Invasive versus noninvasive management of ST-elevation acute myocardial infarction: a review of clinical trials and observational studies

Beck C A, Eisenberg M J, Pilote L

CRD summary
This review compared two approaches to managing uncomplicated myocardial infarction: routine catheterisation with subsequent revascularisation, and ischaemia-guided decisions to catheterise and revascularise. No differences in mortality or reinfarction were found between these approaches. However, the included studies were performed before the use of stents or glycoprotein IIb/IIIa inhibitors and, therefore, do not necessarily reflect current practice.

Authors' objectives
To compare the effects of using a routine invasive approach versus noninvasive management of uncomplicated ST-elevation acute myocardial infarction (AMI).

Searching
PubMed was searched from January 1987 to June 2004; the search terms were given. Only English language papers were sought. The reference lists of identified papers were checked and recent relevant journals were searched (further details were given in the paper).

Study selection

Study designs of evaluations included in the review
Randomised controlled trials (RCTs) and observational studies were eligible for inclusion. The designs of the observational studies included in the review were unclear. The included observational studies compared outcomes for those admitted to hospitals with or without catheterisation facilities, and those carried out in different geographical regions. The follow-up periods ranged from 3 months to 3 years in the RCTs, and from 30 days to 2 years in the observational studies.

Specific interventions included in the review
Studies that compared a routine invasive management with noninvasive management were eligible for inclusion. Protocols used in the included studies were broadly similar: invasive management involved routine cardiac catheterisation, followed by revascularisation with percutaneous coronary intervention (PCI) or coronary artery bypass graft (CABG) surgery; noninvasive management involved risk stratification according to symptoms, with catheterisation and revascularisation only for those with reversible ischaemia. Studies differed in the delay between onset of AMI and the use of routine catheterisation in the invasive groups: from 0.1 hours to 48 hours after thrombolysis or 72 hours after admission. In some studies, people in the noninvasive arm had routine cardiac catheterisation before leaving hospital.

Studies that compared admissions to hospitals with and without availability of cardiac catheterisation, or in different geographical locations, were also sought. In these studies between 47 and 85% of the invasive group underwent catheterisation, compared with between 3 and 52% of the noninvasive group.

Participants included in the review
Studies on people with uncomplicated ST-elevation AMI were sought. People with previous infarction or cardiogenic shock were excluded from some of the studies, whilst they were included in others. The authors stated that the participants in the included studies were relatively young and had a low risk of recurrent cardiac events.

Outcomes assessed in the review
The primary outcomes of interest were the incidence of mortality or reinfarction. The incidence of revascularisation (PCI and CABG) were also reported.

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

Assessment of study quality
It was unclear whether the authors systematically assessed the validity of the included studies. Instead, the authors commented on quality criteria in the narrative (items such as comparability of baseline characteristics between study arms, blinding procedures, high rates of follow-up). The authors did not state how the papers were assessed for validity, or how many reviewers performed the validity assessment.

Data extraction
The authors did not state how the data were extracted for the review, or how many reviewers performed the data extraction. For each study, data on the incidence of death, reinfarction or revascularisation were extracted.

Methods of synthesis
How were the studies combined?
The authors considered that a quantitative pooling of the results was inappropriate because of substantive differences in the study designs. The studies were discussed in a narrative, grouped according to type of study. Summaries of outcomes were also presented in tabular format.

How were differences between studies investigated?
Differences between the studies were discussed within the narrative.

Results of the review
Six RCTs (6,379 participants) and 12 observational studies (106,319 participants) were included.

The six RCTs provided no evidence to suggest that there were any differences in mortality or reinfarction from the invasive or noninvasive approach in patients with uncomplicated ST-segment elevation. Five of these trials were carried out before 1993. The authors commented that techniques and treatments had altered since this date, e.g. the introduction of the routine use of stents and glycoprotein IIb/IIIa inhibitors.

The results from the observational studies provided similar evidence of no difference in mortality or reinfarction between the two approaches. There were also regional variations in the management of patients, with some regions adopting a more invasive approach to management despite similarities in the clinical characteristics of the patients. Patients admitted to a hospital with catheterisation were more likely to receive an invasive approach than those initially admitted to a hospital without the facilities to perform catheterisation.

Authors’ conclusions
There was no evidence to support the use of the routine invasive approach to managing patients with uncomplicated ST-segment elevation AMI.

CRD commentary
The review addressed a clear research question and the inclusion criteria for RCTs appeared appropriate. However, the question and inclusion criteria for the observational studies were not clear, making it difficult to comment on the appropriateness of the included studies and the reliability of the evidence they provided. The database search was limited to PubMed and only papers published in English were sought. Therefore, it is possible that relevant studies might have been missed. The authors gave no information about the methods of the review process (study selection or data extraction), thus it is possible that decisions made at these stages might have introduced selection and reviewer bias into the review. It was unclear if a systematic quality assessment was undertaken; instead, the authors gave an overall summary of the strengths of the study designs. In addition, there was little information about the participants in the included studies (e.g. ages, disease severity, co-morbidities, concomitant treatments). It may therefore be difficult to
generalise from the results of the review. The authors discussed the results of the studies in a narrative form, grouped appropriately by study design. They also stated that most of the studies in this review were conducted before the routine use of stents or glycoprotein IIb/IIIa inhibitors and may not, therefore, reflect current clinical practice. The conclusions drawn from the review of RCTs were supported by the evidence presented. However, these should be treated with caution, as the authors acknowledged, as the studies do not reflect current practice, the review methodology was poorly reported and limited details of the included studies were given.

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

**Practice:** The authors did not state any implications for practice.

**Research:** There is a need for trials to assess the routine invasive approach in the context of current clinical practice. These should also have longer term follow-up and include outcomes such as quality of life and functional status.

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