Off-pump coronary artery bypass sacrifices graft patency: meta-analysis of randomized trials
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CRD summary
This review concluded that off-pump coronary artery bypass resulted in a significant increase in overall graft occlusion and particularly venous occlusion in comparison with conventional coronary artery bypass grafting. These conclusions appear to be supported by the data presented, but limitations in the literature search and the reporting of review methods make it difficult to assess their reliability.

Authors' objectives
To compare off-pump coronary artery bypass with conventional coronary artery bypass grafting (CABG) for patients undergoing coronary artery surgery.

Searching
MEDLINE was searched from January 1966 to June 2006; search terms were reported. Reference lists of retrieved articles were checked for additional studies.

Study selection
Study designs of evaluations included in the review
Only randomised controlled trials (RCTs) were eligible for inclusion in the review.

Specific interventions included in the review
Studies that compared off-pump coronary artery bypass with CABG were eligible for inclusion. The timing of surgery varied from three to 12 months in the included studies; most of the studies carried out surgery at 12 months.

Participants included in the review
Individuals undergoing coronary artery surgery were eligible for inclusion. The proportion of patients undergoing coronary artery surgery in the included studies ranged from 64 to 91%. All but one study reported that surgery was elective, and all but one study reported that the surgery was isolated.

Outcomes assessed in the review
Eligible studies had to report graft patency at 3 months post-surgery, as assessed by angiography. The numbers of overall, venous and arterial graft occlusions were reported in the review.

How were decisions on the relevance of primary studies made?
The authors did not state how the papers were selected for review, or how many reviewers performed the selection.

Assessment of study quality
Study validity was assessed according to the following criteria: blinding of randomisation, completeness of follow-up and objectivity of the outcome assessment. The authors did not state how the validity assessment was performed.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

Risk ratios (RRs) and risk differences (RDs), along with 95% confidence intervals (CIs), were calculated for graft occlusion.

Methods of synthesis
How were the studies combined?
The studies were combined statistically and pooled risk ratios and risk differences, with 95% confidence intervals, calculated using a random-effects model. Publication bias was assessed using funnel plots and the adjusted rank correlation test.

How were differences between studies investigated?
Statistical heterogeneity was assessed using the chi-squared statistic. Sensitivity analyses were carried out by excluding individual trials one-by-one.

Results of the review
Six RCTs (n=1,098) were included in the review.

Allocation and blinding were not possible as the trials assessed a surgical intervention. However, all trials used a blinded committee to judge the outcome assessment, and all but one study used an intention-to-treat analysis with careful accounting of drop-outs and crossovers.

Off-pump coronary artery bypass demonstrated a significant increase in overall graft occlusion (RR 1.27, 95% CI 1.03 to 1.56, p=0.0234; six RCTs) and venous graft occlusion (RR 1.28, 95% CI 1.06 to 1.54, p=0.0094; five RCTs) in comparison with CABG. There was no significant difference between off-pump coronary artery bypass and CABG in arterial graft occlusion (RR 1.17, 95% CI 0.62 to 2.24, p=0.6259; four RCTs). The exclusion of each individual trial in turn did not significantly alter the results.

There was no evidence of significant heterogeneity or publication bias.

Authors' conclusions
This meta-analysis demonstrated that off-pump coronary artery bypass in comparison with CABG results in a significant increase in overall graft occlusion and in particular venous graft occlusion.

CRD commentary
This review answered a clear research question, but only one electronic database was searched and no apparent attempts were made to locate unpublished studies, which suggests there may be some risk of publication bias. The authors did state, however, that they carried out statistical assessments to test for potential publication bias, but as only a small number of studies were included in the review the reliability of these assessments is unclear; some relevant studies may therefore have been missed. It is also unclear how reliable the review methodology is, as the authors did not provide a detailed account of the methods used for the study selection, validity assessment and data extraction processes.

A validity assessment was carried out, the results of which suggested that the studies were of reasonable quality given the limitations with respect to the concealment of allocation and blinding. The pooling of studies appears valid given the lack of statistical heterogeneity and the findings of the sensitivity analyses. However, since the authors did not describe the study populations in detail, it is difficult to judge whether the populations were clinically similar and how applicable the findings are to other populations.

Overall, the authors' conclusion appears to follow from the data presented, but the limited literature search and poor reporting of review methods make it difficult to assess the reliability of the findings.

Implications of the review for practice and research
The authors did not state any implications for practice or further research.

Bibliographic details
Other publications of related interest

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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.