Meta-analysis of short-term and long-term survival following repair versus replacement for ischemic mitral regurgitation

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CRD summary
The authors concluded that mitral valve repair for ischaemic mitral regurgitation was associated with better short- and long-term survival than mitral valve replacement. The conclusions were limited because of the use of retrospective studies. Further randomised controlled trials were needed. The small number, small sample sizes and poor quality of the included studies mean that the authors' caution is warranted.

Authors' objectives
To compare the short- and long-term survival of mitral valve repair and mitral valve replacement in patients with ischaemic mitral regurgitation (IMR).

Searching
PubMed was searched for articles in English. Search terms were reported. Search dates were not reported. Bibliographies of retrieved articles were handsearched.

Study selection
Studies that compared mitral valve repair directly with mitral valve replacement in patients with chronic IMR and reported survival curves or hazard ratios were eligible for inclusion. Studies needed to use annuloplasty or suture/Teflon strip/pericardial strip annuloplasty in more than 10% of patients in the repair group. Studies of patients with non-ischaemic dilated cardiomyopathy, preoperatively haemodynamically unstable patients and studies with ischaemic aetiology of the mitral regurgitation in a subset of patients only and with outcomes not reported for the ischaemic subset were excluded. Studies of concomitant surgical ventricular restoration or beating heart procedures were excluded.

Most patients in the included studies had concomitant coronary artery bypass. Most received a mechanical prosthesis. Mean ejection fractions ranged from 29% to 45% in the repair group and 36% to 44% in the replacement group. In some studies there were significant differences between groups in incidence of comorbidities or mean ejection fractions.

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

Assessment of study quality
The authors did not state that they assessed validity. They reported on some aspects of comparability of groups.

Data extraction
Hazard ratios (HR) and odds ratios (OR) were extracted for each study. Survival curves were inspected and survival rates for each study at six-month intervals were estimated. Log hazard ratios and their variances were calculated for each six-month interval on the survival curve using the Parmar et al. method. Where numbers of subjects at risk along the curve were reported, the Williamson et al. method was used to adjust censoring rates. Overall log hazard ratios ratios were calculated for risk of mortality with replacement relative to repair.

Data were extracted by one reviewer and independently verified by a second reviewer. Disagreements were resolved by consensus.

Methods of synthesis
Pooled odds ratios and corresponding 95% confidence intervals (CI) were calculated for short-term survival. Pooled hazard ratios with 95% CIs were calculated for long-term survival. Fixed models were used for the meta-analyses. Statistical heterogeneity was assessed using Cochran's Q and the $I^2$ statistic. Funnel plots were used to assess publication
Results of the review
Nine retrospective studies were included for review (n=1,736 participants, range 52 to 522).

Short-term mortality was two and a half times greater in patients with mitral valve replacement compared to mitral valve repair (OR 2.66, 95% CI 1.86 to 3.82; eight studies). Statistical heterogeneity was low ($I^2$=19.6%).

Long-term mortality was 35% greater in the replacement group compared to the repair group (HR 1.35, 95% CI 1.13 to 1.62; eight studies). Statistical heterogeneity was low ($I^2$=5.8%).

Authors’ conclusions
Mitral valve repair for IMR was associated with better short- and long-term survival than mitral valve replacement. The conclusions were limited because of the use of retrospective studies. Further randomised controlled trials were needed.

CRD commentary
The review addressed a clear question. Inclusion criteria were expressed as exclusion criteria, but were generally clear. The authors did not appear to define short- and long-term mortality. Only one database was searched and so relevant data may have been omitted. The search was restricted to articles in English, which introduced the possibility of language bias. It appeared that no attempts were made to identify unpublished data. The authors stated there was no evidence of publication bias (data not reported). Given the small number of studies included in the meta-analysis, there was potential for bias. Appropriate steps were taken during data extraction to minimise reviewer error and bias; similar steps were not taken during the study selection process. No validity assessment was performed and so it was not possible to determine the quality of included studies. All studies were of weaker design and in some studies there were significant differences between groups that may have undermined the reliability of the results.

Appropriate analyses were performed. Statistical heterogeneity was assessed and levels of statistical heterogeneity were low. However, there was evidence of clinical heterogeneity between studies that may have made pooling of results unreliable.

The small number, small sample sizes and poor quality of the included studies mean that the authors’ caution is warranted.

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

Research: The authors stated that further randomised controlled trials were needed to compare survival rates for mitral valve repair versus mitral valve replacement in patients with IMR.

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