Coronary artery bypass surgery compared with percutaneous coronary interventions for multivessel disease: a collaborative analysis of individual patient data from ten randomised trials


CRD summary
This meta-analysis of individual patient data concluded that long-term (five-year) mortality was similar following coronary bypass grafting (CABG) and percutaneous coronary intervention (PCI). Patients with diabetes and those aged over 65 had lower mortality after CABG. The conclusions were likely to be reliable for patients with multi-vessel coronary artery disease for whom either CABG or PCI was a reasonable option.

Authors' objectives
To assess the effects of patient characteristics on outcomes of coronary artery bypass grafting (CABG) and percutaneous coronary intervention (PCI) in patients with multi-vessel coronary disease.

Searching
The authors searched MEDLINE, EMBASE and the Cochrane databases without language restrictions for studies published between January 1966 and August 2006. Search terms were reported briefly and more details are available (see Other publications of related interest). They also screened reference lists of retrieved articles, conference abstracts and the bibliographies of expert advisers.

Study selection
The review included individual patient data (IPD) from randomised controlled trials (RCTs) that compared CABG and PCI in patients with multi-vessel coronary artery disease and reported at least three years of follow-up. The primary outcome of the review was all-cause mortality over all available follow-up. Composite outcomes of death with myocardial infarction (MI), repeat revascularisation or both were also evaluated.

The authors did not state how relevant studies were selected for the review.

Assessment of study quality
IPD from each trial were recorded in a uniform format after resolution of data queries. Data summaries from each trial were checked for accuracy against the associated publications. The authors did not state how the validity assessment was performed.

Data extraction
Investigators of included trials were asked to provide IPD on demographics, cardiac risk factors, clinical history, angiographic factors, randomised treatment, outcomes at follow-up (death, MI, stroke, repeat revascularisation and angina) and date of last follow-up contact.

Methods of synthesis
Pooled hazard ratios (HRs) and 95% confidence intervals (CIs) were derived from the five-year event rates in each group for each outcome. IPD were pooled to create unadjusted Kaplan-Meier survival curves. Stratified random-effects Cox proportional hazards models were used to test the effect of treatment on mortality and the interaction of treatment effect with patient and intervention characteristics. Several analyses were performed to test the sensitivity of results to changes in assumptions and model specifications. All analyses were done on an intention-to-treat basis.

Results of the review
Twelve eligible RCTs were identified and IPD were obtained for 10 of them (7,812 patients). Median follow-up was 5.9 years.

All-cause mortality did not differ significantly between treatment groups (HR 0.91, 95% CI 0.82 to 1.02). Rates of
death or repeat revascularisation (HR 0.41, 95% CI 0.37 to 0.45) and death, MI or repeat revascularisation (HR 0.52, 95% CI 0.49 to 0.57) were significantly lower with CABG than PCI.

Patients with diabetes (HR 0.70, 95% CI 0.56 to 0.87) and patients aged over 65 years (HR 0.82, 95% CI 0.70 to 0.97) had significantly lower mortality in the CABG group; other factors examined did not significantly influence treatment effect.

Authors' conclusions
Long-term mortality was similar after CABG and PCI in most patient subgroups. CABG might be a better option for patients with diabetes and those aged 65 or older in view of lower mortality in these subgroups.

CRD commentary
The research question was clear, as were the inclusion criteria. The search covered a range of sources and included some attempt to locate unpublished studies. Risk of publication bias was not assessed. Details of study selection were not reported, so the rigour of the methods used was uncertain.

Quality of the IPD was checked by raising queries and comparing data summaries with results from published papers. Data were synthesised using rigorous methods for long-term time to event data. Two eligible trials were omitted from the meta-analysis, but they were small and unlikely to have affected the findings.

The authors' conclusions followed from the evidence presented and were likely to be reliable for the type of patients included in the trials: patients with multi-vessel coronary artery disease for whom either CABG or PCI was a reasonable option.

Implications of the review for practice and research
Practice: The authors stated that choice of treatment between PCI and CABG for patients in most subgroups should depend on patient preferences for other outcomes.

Research: The authors stated that collaborative analysis of IPD could be used more often, especially to assess subgroup effects that were difficult to address in single trials.

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