Directional atherectomy before stenting versus stenting alone in percutaneous coronary interventions: a meta-analysis

CRD summary
The authors concluded that directional coronary atherectomy before stenting in percutaneous coronary interventions improves acute angiographic results and target lesion revascularisation more than stenting alone, but also increases early major adverse cardiac events. Poor reporting of the review methods, the lack of a validity assessment, and differences between the studies mean that the authors’ conclusions may not be reliable.

Authors’ objectives
To compare directional coronary atherectomy (DCA) before stenting with stenting alone in percutaneous coronary interventions.

Searching
MEDLINE was searched in July 2005 using the reported search terms. Also searched were the Transcatheter Cardiovascular Therapeutics website and a relevant book chapter. Unpublished studies were sought from scientific sessions held by three specified societies (1998 to July 2005). No language restrictions were applied.

Study selection
Studies that compared DCA before stenting with stenting alone were eligible for inclusion.

The review assessed angiographic outcomes (acute gain, final minimal lumen diameter, late loss and angiographic restenosis rate) and the following clinical outcomes: early major adverse cardiac events (MACE: death, Q-wave and non Q-wave myocardial infarction), late MACEs (death, Q-wave myocardial infarction) and target lesion revascularisation. The included studies were randomised controlled trials (RCTs) and case-control studies. All studies excluded patients with a recent acute myocardial infarction or ejection fraction less than 35%, and most excluded patients with the following angiographic criteria: an unprotected left main; severe vessel tortuosity; severe coronary calcifications; detectable thrombus in the target lesions; or total occlusion. All studies used a femoral approach. The majority of studies included patients with stable and unstable angina. All of the non-randomised studies included high-risk complex lesions; two of the 3 RCTs included a high proportion of favourable lesions. Where reported, the proportion of diabetics ranged from 3 to 32%. The mean duration of follow-up was 12.4 months (range: 5.8 to 25.5).

The authors did not state how the papers were selected for the review, or how many reviewers performed the selection.

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

Data extraction
The data were extracted in duplicate. For each study, the number of events from the total population reported at each follow-up point were extracted or calculated from raw data or presented event rates.

Methods of synthesis
Pooled odds ratios (ORs) and weighted mean differences (WMDs) were calculated, along with 95% confidence intervals (CIs), using a fixed-effect model. Statistical heterogeneity was assessed using the Mantel Haenszel method.

Results of the review
Twelve studies (n=2,712) were included: 3 RCTs (n=1,340) and 9 case-control studies (n=1,372).

Angiographic outcomes.
Compared with stenting alone, DCA was associated with a statistically significant increase in acute gain (WMD 0.23, 95% CI: 0.18, 0.28, p<0.0001), a greater final minimal lumen diameter (WMD 0.23, 95% CI: 0.19, 0.27, p<0.0001) and a significant reduction in angiographic restenosis rate (OR 0.67, 95% CI: 0.54, 0.83, p=0.0003). There was no statistically significant difference between DCA before stenting and stenting alone in late loss (p=0.98). Statistically significant heterogeneity was detected for the analyses of acute gain and restenosis rate (p<0.001 for both) and late loss (p=0.03).

Clinical outcomes.

Compared with stenting alone, DCA was associated with a significantly lower rate of late target lesion revascularisation (OR 0.73, 95% CI: 0.59, 0.91, p=0.006) and a significantly higher rate of early MACE (OR 1.87, 95% CI: 1.16, 3.02, p=0.01). There was no statistically significant difference between DCA before stenting and stenting alone in late MACE (p=0.13). Statistically significant heterogeneity was detected for the analyses of target lesion revascularisation (p=0.04), but not for early or late MACE.

Authors’ conclusions
DCA before stenting improved acute angiographic results and target lesion revascularisation more than stenting alone, but also increased early MACE.

CRD commentary
The review question was clear but broadly defined. Several relevant sources were searched and attempts were made to minimise publication and language bias. The data extraction was undertaken in duplicate, thus minimising reviewer errors and bias, but it is not clear whether similar steps were taken at the study selection stage. Study validity was not assessed, thus the results from these studies and any synthesis may not be reliable. Data from randomised and non-randomised studies were pooled. Forest plots showed the results separately for the two types of study design, and the authors acknowledged that the results for the two different types of studies differed: case-control studies showed a statistically significant benefit from the combined strategy compared with stenting alone for restenosis rate, target lesion revascularisation and early MACE, whereas RCTs showed no significant difference between treatments for these outcomes. However, the main results were from the analyses of all studies. In view of the incomplete reporting of review methods, lack of a validity assessment, the pooling of data from studies of differing design, and differences between the studies, the authors’ conclusions may not be reliable.

Implications of the review for practice and research
The authors did not state any implications for practice or further research.

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