Exercise training reduced ischemic events more than percutaneous coronary intervention in stable coronary artery disease

Hambrecht R, Walther C, Möbius-Winkler S, et al. **Percutaneous coronary angioplasty compared with exercise training in patients with stable coronary artery disease: a randomized trial.** Circulation. 2004;109:1371-8.

QUESTION

In patients with stable coronary artery disease (CAD), does exercise training reduce coronary outcomes more than standard percutaneous coronary intervention (PCI)?

METHODS

Design: Randomized controlled trial.

Allocation: Unclear concealment.*

Blinding: Blinded (outcome assessors).*

Follow-up period: 12 months.

Setting: A university hospital in Leipzig, Germany.

Patients: 101 men ≤ 70 years of age (mean age 61 y) who had stable CAD and 1 native coronary artery stenosis ≥ 75% amenable to PCI and Canadian Cardiovascular Society (CCS) class I to III angina pectoris with documented myocardial ischemia during stress electrocardiography or technetium-99m scintigraphy. Exclusion criteria included acute coronary syndromes or myocardial infarction (MI) in the previous 2 months, left main coronary artery stenosis > 25% or high-grade proximal left anterior descending artery stenosis, left ventricular ejection fraction < 40%, coronary artery bypass grafting (CABG) or PCI in the previous year, and conditions precluding regular exercise.

Intervention: Exercise training (*n* = 51) or PCI (*n* = 50). Exercise training involved using a bicycle ergometer at 70% of the symptom-limited maximal heart rate for 10 minutes, 6 times/d for 2 weeks. After discharge, patients used the bicycle ergometer 20 minutes/d and participated in a 60-minute aerobic session once per week. PCI was done with stent angioplasty.

Outcomes: Combined endpoint of death from cardiac causes, stroke, CABG, angioplasty, acute MI, and worsening MI needing hospitalization; exercise tolerance; and cost-effectiveness.

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

MAIN RESULTS

Fewer patients in the exercise group had an ischemic event than did patients in the PCI group (Table). Clinical symptoms improved from baseline in both groups. Exercise capacity and maximal oxygen uptake increased by 20% and 16%, respectively, in the exercise group, while no changes occurred in the PCI group (*P* < 0.01). Exercise training was more cost-effective than PCI ($3429 vs $6956 to gain 1 CCS class, *P* < 0.001).

CONCLUSION

In patients with stable coronary artery disease, exercise training reduced coronary outcomes more than standard percutaneous coronary intervention.

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*See Glossary.

Exercise training vs percutaneous coronary intervention (PCI) for stable coronary artery disease at 12 months†

Outcome	Exercise training	PCI	RRR (95% CI)	NNT (CI)
Composite endpoint	12%	30%	61% (11 to 83)	6 (3 to 42)

†Composite endpoint = death from cardiac causes, stroke, coronary artery bypass graft, angioplasty, acute MI, and worsening MI needing hospitalization. Abbreviations defined in Glossary; RRR, NNT, and CI calculated from data in article.

COMMENTARY

The study by Hambrecht and colleagues gained wide attention in the lay press because the results were considered a surprising "win" for the underdog (exercise) versus the heavily favored coronary stenting. In fact, the data emphasize 3 well-known clinical points. First, patients with single-vessel disease and good functional status have excellent outcomes. A generation ago, patients similar to those enrolled in this study were managed with medical therapy and had excellent outcomes. Angioplasty might have been shown to be superior in a population more disabled by angina but not in this one.

Second, exercise is good for you. Not surprisingly, patients who were allocated to exercise had better functional capacity as measured by maximal oxygen uptake after 1 year. Patients in the exercise-training group had significantly less progression of CAD than did those in the angioplasty group. At repeated angiography, progression of CAD occurred at rates of 32% and 45% in the 2 groups, respectively. However, no real difference existed between the 2 groups in mean improvement in CCS class.

Third, coronary angioplasty provides rapid relief of angina but often leads to repeated coronary angiography and revascularization. Coronary restenosis occurred in 15% of the patients who had angioplasty, where-as no significant change occurred in the target lesion of the exercise training group.

This study should not be considered evidence that angioplasty should be replaced by exercise. These 2 approaches are not mutually exclusive. Every patient with CAD should exercise and make every effort to control their risk factors. Angioplasty should also be readily available for patients with high-risk noninvasive test results or disabling symptoms.

As good as angioplasty may be for relieving angina, however, no one should expect it to prevent MI or death in patients with mild or no symptoms. Mild-to-moderate coronary stenoses are the usual sites of plaque rupture and coronary thrombosis, so stenting 1 narrowed artery has minimal effect on a patient's overall risk for coronary events. To extend life, risk factor interventions, such as lipid lowering, smoking cessation, and blood pressure control, are more likely to be beneficial when combined with exercise, as shown by this study.

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