Meta-analysis: effects of percutaneous coronary intervention versus medical therapy on angina relief

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CRD summary
This review found that surgery (percutaneous coronary intervention) provided greater freedom from angina than did drug therapy for patients with stable coronary artery disease. However, the benefit was not significant in more recent trials, possibly because of increased use of effective drugs. The conclusions reflect the evidence presented and changes in clinical practice and appear reliable.

Authors' objectives
To assess the degree of angina relief provided by percutaneous coronary intervention compared with medical therapy in patients with stable coronary artery disease.

Searching
The authors searched the Cochrane Library, EMBASE and MEDLINE from inception to June 2009. Search terms were reported. No language restrictions were imposed. Reference lists of retrieved articles and reviews were searched for additional studies.

Study selection
Randomised controlled trials (RCTs) that compared percutaneous coronary intervention with medical therapy in patients with stable coronary artery disease were eligible for the review. In the absence of an accepted definition of stable disease, trials that enrolled patients with recent acute coronary syndromes that had been stabilised for more than seven days were included, as were trials in patients with minimal or no angina. The primary outcome was freedom from angina as defined by the study authors.

Most participants in included trials were men with normal left ventricular systolic function. About half of the trials enrolled patients who had been stabilised after an acute myocardial infarction. Medication use at baseline varied widely among trials but was generally similar between groups.

Two independent reviewers selected studies for the review.

Assessment of study quality
Validity was assessed using the 5 point Jadad scale. Two independent reviewers assessed validity.

Data extraction
Data on numbers of patients free from angina at the longest available follow-up were used to calculate the odds ratio (OR) and its 95% confidence interval (CI). Freedom from angina was estimated using surrogate information if necessary. The number of patients with follow-up assessments was used as the denominator in all calculations.

Data were extracted by two independent reviewers.

Methods of synthesis
Trial results were combined by meta-analysis using a random-effects (DerSimonian and Laird) model. Statistical heterogeneity was assessed using the Cochran Q and I² statistics. Differences between trials were investigated by subgroup and meta-regression analyses. A sensitivity analysis was performed by removing one trial at a time from the analyses to check the overall robustness of the meta-analysis and meta-regression. Publication bias was assessed qualitatively using a funnel plot and quantitatively using the Egger test.

Results of the review
Fourteen RCTs, with 7,818 participants, were included. All were randomised and reported on withdrawals and loss to follow-up, but only six trials reported allocation concealment.

Overall, freedom from angina at follow-up was significantly more likely in the percutaneous coronary intervention group than in the medical therapy group (OR 1.69, 95% CI 1.24 to 2.30). Significant heterogeneity was present.

Subgroup analysis indicated that the benefit of percutaneous coronary intervention was greatest in older trials (recruitment ended in 1990 to 1994; three RCTs) and was not significant in trials that completed recruitment in 2000 or later (five RCTs).

There was a statistically significant benefit of percutaneous coronary intervention at one year follow-up (eight RCTs) and one to five year follow-up (10 RCTs), but not in trials with follow-up longer than five years (five RCTs).

Meta-regression analysis revealed a statistically significant inverse relationship (p=0.021) between odds ratio for freedom from angina and number of evidence-based medications used in the trial. Results of other analyses were reported.

No evidence of publication bias was found.

**Authors’ conclusions**

Percutaneous coronary intervention was associated with greater freedom from angina compared with medical therapy, but this benefit was reduced in more recent trials, possibly because of increased use of evidence-based medications.

**CRD commentary**

The inclusion criteria were clear and the authors searched a number of relevant sources without language restrictions. Unpublished studies were not sought, but risk of publication bias was assessed and no evidence of bias was found. Validity of included trials was assessed using standard criteria. However, some of these criteria were not relevant to trials of surgery versus medical therapy, while criteria that would have been relevant were not assessed. Study selection, validity assessment and data extraction were performed by two independent reviewers, minimising the risk of reviewer errors and bias.

Relevant details of included trials were presented. Trials were pooled by meta-analysis and sources of heterogeneity were thoroughly investigated. The authors acknowledged a number of limitations, including incomplete reporting of medication use, possible selective reporting of freedom from angina and the exploratory nature of meta-regression.

This was a generally well-conducted review. The authors’ main conclusions were based on subgroup and meta-regression analyses but were in line with changes in clinical practice and appear reliable.

**Implications of the review for practice and research**

**Practice:** The authors stated that the review findings support guidelines that emphasise the need to optimise medical therapy before referring patients for percutaneous coronary intervention.

**Research:** The authors did not state any implications for research.

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Record Status
This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.