Statins in prevention of repeat revascularization after percutaneous coronary intervention: a meta-analysis of randomized clinical trials

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CRD summary
This review concluded that statin therapy initiated after percutaneous coronary intervention could reduce the risk of repeat revascularisation. The possibility of bias, significant variation and lack of quality assessment of included trials suggest that the authors’ conclusion should be interpreted with caution.

Authors’ objectives
To investigate the effects of statin therapy initiated after percutaneous coronary intervention on repeat revascularisation, all-cause mortality and myocardial infarction.

Searching
MEDLINE was searched from inception to October 2009 for studies published in English. Search terms were reported. References from recent review articles were also searched.

Study selection
Randomised controlled trials (RCTs) of patients that had undergone percutaneous coronary intervention therapy that compared statin therapy with placebo or usual care were eligible for inclusion. Eligible trials had to randomise patients after angioplasty. For inclusion, individual outcomes of repeat revascularisation, all-cause mortality or myocardial infarction had to be reported and available for follow-up of at least six months on average. Subgroup data that fulfilled these criteria could also be included.

The included patients mean age ranged from 58 to 63 years (where reported); the proportion of males ranged from 63 to 100%. Half of the trials compared statin therapy with placebo; the other half compared statin therapy with usual care. The statins used were atorvastatin (10 to 80mg/day), fluvastatin (80mg/day) and pravastatin (40mg/day). Concomitant medications taken were aspirin, beta-blockers, angiotensin-converting enzyme inhibitors and calcium channel blockers.

Two reviewers selected studies for inclusion.

Assessment of study quality
The authors did not report that study quality was assessed, but they did report whether trials were double-blind or open-label.

Data extraction
The incidence of repeat revascularisation (repeat percutaneous coronary intervention or coronary artery bypass graft surgery), mortality (all-cause mortality) and myocardial infarction (as defined by trials) were extracted and relative risks (RRs) calculated according to the intention-to-treat principle. In the case of incomplete follow-up, the authors assumed that all patients in both groups with unknown outcome had a good outcome.

The authors did not state how many reviewers extracted data.

Methods of synthesis
Relative risks were pooled using DerSimonian and Laird meta-analyses. Statistical heterogeneity was assessed using the $\chi^2$ test.

Subgroup analyses were performed to examine the effect on target vessel and target lesion revascularisation.

Publication bias was evaluated using a funnel plot and Begg's test.
Results of the review
Six RCTs were included in the review (n=2,979 patients; range 70 to 1677). Three trials were double blind; three trials were open-label. Trial follow-up ranged from a mean of six months to a median of 46.8 months.

Statin therapy was associated with significantly less repeat revascularisations compared with control therapy (RR 0.73, 95% CI 0.55 to 0.98; six RCTs; $\chi^2 p=0.05$). Subgroup analyses results were not significant.

There was no significant difference between statin and control groups for all-cause mortality (three RCTs) or rate of myocardial infarction (four RCTs); these analyses were not associated with significant heterogeneity.

There was no evidence of publication bias in any of the analyses.

Authors' conclusions
Statin therapy initiated after percutaneous coronary intervention could reduce the risk of repeat revascularisation.

CRD commentary
The review question was well-defined for participants, intervention, study design and outcomes. Only one database was searched and only English-language studies were included, which increased the possibility of language and publication bias (although funnel plots did not suggest publication bias). Study selection was performed by two reviewers, but it was unclear whether similar steps were taken to reduce error and bias in data extraction.

Although inclusion was restricted to RCTs, trial quality was not systematically assessed, so the reliability of the included trials and their synthesis was unknown. A reasonable level of detail about individual trials was provided in tables, although details about incomplete follow-up was not provided; this made it difficult to determine if the methods used to incorporate trials with incomplete follow-up were appropriate. Statistical heterogeneity was assessed; the presence of heterogeneity for repeat revascularisation outcomes suggested that pooling the results may not have been appropriate.

The possibility of bias, lack of trial quality assessment and significant heterogeneity suggest the authors' conclusions should be interpreted with caution.

Implications of the review for practice and research
Practice: The authors did state any implications for practice.

Research: The authors stated that further investigation is needed to identify the underlying mechanism(s) of statins after percutaneous coronary intervention.

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