Effect of statins pretreatment on periprocedural myocardial infarction in patients undergoing percutaneous coronary intervention: a meta-analysis

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CRD summary
This review found that pre-treatment with statins was effective in reducing the rate of peri-procedural myocardial infarction in patients undergoing percutaneous coronary interventions, but that further studies are needed to identify the optimum statin type, dose and timing. The authors' conclusions were a reasonable interpretation of the data presented, but the quality of the underlying studies is uncertain.

Authors' objectives
To assess the effectiveness of statins, given to patients before percutaneous coronary intervention, in reducing the rate of peri-procedural myocardial infarction.

Searching
PubMed, EMBASE and Cochrane Central Register of Controlled Trials (CENTRAL) were searched to August 2009; search terms were reported. Conference proceedings from the American College of Cardiology, American Heart Association, and European Society of Cardiology were scanned for additional studies. Reviews and editorials published in the preceding year, and the Internet, were also searched. There were no language or publication status restrictions.

Study selection
Randomized controlled trials that comparing pre-procedural statins with placebo in patients undergoing percutaneous coronary interventions were eligible for inclusion. Studies had to report peri-procedural myocardial infarction as an outcome and define myocardial infarction events.

Most of the included trials (four out of six) were of atorvastatin and used differing dosing schedules. One trial used rosuvastatin. One trial used a variety of statins and dosing regimens.

Four trials reported peri-procedural myocardial infarction as the primary outcome measure; one specified large non-Q-wave myocardial infarction; and one reported 30-day major adverse cardiac events. Peri-procedural myocardial infarction was defined by the included trials as post-procedural elevation in creatine kinase-MB isoenzyme (various thresholds), alone or in combination with chest pain and/or ST-segment or T-wave abnormalities. Other outcomes of interest were: one-month mortality; non peri-procedural myocardial infarction; target vessel revascularisation; by-pass surgery or repeat percutaneous coronary interventions of the target vessel; and composite outcomes.

The mean age of participants in included trials ranged from 62 to 68 years; the proportion of males ranged from 54 to 88%. Treatment and placebo groups were similar at baseline for diabetes mellitus, hypercholesterolaemia, and use of platelet IIb/IIIa antagonist.

Two reviewers independently assessed studies for inclusion.

Assessment of study quality
The authors did not state that they assessed trial validity.

Data extraction
Numbers of events in treatment and control arms were extracted and used to calculate odds ratios (ORs) with 95% confidence intervals (CIs).

Two reviewers independently extracted data; any disagreements were resolved by consensus.
Methods of synthesis
The pooled odds ratio for peri-procedural myocardial infarction was calculated using both fixed-effect and random-effects models, weighted by inverse variance; analysis was conducted on an intention-to-treat basis. Between trial heterogeneity was assessed using Cochran’s test and the I² statistic.

A sensitivity analysis was conducted comparing the overall pooled odds ratio with the odds ratio obtained when each trial was excluded (singly) from the analysis.

Publications were assessed using a funnel plot and adjusted rank correlation test.

Results of the review
Six trials (n=2,088 patients) were included in the analysis.

Significantly fewer patients experienced a peri-procedural myocardial infarction in the statin treatment group (81 out of 1,051 patients; 7.7%) compared with the placebo group (147 of 1,037 patients; 14.2%) during percutaneous coronary intervention (OR 0.51, 95% CI 0.38 to 0.67). There was no significant between trial heterogeneity and no evidence of publication bias. Omission of individual trials from the analysis did not significantly effect the pooled estimate of odds ratio.

No differences between statin treatment and placebo groups were found for any of the other outcomes of interest.

Authors’ conclusions
This meta-analysis supported the effectiveness of pre-treatment with statins in reducing the rate of peri-procedural myocardial infarction in patients undergoing percutaneous coronary interventions.

CRD commentary
This review addressed a clearly stated research question and defined appropriate inclusion criteria. A number of sources, including gray literature, were searched for relevant studies, with no language or publication status restrictions; it is likely that a high proportion of relevant studies were retrieved. Measures were taken to minimise error and bias in the review process.

Included studies were restricted to randomized controlled trials, but no assessment of the methodological quality was reported. Results and relevant characteristics of included trials were reported. Although the included trials used different statins, dose regimens and thresholds for determining peri-procedural myocardial infarction, there was no evidence of significant heterogeneity in effect size, and the meta-analysis presented was reasonable.

The authors’ conclusions were a reasonable interpretation of the data and highlighted areas requiring further research, but the quality of the underlying trials is uncertain.

Implications of the review for practice and research
Practice: The authors made no recommendations for practice.

Research: The authors stated that further studies are needed to identify the optimum statin type, dose and time of onset before percutaneous revascularization; studies with long-term follow-up would provide useful information regarding outcomes such as death and major adverse cardiac events.

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