Management of heart failure - III: the role of revascularization in the treatment of patients with moderate or severe left ventricular systolic dysfunction

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Authors' objectives
To review the benefits and risks of coronary artery bypass grafting (CABG) and angioplasty in patients with moderate-to-severe left ventricular dysfunction.

Searching
MEDLINE and EMBASE were searched from 1966 to 1993, and the references in relevant articles were reviewed. A search strategy is given.

Study selection
Study designs of evaluations included in the review
1. Cohort studies of mortality after CABG, with follow-up periods ranging from 1 to 6 years, and case series studies of change in functional status after CABG.

2. Case series and case reports of outcomes and risks in angioplasty. Studies dealing with aneurysm resection, simultaneous repair of valvular congenital heart disease or mechanical assist devices were excluded, as were technical reviews of surgical techniques and articles dealing solely with determinants of operative mortality rates.

Specific interventions included in the review
1. Coronary artery bypass grafting (CABG).

2. Percutaneous coronary angioplasty.

Participants included in the review
Patients with moderate-to-severe left ventricular dysfunction (ejection fraction less than 0.04).

In the 7 included studies of survival after CABG, the proportion of male participants ranged from 87 to 93, and all the patients suffered from angina.

In the 17 studies of the impact of CABG on functional status, the proportion of male participants ranged from 81 to 100%, and the majority of participants suffered from angina.

Outcomes assessed in the review
1. Operative mortality, total mortality, change in functional status (changes in ejection fraction, change in New York Heart Association (NYHA) class, and symptom improvement) and risk of procedure-related complications.

2. Relief of angina, improvement in ventricular function and risk of procedure-related complications.

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

Assessment of study quality
Quality of cohort studies was rated according to 7 criteria: presence of definition of heart failure, confounder measurement, therapeutic regimen, study administration, withdrawals, outcome measurement and statistical analysis. These were summarised to give a total score. No quality assessment was performed for case series. One author rated the quality of the cohort studies according to the quality criteria.
Data extraction
The authors do not state how the data were extracted for the review, or how many of the authors performed the data extraction.

Methods of synthesis
How were the studies combined?
The studies were combined by a narrative review. The narrative summary of the effect of CABG on mortality is based on the 3 highest quality studies, selected according to quality criteria.

How were differences between studies investigated?
Cohort studies of mortality following CABG are grouped according to whether or not patients had angina. The results of the 3 highest quality cohort studies were also summarised separately.

Results of the review
Eight cohort studies of CABG versus medical treatment with a total of 1,264 patients undergoing CABG and 1,431 receiving medical treatment.

1. CABG appears to improve survival compared to medical treatment, with a likely reduction in mortality of 30 to 50%. CABG also results in an improvement in functional outcome, assessed as either improvement in ejection fraction or decrease in NYHA class. However, it is not possible to determine how often clinical improvement occurs, or the size of the reduction in mortality, in the absence of angina. Operative mortality rates range from about 5% in patients younger than 60 years who have mild heart failure without comorbid conditions, to more than 30% in patients older than 70 years with severe ventricular dysfunction and comorbid conditions. Perioperative mortality rates also vary significantly.

2. Angioplasty: although there were no reports located which compared angioplasty with CABG or standard medical treatment, case reports and case series suggested that angioplasty can relieve angina and improve ventricular function or wall motion. There are also significant risks associated with angioplasty.

Authors' conclusions
Patients with moderate to severe left ventricular systolic dysfunction and concomitant limiting angina have improved survival and improved physical functioning following CABG, though the question of whether revascularisation causes similar improvements in patients without angina remains unanswered. The role of angioplasty as an alternative to CABG in patients with heart failure remains unclear.

CRD commentary
The conclusions regarding CABG are based on cohort studies and case series in which the large majority (greater than 80%) of participants are male. The conclusions regarding the effectiveness of surgical revascularisation may, therefore, not apply equally to women.

The conclusions favouring surgery in terms of improved survival are based on the 3 highest quality papers. However, the authors point out that 1 of these studies shows no significant difference between medical and surgical treatment, while the results of another may be compromised by the possibility of unadjusted baseline differences between the surgical and medical treatment groups. The likely reduction in mortality may, therefore, differ from the 30 to 50% reported. The paper presents a useful critical review of the published evidence, and its conservative conclusions in relation to angioplasty are justified by the reviewed papers.

Bibliographic details
Record Status
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.