Per cutaneous transluminal coronary angioplasty versus medical treatment for non-acute coronary heart disease: meta-analysis of randomised controlled trials

Bucher H C, Hengstler P, Schindler C, Guyatt G H

Authors’ objectives
To determine whether percutaneous transluminal angioplasty (angioplasty) is superior to medical treatment in non-acute coronary artery disease.

Searching
The authors searched MEDLINE, EMBASE, Cochrane, Biological Abstracts, Health Periodicals, and Pascal from 1979 to December 1998 using the search terms: ‘transluminal percutaneous coronary angioplasty’, ‘cardiovascular agents’, ‘coronary disease’, and the truncated textword ‘random’. The authors also searched for additional studies in the references of relevant articles and previous overviews.

Study selection
Study designs of evaluations included in the review
Randomised controlled trials (RCTs) published between 1979 and 1998.

Specific interventions included in the review
Percutaneous transluminal angioplasty (angioplasty) compared to medical treatment (anti-ischaemic treatment and treatment of risk factors for secondary events).

Participants included in the review
Patients with coronary artery disease. Three of the studies included patients with multivessel disease and previous myocardial infarction. Patients had to have non-acute coronary artery disease with no acute myocardial infarction for at least one week before randomisation for inclusion on the review.

Outcomes assessed in the review
Angina, fatal and non-fatal myocardial infarction, death, repeated angioplasty, and coronary artery bypass grafting.

The authors also looked at the improvement of exercise time during exercise testing and the mean change in angina, but inconsistent reporting of these end points precluded further analysis.

How were decisions on the relevance of primary studies made?
Two investigators independently assessed study eligibility. Agreement was measured using the kappa statistic (K = 0.91).

Assessment of study quality
The authors used a modified version of Jadad's quality assessment method (0-5 points) to assess the quality of included studies (see Other Publications of Related Interest no.1). The assessment method rated the methodological quality of the included studies based on randomisation of participants, blinding of patients, caregivers, and those assessing outcome, and full description of withdrawals and drop-outs. The authors do not state how papers were assessed for quality, or how many of the reviewers performed the quality assessment.

Data extraction
The authors do not state how many of the authors performed the data extraction. Data were extracted for the categories of: study identification, inclusion criteria (clinical and angiographic), number of vessels (% successful dilatation), complications related to PRCA in intervention groups, follow-up (months), pre-existing conditions (% MI and non-Q MI), mean ejection fraction (%), and total quality score.
Methods of synthesis
How were the studies combined?
Pooled risk differences and risk ratios (RRs) with 95% confidence intervals (CIs) were calculated using a random-effects model.

How were differences between studies investigated?
The Breslow-Day test was used to test for heterogeneity. The results were further investigated according to a pre-specified subgroup analysis based on the categories of methodological quality, single versus multi-vessel disease, and duration of follow-up.

Results of the review
Six RCTs were included with 1,904 participants (953 in the angioplasty group and 951 in the medical treatment group).

Angina: RR 0.70 (95% CI: 0.50, 0.98), heterogeneity P < 0.001.
Fatal and non-fatal myocardial infarction: RR 1.42 (95% CI: 0.90, 2.25). Heterogeneity p > 0.05.
Death: RR 1.32 (95% CI: 0.65, 2.70). Heterogeneity p > 0.05.
Coronary artery bypass graft: RR 1.59 (95% CI: 1.09, 2.32). Heterogeneity p > 0.05.
Repeated angioplasty: RR 1.29 (95% CI: 0.71, 3.36), heterogeneity P < 0.001).

Differences in the methodological quality of the trials, in follow-up, or in single versus multi-vessel disease did not explain the variability in study results in any analysis.

Authors’ conclusions
The authors state that percutaneous transluminal coronary angioplasty may lead to a greater reduction in angina in some patients with non-acute coronary heart disease than medical treatment but at the cost of more coronary artery bypass grafting. Trials have not included enough patients for informative estimates of the effect of angioplasty on myocardial infarction, death, or subsequent revascularisation, though trends so far do not favour angioplasty.

CRD commentary
The authors have stated their research question and inclusion and exclusion criteria. The literature search appears to be thorough although it is not stated whether the search had any language restrictions or sought unpublished studies. It is possible that additional studies may have been missed however the authors discuss this possibility in the review and any possible effects missing studies would make to the review. The authors report how many of the authors performed the selection of studies but not the quality assessment or the data extraction. There is an assessment of the included studies using the Jadad score and this was investigated as a possible source of heterogeneity. However, results were pooled when significant heterogeneity was present. This is not appropriate and the results of these analyses should be interpreted with great caution.

The review performed statistical pooling using a random-effects model. There was also further testing and discussion about the heterogeneity between studies. Further analysis however, did not explain the heterogeneity.

The authors’ conclusions appear to follow from the results but these should be viewed with caution because of methodological limitations in the process of the review.

Implications of the review for practice and research
Practice: The authors state that clinicians should be restrained in their recommendations for percutaneous transluminal
coronary angioplasty, reserving the procedure for patients whose symptoms of angina are not well controlled on medical treatment.

Research: The authors do not state any implications for research.

Bibliographic details

PubMedID
10884254

Original Paper URL
http://bmj.com/cgi/content/full/321/7253/73

Other publications of related interest

This additional published commentary may also be of interest. Bates ER. Review: percutaneous coronary angioplasty is associated with less angina but more coronary artery bypass grafting in patients with non-acute coronary artery disease than is medical treatment. Evid Based Med 2001;6:13.

Indexing Status
Subject indexing assigned by NLM

MeSH
Angina Pectoris /therapy; Angioplasty, Balloon, Coronary /methods; Coronary Artery Bypass /statistics & numerical data; Humans; Myocardial Infarction /therapy; Randomized Controlled Trials as Topic; Risk Factors

AccessionNumber
12000008332

Date bibliographic record published
28/02/2001

Date abstract record published
28/02/2001

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.