Percutaneous coronary intervention versus bypass surgery for left main coronary artery disease: a meta-analysis of randomised trials


CRD summary
The review concluded that percutaneous coronary intervention was comparable with coronary artery bypass grafting for treating unprotected left main artery stenosis for the composite outcome of death, myocardial infarction, repeat revascularisation and stroke at 12 months follow-up. The review had some methodological and data limitations so a degree of caution is warranted when interpreting the authors’ conclusions.

Authors' objectives
To compare percutaneous coronary intervention and coronary artery bypass grafting for treatment of unprotected left main artery stenosis.

Searching
PubMed, EMBASE and Cochrane Central Register of Controlled Trials (CENTRAL) were searched. Search terms were reported. No search dates were reported. Ongoing clinical trials and unpublished studies were searched on three online sites. Reference lists of retrieved articles were searched and textbooks were handsearched.

Study selection
Randomised controlled trials (RCTs) of percutaneous coronary intervention versus coronary artery bypass grafting in patients with unprotected left main artery stenosis and a minimum length of follow-up of 12 months were eligible for inclusion. The primary outcome was the composite of death, myocardial infarction, repeat revascularisation and stroke at 12 months follow-up. Secondary endpoints were the composite of death, myocardial infarction and repeat revascularisation; death; myocardial infarction; repeat revascularisation; graft failure; stent thrombosis; and stroke. Trials were excluded if they were ongoing, unpublished or published only as an abstract.

The included trials studied percutaneous coronary intervention versus coronary artery bypass grafting in patients with unprotected left main artery stenosis. The type of stent used during percutaneous coronary intervention varied; most were drug eluting and one study used bare metal stents. The proportion of patients with off-pump coronary artery bypass grafting varied from 46% to 64%, where reported. The proportion of patients with three-vessel disease ranged from 17% to 75% in the coronary artery bypass grafting group and 11% to 60% in the percutaneous coronary intervention group.

The authors did not state how many reviewers performed study selection.

Assessment of study quality
Quality assessment was undertaken using Cochrane Collaboration criteria of randomisation, allocation concealment, blinding, incomplete outcome data, selective reporting and other biases.

The authors did not state how many reviewers undertook quality assessment.

Data extraction
Data were extracted on a variety of composite and individual coronary outcomes and used to calculate odds ratios (ORs) and 95% confidence intervals (CIs).

Two reviewers independently extracted data and disagreements were resolved by consensus.

Methods of synthesis
Mantel-Haenszel fixed-effect meta-analysis was used to calculate pooled odds ratios and 95% CIs. DerSimonian random-effects meta-analysis was used where statistical heterogeneity was detected. Sensitivity analysis was conducted using random-effects meta-analysis with relative risks in place of odds ratios. Statistical heterogeneity was assessed
using $I^2$ and $X^2$ statistics. Publication bias was assessed using Egger’s test and Peter’s test.

**Results of the review**

Four RCTs were included in the review (1,611 patients, range 87 to 457). Three trials had low risk of bias. One study was unclear for quality items that included blinding, randomisation and allocation concealment.

Compared with coronary artery bypass grafting, percutaneous coronary intervention was associated with a statistically significant increased risk of repeat revascularisations (OR 2.17, 95% CI 1.48 to 3.17; $I^2=0\%$; four RCTs), a reduced risk of stroke (OR 0.14, 95% CI 0.04 to 0.55; $I^2=0\%$; four RCTs) and an increased risk of the composite of death, myocardial infarction and repeat revascularisation (OR 1.50, 95% CI 1.10 to 2.04; $I^2=0\%$; four RCTs). There was no significant difference in the primary composite outcome of death, myocardial infarction, repeat revascularisation and stroke. There was no significant difference in mortality or myocardial infarction. Results for stent thrombosis and graft occlusion were reported in the review.

There was evidence of publication bias for mortality and repeat revascularisation. Sensitivity analysis yielded similar results to the main analysis.

**Authors’ conclusions**

Percutaneous coronary intervention was comparable with coronary artery bypass grafting for treatment of unprotected left main artery stenosis for the composite of death, myocardial infarction, repeat revascularisation and stroke at 12 months follow-up. The reduced risk of stroke was counterbalanced by an increase in revascularisations.

**CRD commentary**

Inclusion criteria for the review were clearly defined. Several relevant data sources were searched. The authors did not state whether there were any language restrictions so the risk of language bias was unclear. Publication bias was assessed and detected in two outcomes but the meaningfulness of an analysis with fewer than 10 studies was limited. Attempts were made to reduce reviewer error and bias during data extraction; whether the same methods were used for study selection and quality assessment was unclear. Quality assessment indicated that most evidence had a low risk of bias and one study had potential for important biases. The authors noted that there were differences across the studies in types of stent used during percutaneous coronary intervention and numbers of diseased vessels and recruiting sites. The authors stated that one third of patients did not meet the criteria for left main artery disease by definition. Trials were combined using standard statistical techniques and statistical heterogeneity was assessed, which was appropriate.

The review had some methodological issues and the evidence base was small and had some limitations so a degree of caution is warranted when interpreting the authors’ conclusions.

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

**Practice:** The authors did not state any implications for practice.

**Research:** The authors stated a need for studies with longer follow-up (over one year).

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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.