular mortality.⁴ In another meta-analysis comparing PCI versus CABG in left main CAD and multivessel disease, overall cardiovascular mortality and recurrent MI were increased in PCI in both 30 day mortality and long term mortality.⁵ No statistical significance was seen in risk for MI or stroke, but increased risk for revascularization with PCI was found.⁴
- In patients with reduced ejection fraction, 30 day mortality was similar between the two treatment options, but overall mortality and repeat revascularization were increased with PCI and cumulative incidence of hospital readmission was lower for CABG.⁶
- In patients with multivessel and left main CAD, multivessel disease was found to have decreased cardiovascular mortality in CABG. However, risk of stroke in patients with multivessel disease was increased in CABG. As for left main CAD, recurrent MI was decreased in PCI.⁷
- In a 5 year outcome retrospective analysis, patients with CAD treated with PCI versus CABG had no significant differences in overall mortality or rates of MI. The incidence of repeat revascularization was higher in PCI and the rate of stroke was higher in CABG.⁸

Discussion

Best Practice:

- CABG poses a more permanent management option with decreased rates of cardiovascular mortality in most cases.
- There was an increased rate of stroke in CABG when compared to PCI and increased rate of revascularization seen in PCI when compared to CABG.
- There did not seem to be significant evidence of reducing recurrent myocardial infarction in either CABG or PCI.

Limitations/Further study:

- No standardized length for follow up.
- Evaluation of patients with CAD without the same exact risk factors and comorbidities that can also increase cardiovascular mortality rates independently.
- Patients being treated for true acute MI versus acute on chronic CAD.
- Future research should include individual evaluation of confounding factors such as diabetes, smoking history, hypertension, dyslipidemia family history, and heart failure.

Conclusion

CABG accounts for the highest rates of reducing cardiovascular mortality. In some cases of individualized patients in need of revascularization, PCI is more effective at reducing cardiovascular mortality as they are less invasive and do not pose as many postoperative complications. The question of PCI versus CABG is still not evidently clear for most effectively reducing cardiovascular mortality given each individual patient's personal past medical history, length of follow up, and if they are undergoing these procedures after an acute myocardial infarction or with acute on chronic coronary artery disease.

References

1. The top 10 causes of death. Accessed June 21, 2024. <https://www.who.int/news-room/fact-sheets/detail/the-top-10-causes-of-death>
2. Heart Disease. Accessed June 21, 2024. <https://dph.illinois.gov/topics-services/diseases-and-conditions/heart-stroke/heart-disease.html>
3. Overall and Cause-Specific Mortality in Randomized Clinical Trials Comparing Percutaneous Interventions With Coronary Bypass Surgery: A Meta-analysis - PubMed. Accessed June 21, 2024. <https://pubmed.ncbi.nlm.nih.gov/33044497/>
4. Shaik TA, Chaudhari SS, Haider T, et al. Comparative Effectiveness of Coronary Artery Bypass Graft Surgery and Percutaneous Coronary Intervention for Patients With Coronary Artery Disease: A Meta-Analysis of Randomized Clinical Trials. *Cureus*. 2022;14(9):e29505. doi:10.7759/cureus.29505
5. Feng S, Li M, Fei J, et al. Ten-year outcomes after percutaneous coronary intervention versus coronary artery bypass grafting for multivessel or left main coronary artery disease: a systematic review and meta-analysis. *J Cardiothorac Surg*. 2023;18(1):54. doi:10.1186/s13019-023-02101-y
6. Bianco V, Kilic A, Mulukutla S, et al. Percutaneous coronary intervention versus coronary artery bypass grafting in patients with reduced ejection fraction. *J Thorac Cardiovasc Surg*. 2021;161(3):1022-1031.e5. doi:10.1016/j.jtcvs.2020.06.159
7. Andrade PJN de, Falcão JL de AA, Falcão B de AA, Rocha HAL. Stent versus Coronary Artery Bypass Surgery in Multi-Vessel and Left Main Coronary Artery Disease: A Meta-Analysis of Randomized Trials with Subgroups Evaluation. *Arg Bras Cardiol*. 2019;112(5):511-523. doi:10.5935/abc.20190027
8. Jonik S, Kageyama S, Ninomiya K, et al. Five-year outcomes in patients with multivessel coronary artery disease undergoing surgery or percutaneous intervention. *Sci Rep*. 2024;14(1):3218. doi:10.1038/s41598-024-53905-4

