THERAPEUTICS

Cardiac outcomes occurred more frequently with PCI than CABG or medical therapy in coronary artery disease

Hueb W, Soares PR, Gersh BJ, et al. **The medicine, angioplasty, or surgery study (MASS-II): a randomized, controlled clinical trial of three therapeutic strategies for multivessel coronary artery disease: one-year results.** J Am Coll Cardiol. 2004;43:1743-51.

QUESTION

In patients with multivessel coronary artery disease (CAD), how do percutaneous coronary intervention (PCI), coronary artery bypass graft (CABG) surgery, and medical therapy (MT) compare for reducing cardiac outcomes?

METHODS

Design: Randomized controlled trial (Medicine, Angioplasty, or Surgery Study [MASS-II]).

Allocation: Concealed.*

Blinding: Blinded (participants, data collectors, data analysts, and data safety and monitoring committee).*

Follow-up period: 1 year.

Setting: The Heart Institute, São Paulo, Brazil.

Patients: 611 patients (mean age 60 y, 85% men) with angiographically documented, visually assessed, proximal, multivessel coronary stenosis > 70% and ischemia (documented by either stress testing or the Canadian Cardiovascular Society class II or III). Exclusion criteria included unstable angina or acute myocardial infarction (MI) requiring emergency revascularization.

Intervention: All patients received MT (including nitrates, aspirin, β-blockers, calcium-channel blockers, angiotensin-converting enzyme inhibitors, or a combination of these drugs unless contraindicated). Patients were allocated to continue aggressive MT alone (n = 203), PCI (residual stenosis of < 50% reduction in luminal diameter) within 3 weeks (n = 205), or CABG within 12 weeks (n = 203).

Outcomes: Composite endpoint of cardiac mortality, MI, or refractory angina requiring revascularization (event-free survival); therapeutic PCI or CABG during an episode of unstable angina at any time during follow-up; and angina status.

Patient follow-up: All patients were included in the intention-to-treat analysis.

MAIN RESULTS

The composite endpoint occurred in more patients who received PCI than in those who received MT or CABG, and in more MT patients than in the CABG group (Table). The groups did not differ for cardiac death (4.5%, 1.5%, and 4.0%, respectively; P = 0.23). Fewer patients who received CABG or MT had MI than did those who received PCI (2% or 5% vs 8.3%, respectively; P = 0.01). Additional revascularizations were required in fewer patients in the CABG group (0.5%) compared with the MT (8%) or PCI group (12%) (P < 0.001). Angina was more frequent with MT than PCI or CABG (64% vs 45% or 39%, respectively; P < 0.001).

CONCLUSIONS

In patients with multivessel coronary artery disease, the combined endpoint of cardiac death, myocardial infarction (MI), and refractory angina occurred more frequently with percutaneous coronary intervention (PCI) than with coronary artery bypass grafting (CABG) or medical therapy (MT).

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*See Glossary.

Percutaneous coronary intervention (PCI), coronary artery bypass grafting (CABG), and medical therapy (MT) for coronary artery disease at 1 year†

Outcome	Comparisons	Event rates	RRR/RRI (95% CI)	NNT/NNH (CI)
Composite endpoint	PCI vs MT	24% vs 14%	RRI 71% (13 to 158)	NNH 10 (6 to 41)
	CABG vs MT	6% vs 14%	RRR 55% (17 to 76)	NNT 13 (8 to 50)
	PCI vs CABG	24% vs 6%	RRI 74% (54 to 85)	NNH 6 (5 to 9)

†Composite endpoint = cardiac mortality, myocardial infarction, and refractory angina requiring revascularization. Abbreviations defined in Glossary; RRR, RRI, NNT, NNH, and CI calculated from data in article.

COMMENTARY

Trials in the 1970s clearly showed that CABG reduces mortality in patients with extensive CAD (1). More recent trials in patients with less extensive CAD have shown no difference for cardiac events after revascularization or MT (2). A limitation of revascularization is that it addresses only the most narrowed coronary segments, yet most MIs arise from rupture of nonobstructive coronary plaques.

The results of the MASS-II trial are consistent with other studies: Medically treated patients had more angina and PCI-treated patients had more repeated procedures, but the groups did not differ for mortality. In MASS-II, more Q-wave MIs occurred than expected after PCI. However, it isn't clear how many of these MIs were procedure-related. Revascularization procedures clearly precipitate some cardiac events, which is acceptable only if they substantially reduce long-term risk. The 1-year follow-up in MASS-II is too brief to assess the effect of revascularization on subsequent cardiac risk. Because effective MT is still needed after revascularization, long-term risk reduction may be undermined by the lower use of aspirin, β-blockers, and statins after CABG.

While awaiting the longer-term results from the MASS-II trial and the larger ongoing Bypass Angioplasty Revascularization Investigation 2 Diabetes (BARI-2D) and Clinical Outcomes Utilizing Revascularization and Aggressive Drug Evaluation (COURAGE) trials (3, 4), revascularization should be continued to improve the prognosis in patients with extensive anatomical CAD or high-risk features on noninvasive testing, while maintaining optimal MT in all patients.

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