ST-segment resolution and prognosis after facilitated versus primary percutaneous coronary intervention in acute myocardial infarction: a meta-analysis

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CRD summary
The authors concluded pre-hospital facilitated percutaneous coronary intervention (PCI) produced a higher rate of complete ST-segment resolution compared with primary PCI in ST-segment elevation myocardial infarction patients; as mortality was similar between groups, facilitated PCI had no advantage over primary PCI. Potential limitations in the review process and suboptimal trial quality mean that the reliability of these conclusions is unclear.

Authors' objectives
To evaluate the extent of early ST-segment resolution and prognosis in facilitated versus primary percutaneous coronary intervention (PCI) in patients with ST-segment elevation myocardial infarction.

Searching
MEDLINE was searched from 1990 to 2009. Search terms were reported. Review articles, relevant journal articles, and conference abstracts of the American Heart Association, the American College of Cardiology, and the European Society of Cardiology meetings were scanned to locate additional studies.

Study selection
Randomised controlled trials (RCTs) that compared various types of facilitated percutaneous coronary intervention (PCI) with primary PCI in ST-segment elevation myocardial infarction patients were eligible for inclusion in the review. Eligible trials had to measure ST-segment resolution rates before and after PCI (primary endpoint) and mortality (30 to 90 days, and after six month).

In included trials, the facilitation agents included platelet glycoprotein IIb/IIIa inhibitors (abciximab, eptifibatide and tirofiban), fibrinolysis (tenecteplase and reteplase), or a combination of the two. Definitions of ST-segment resolution measurement were adopted from the included trials. Symptom duration ranged from less than four hours, to less than 24 hours.

Two independent reviewers selected trials for inclusion. Disagreements were resolved by consensus.

Assessment of study quality
Although no formal validity assessment was specified, the authors reported on randomisation, allocation concealment, blinding, and follow-up.

The authors did not state how many reviewers carried out the validity assessment.

Data extraction
Data were extracted to enable the calculation of odds ratios (ORs) and 95% confidence intervals (CI). Adverse events were minimally commented upon.

The authors did not state how many reviewers carried out the data extraction.

Methods of synthesis
Odds ratios and 95% confidence intervals were pooled using random-effects or fixed-effect meta-analyses. Random-effects meta-analysis was used where statistical heterogeneity was present (measured by χ² and I² statistics).

Facilitated PCI was also assessed in subgroups, according to the various agents (listed above) applied prior to PCI.
Results of the review
Fourteen RCTs were included in the review (n=6,439 patients). All trials reported allocation concealment; three trials were double-blind and placebo-controlled. The remaining trials were open-label design in terms of the facilitation agent. Follow-up rates and time periods varied. Four trials were stopped early.

Pre-percutaneous coronary intervention (PCI), facilitated PCI was significantly more effective than primary PCI in achieving complete ST-segment resolution pre-PCI (OR 1.60, 95% CI 1.33 to 1.92; I²=0%; six RCTs), and post-PCI (OR 1.69, 95% CI 1.28 to 2.24; I²=69.8%; 14 RCTs).

Post-PCI, ST-segment resolution following facilitation with glycoprotein IIb/IIIa inhibitor was significantly higher than with primary PCI (OR 1.95, 95% CI 1.31 to 2.91; I²= 60.7%; eight RCTs); the results for other facilitation agents were not statistically significant.

There were no significant differences for mortality outcomes (OR 1.11, 95% CI 0.84 to 1.45; I²=5.6%; 14 RCTs), although facilitation with glycoprotein IIb/IIIa inhibitor resulted in the lowest mortality.

Funnel plots indicated the presence of publication bias only in the sub-group analyses of facilitation agents for ST-segment resolution post-PCI.

Full-dose fibrinolytic therapy was noted to be harmful in one trial.

Authors' conclusions
Pre-hospital facilitated percutaneous coronary intervention (PCI) resulted in a higher rate of complete ST-segment resolution before and after PCI when compared with primary PCI. Given that the mortality outcome was similar between the two groups, facilitated PCI had no advantage over primary PCI.

CRD commentary
The review question was clear, and inclusion criteria were sufficiently detailed to allow potential replication. The search strategy was limited to one database, but attempts were made to minimise publication bias. The review process was carried out with steps to minimise bias and error in the study selection process, but the extent to which this was applied to data extraction and validity assessment was unclear.

Although a formal quality assessment tool did not appear to have been used, relevant aspects of trial quality were assessed. Trial details were provided, but little information on patient demographics meant that the generalisability of findings was uncertain. Statistical heterogeneity was assessed, and appropriate methods of synthesis were applied. The authors' conclusions reflected the evidence presented, but the overall recommendation focused on mortality rather than any interim clinical measure.

Potential limitations in the review process, together with apparent limited quality of the included trials, means that the extent to which these conclusions are reliable is unclear.

Implications of the review for practice and research
Practice: The authors stated that facilitated PCI cannot be currently recommended outside of the experimental protocol.

Research: The authors stated that early administration of glycoprotein IIB/IIIa should be considered in future studies of pharmacological facilitated PCI.

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