Coronary Artery Bypass Grafting Versus Combined Coronary Artery Bypass Grafting and Mitral Valve Repair in Treating Ischaemic Mitral Regurgitation: A Meta-analysis

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Background	Ischaemic mitral regurgitation (IMR) is commonly manifested after coronary artery disease, but it is still controversial as to whether coronary artery bypass grafting (CABG) alone improves postoperative outcome.
Objectives	A focussed clinical question was designed and a meta-analysis of published studies was performed to identify the impact of mitral valve repair (MVR) in patients with IMR undergoing CABG versus those undergoing CABG alone.
Methods	Using the Medline database, the Cochrane clinical trials database and online clinical trial databases, we reviewed all RCTs and observational studies examining the impact of MVR and CABG in treating patients with IMR. We searched for literature published before September 2013 and earlier.
Results	This analysis identified five studies which examined the impact of CABG alone versus combined CABG and MVR in treating patients with IMR, involving 1038 patients, with 423 patients undergoing CABG alone and 615 were performed combined CABG and MVR procedures. There was significant improvement in postoperative mitral regurgitation (MR) grade in combined group, comparing with CABG alone group (WMD: 1.34, 95% CI: 0.47 to 2.21, p = 0.003), but no significant differences were noted between the CABG plus MVR group and CABG alone group in terms of in-hospital mortality (OR: 0.84, 95% CI: 0.44 to 1.61, p = 0.60), MR grade improvement rate (OR: 0.19, 95% CI: 0.02 to 1.66, p = 0.13), postoperative mean NYHA functional class (WMD: 0.33, 95% CI: -0.29 to 0.94, p = 0.30) and five-year survival (OR: 0.77, 95% CI: 0.34 to 1.73, p = 0.53).
Conclusions	Compared with CABG alone, patients who underwent combined CABG and MVR procedures showed a greater improvement in postoperative MR grade, but in terms of in-hospital mortality, MR grade improvement rate, postoperative mean NYHA functional class and five-year survival, adding MVR to CABG surgery lacks evidence to show its superiority.
Keywords	Coronary artery bypass grafting • Mitral valve repair • Ischaemic mitral regurgitation • Postoperative • Meta-analysis

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Introduction

Ischaemic mitral regurgitation (IMR) is a common complication after myocardial infarction (MI) with normal leaflet and chordal morphology, frequently following an inferior MI [1]. Nowadays, it is still controversial in the management of mild to moderate IMR at the time of coronary artery bypass grafting (CABG). There are several studies suggesting that isolated CABG (without mitral valve repair (MVR)) suffices, with dramatic improvement in ejection fraction, degree of mitral regurgitation (MR) and long-term survival [2,3]. But other authors advocating MVR at the time of CABG have suggested that CABG alone will not correct moderate IMR in many patients, especially those with annular and ventricular dilation [4–6].

Therefore, we conducted a meta-analysis of the evidence obtained from published studies to compare the impact of CABG alone versus combined CABG and MVR in treating patients with IMR, which we thought can provide useful clinical evidence for the surgery management in treating IMR patients.

Methods

We performed this analysis according to the guidelines of the meta-analysis of observational studies in epidemiology group (MOOSE) [7].

Inclusion criteria

Studies were considered eligible for this review if they met the following criteria: (1) The study must have observational study design. Mitral regurgitation (MR) of patients was caused by coronary artery disease, and MR with rheumatic, myxomatous, infectious, or congenital diseases were excluded. (2) Patients included were assigned into CABG group and CABG+MVR group. (3) The study should describe the basic characteristics of patients involved in the study, and (4) Evaluate the postoperative outcomes of CABG alone versus combined CABG with MVR on patients with IMR.

Search strategies

Published and unpublished studies from 1990-2013 without language restriction were included. The databases of MEDLINE, EMBASE and the Cochrane Controlled Trials Register were searched. The following keywords: ''ischemic mitral regurgitation/insufficiency'' ''coronary artery bypass grafting'' ''mitral valve repair'' ''impact'' ''outcome'' were used to help find the articles. Titles and abstracts as well as the reference lists of all of the identified reports were also independently examined. The whole search process was examined by two reviewers independently (SH and LXY). Discussion was conducted or consensus with the third reviewer (XW) was undertaken when disagreement occurred.

Quality assessment

According to the checklist of the Dutch Cochrane Centre which was proposed by MOOSE, we assessed several key points of study quality of the included studies. The factors involved in assessment include: (1) whether there is clear definition of outcomes, (2) whether independent assessment of outcome is performed, (3) whether the author carries out a follow-up in a certain period of time, and (4) whether there is elective loss during follow-up [8,9]. The results are shown in Table 1.

Statistical analysis

The data extraction was performed using a well-designed data extraction form to determine eligibility for inclusion and extract data. The data elements include: (1) publication details: first author's name, and publication year, (2) characteristics of the studied population: sample size, age, gender, and which type of surgery was performed and (3) endpoint evaluation: postoperative impact during the same period of time for each group, which included postoperative MR grade, in-hospital mortality, MR grade improvement rate, postoperative mean New York Heart Association (NYHA) functional class and five-year survival.

All studies were conducted using Review Manager Version 5.1 (Revman, The Cochrane Collaboration). If significant heterogeneity was tested a random-effects model was used, otherwise, a fixed-effects model was used [10–14]. All the statistical strategies were performed by the professional statistical reviewer independently (YL). Disagreements were resolved by consensus with a second reviewer (MJ).

Results

Articles

Fifteen records were identified by the primary literature search. However, finally five studies [5,15–18] were included in this analysis, the other 10 studies were excluded because they were either laboratory studies, review articles, or irrelevant to the current analysis (Fig. 1). There were altogether

Table 1   Quality Assessment of Included Studies.

Cord	1	2	3	4	5
Clear definition of study population?	+	+	+	+	+
Independent assessment of outcomes?	+	+	+	+	+
Clear definition of outcomes?	+	+	+	+	+
Follow-up of certain period of time?	+	+	+	+	+
No selective loss during follow-up?	−	−	−	+	−

+, eligible; −, not eligible.

The quality assessment showed that all the included articles had clear definition of study population, definition of outcomes and assessment of outcome. But four of them were lack of follow-up detail or not mentioned the selective loss during follow-up.