Effect of stents in reducing restenosis in small coronary arteries: a meta-analysis
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CRD summary
This review assessed the efficacy of stents in reducing restenosis in small coronary arteries. The author concluded that stents are effective. However, the validity of the meta-analysis is doubtful, and the author did not provide sufficient detail of the results for the primary outcome to justify his conclusions.

Authors' objectives
To detect a difference in restenosis between stents and conventional angioplasty used in small coronary arteries, by pooling the results of several underpowered clinical trials.

Searching
MEDLINE was searched (no dates or terms given). In addition, a manual review of the published abstract indexes of the major North American and international cardiology meetings of the past five years was conducted. These comprised the American Heart Association, the American College of Cardiology, the European Society of Cardiology, and Transcatheter Therapeutics. A second MEDLINE search was conducted for authors identified in the manual search. The references cited in all retrieved trials were also examined. Only studies in English, or those with an English abstract, were eligible for inclusion.

Study selection
Study designs of evaluations included in the review
Prospective randomised trials with follow-up at an appropriate time interval (typically 6 months) were eligible for inclusion. Two further retrospective subsets of two trials were included. The author stated that, in all other respects, these subsets were consistent with the review inclusion criteria. The follow-up time ranged from 6 to 12 months.

Specific interventions included in the review
The intervention of interest was the use of coronary stents in comparison with standard balloon angioplasty. The stents used in the included studies were Palmaz-Schatz, Jomed Flex, Bestent, NIR and Multi-Link. Both heparin-coated and bare metal stents were used in one study.

Participants included in the review
Participants with a coronary arterial diameter of less than 3.0 mm were eligible for inclusion. In the included studies, the mean vessel diameter ranged from 2.23 to 2.69 mm. Where reported, the proportion of participants with diabetes ranged from 2.6 to 30.1%. No other information about the included patients was given.

Outcomes assessed in the review
The primary outcome of interest was angiographic restenosis. The secondary outcome was revascularisation, defined in the included studies as either target lesion revascularisation (TLR), target vessel revascularisation (TVR), or any repeat revascularisation.

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

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

Data extraction

The author did not state how the data were extracted for the review, or how many reviewers performed the data extraction.

In one study with three arms, the groups that used bare metal stents and heparin-coated stents were combined for the analysis. Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated for each outcome for each trial. Where available, data on early major adverse coronary event, long-term coronary artery bypass graft and long-term mortality from individual trials were also presented. The rate of crossover from conventional angioplasty to stenting was also recorded. The author does not appear to have analysed data on an intention-to-treat basis as he said that angiographic data were available only for those participants who underwent a repeat angiography.

**Methods of synthesis**

How were the studies combined?
The data for angiographic restenosis were combined using the Mantel-Haenszel method. The method of Robins et al. was used to estimate the variance. The results were presented as pooled ORs with 95% CIs.

How were differences between studies investigated?
The author did not report a method for formally assessing any differences between the studies.

**Results of the review**

Nine studies (2,992 participants) were included. Of these, seven (2,395 participants) were prospective randomised controlled trials and two (597 participants) were retrospective subsets of two other trials. The final number (2,429 participants) represented those participants in which angiographic restenosis was assessed by repeat angiography.

The pooled analysis (8 studies) showed that when compared with conventional balloon angioplasty, stenting significantly reduced restenosis (OR 0.62, 95% CI: 0.61, 0.63). Revascularisation, when analysed separately, according to original study definitions, was significantly reduced by stenting as follows: TLR (3 studies, n=818), OR 0.49 (95% CI: 0.45, 0.52); TVR (4 studies, n=1,020), OR 0.90 (95% CI: 0.85, 0.95); any revascularisation (5 studies, n=1,510), OR 0.48 (95% CI: 0.46, 0.49).

The percentage of people crossing-over from the randomised intervention (reported in 8 studies) varied from 6.8 to 27.2%.

**Authors’ conclusions**
The author stated that the meta-analysis supports the hypothesis that, compared with conventional balloon angioplasty, stenting reduces restenosis in small coronary arteries.

**CRD commentary**
The aims of this review were clearly stated, and the method of pooling was appropriate. However, as the search strategy seemed limited, and only papers in English or with an English abstract were sought, it is possible that studies might have been missed. The methods of the review (study selection, data extraction and quality assessment) were not described; there is the potential for bias to be introduced if these processes are not conducted adequately. The author included data from a subset of two additional studies. These studies themselves did not meet the stated inclusion criteria. The author made no mention of whether any other similar studies were considered, or the effect on the results of the meta-analysis if they were excluded.

There was little information about the participants in terms of their demographics or co-morbidities, thus the generalisability of the results was unclear. A visual inspection of the forest plot indicated some evidence of statistical heterogeneity. This, however, was not considered and the validity of the results is therefore compromised. Although some of the outcome data for each study were presented, no details or tables were given for the outcomes of interest to the review. In addition, apart from one study, there was no mention of whether the stents were heparin-coated or bare metal.
Overall, the lack of detail provided in the review, and the doubts regarding the possible statistical heterogeneity, make it difficult to have complete confidence in the validity of the conclusions.

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

Practice: The author implied that stenting is applicable to the subset of people with small coronary vessel occlusion.

Research: The author did not state any implications for further research.

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