Immediate and late outcome of patients aged 80 years and older undergoing isolated aortic valve replacement: a systematic review and meta-analysis of 48 studies

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CRD summary
The authors concluded that immediate postoperative mortality and morbidity after isolated aortic valve replacement in patients aged 80 years and older were low and late survival results were positive. The uncertain quality of included studies, absence of comparative data and potential biases in the search and review processes make the authors’ conclusion and practice implication appear unlikely to be reliable.

Authors' objectives
To evaluate the effects of isolated conventional aortic valve replacement in patients aged 80 years and older.

Searching
PubMed, Scopus, Science Direct and The Cochrane Library were searched up to January 2011 for articles in English. Search terms were reported. Reference lists of relevant studies were scanned for further articles. Unpublished data and abstracts were excluded.

Study selection
Eligible studies were of patients aged 80 years and over who underwent isolated conventional aortic valve replacement. The primary outcomes of interest were immediate postoperative death (in hospital or 30-days postoperatively) and long-term mortality. Secondary outcomes were stroke, acute renal failure needing dialysis, requirement for pacemaker implantation and lengths of stay in intensive care unit and in hospital.

Included studies were conducted between 1976 and 2009 and located largely in USA and Europe (two in UK). A few studies contained patients with prior cardiac surgery. Included patients were self-selected (being fit for surgery).

Studies were selected by one reviewer.

Assessment of study quality
The authors did not state whether they assessed study quality.

Data extraction
Data were extracted to enable calculation of proportions of the study population who survived for up to 10 years and proportions who experienced various negative outcomes.

Two independent reviewers were involved in this process. Disagreements were resolved by consensus. Study authors were not contacted for missing data.

Methods of synthesis
Proportions were pooled in a random-effects meta-analysis. Pooled estimates with 95% confidence intervals (CI) were presented. The Cochran Q test and I² were used to assess statistical heterogeneity. Subgroup analyses were carried out to explore potential differential effects according to: mid-date of the study (middle year of the study period); using data from audited registries and institutional series; in patients operated by ministernotomy; patients with primary isolated aortic valve replacement or prior cardiac surgery; and studies where data on the logistic European System for Cardiac Operative Risk Evaluation (Euro-SCORE) were available. Publication bias was explored for the primary outcome in a funnel plot.

Results of the review
Forty-eight studies (13,216 patients, range 11 to 4,299) were included in the review: 47 retrospective studies and one prospective study.
Immediate postoperative mortality was 6.7% (95% CI 5.8 to 7.5; 47 studies; substantial heterogeneity $I^2=48.2\%$).

Pooled late survival rates were 87.6% (at one year), 78.7% (at two years), 65.4% (at three years) and 29.7% (at 10 years). The funnel plot did not demonstrate evidence of publication bias. Subgroup analysis suggested that immediate postoperative mortality was lower (5.8%, 95% CI 4.8 to 6.9) in 18 studies with a mid-date from 2000 to 2006. Similar proportions were reported for early and late mid-dates in relation to five-year survival.

The pooled result for postoperative stroke was 2.4% (95% CI 2.0 to 2.9; 21 studies; no substantial heterogeneity $I^2=18.9\%$). Similar pooled risks were reported for earlier and later mid-dates. The pooled proportion at risk for postoperative dialysis was 2.6% (95% CI 1.6 to 3.8; 10 studies; significant heterogeneity) and for pacemaker implantation was 4.7% (95% CI 3.4 to 6.1; six studies; no significant heterogeneity). Pooled mean length of stay in intensive care was 3.5 days (95% CI 2.8 to 4.3; six studies; significant heterogeneity) and mean length of in-hospital stay was 13.3 days (95% CI 11.1 to 15.6; nine studies; no significant heterogeneity).

Further results for subgroup analyses were reported in the paper.

**Authors' conclusions**

Immediate postoperative mortality and morbidity after isolated aortic valve replacement in patients aged 80 years and older were low and late survival results were positive.

**CRD commentary**

The research question was clear and inclusion criteria were specified although broad for study design. Relevant data sources were searched. The restriction to published studies in English suggested that relevant articles might have been overlooked and the associated biases introduced. There was potential for error and bias in the process of study selection but subsequent parts of the review process were conducted appropriately. There was no reported quality assessment of included studies and this made their reliability (and that of subsequent pooled analysis) unclear. Some study characteristics were presented. The review findings were limited by an absence of comparative data with other interventions.

Various potential methodological limitations make the authors' conclusion and implication for practice appear unlikely to be reliable.

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

**Practice:** The authors stated that advance age alone was not contraindicated to conventional isolated aortic valve replacement. New valve prosthesis implants should be durable enough to guarantee the positive results demonstrated by conventional surgery.

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

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