Coronary stenting versus balloon angioplasty for acute myocardial infarction: a meta-regression analysis of randomized trials


CRD summary
The authors concluded that coronary stenting (where anatomically and technically possible) may be considered to reduce mortality in acute myocardial infarction patients undergoing primary angioplasty and classified as high-risk by validated risk scores. The review was generally well-conducted and the authors’ cautious conclusion appeared to reflect limited evidence from exploratory analyses.

Authors' objectives
To compare coronary stenting with balloon angioplasty for patients with acute myocardial infarction (AMI).

Searching
MEDLINE and Cochrane Central Register of Controlled Trials were searched from 1990 to September 2006 for completed published studies. Key search terms were reported. No language restrictions were applied. Abstracts from scientific sessions of four specified relevant journals were screened over the same time period.

Study selection
Randomised controlled trials (RCTs) that evaluated coronary stenting in patients with AMI and followed-up at least 90 per cent of patients for at least one month were eligible for inclusion. Ongoing studies were excluded. Although not stated specifically, it was clear that balloon angioplasty was the target control treatment. The primary review outcomes were mortality at 30 days and six to 12 months. Secondary outcomes were reinfarction and target vessel revascularisation (TVR) at 30 days and six to 12 months.

The included studies compared balloon angioplasty with a variety of stent types including Palmaz-Schatz, Gianturco-Robin, Wiktor GX, Tensum III and Multilink- (Duet); some studies evaluated various unnamed types of stents. Most of the included studies did not include glycoprotein IIb-IIIa inhibitors; most included antiplatelet treatment (ticlopidine) for one month in the stent group only. Where reported, most patients were male (71 to 84 per cent). The mean age ranged from 58 to 67 years. The duration of follow-up for most studies was 12 months; for others it was six months.

The authors stated neither how papers were selected for the review nor how many reviewers performed the selection.

Assessment of study quality
Two reviewers independently assessed validity using the following criteria: objective stated; inclusion and exclusion criteria explicitly reported; intervention described; objective methods of follow-up; adverse events described; power analysis; statistical methods described; multicentre design; withdrawals discussed; and details of medical treatment during and after procedure described. Disagreements were resolved by consensus. The maximum possible validity score was 9 points (one for each met criterion).

Data extraction
Two reviewers independently extracted data on an intention-to-treat basis. Discrepancies were resolved by consensus.

Methods of synthesis
Pooled odds ratios (OR) and 95% confidence intervals (CI) were calculated using the fixed-effect Mantel-Haenszel method in the absence of significant heterogeneity and the DerSimonian and Laird random-effects model in its presence (p<0.10). Heterogeneity was assessed using the Breslow-Day test. Publication bias was assessed using a funnel plot and tested using Egger's regression test. Meta-regression was used to examine the association between effect size and the underlying risk based on the event rate in the control group. L’Abbe plots were used to display results of the meta-regression analysis.
Results of the review
Thirteen RCTs were included (n=6,922). Seven studies scored 9 out of 9 for validity, four scored 7 or 8 and two scored 2 or 3.

There was no statistically significant difference between stenting and balloon angioplasty in mortality at 30 days (OR 0.97, 95% CI: 0.83, 1.28, p=0.81) or six to 12 months (OR 0.97, 95% CI: 0.78, 1.21, p=0.81). No significant heterogeneity was found. Control group event rates ranged from 0 to 9.9 per cent for mortality at 30 days and from 1.8 per cent to 18.2 per cent at six to 12 months. There was a statistically significant association between the control group event rate and a reduced mortality at 30 days (beta -0.63, 95% CI: -25.4, -2.45, p=0.022) and 12 months (beta -0.61, 95% CI: -15.9, -0.76, p=0.034). There was no significant evidence of publication bias from the regression test (p=0.48).

There was no statistically significant difference between stenting and balloon angioplasty in reinfarction at 30 days (OR 0.90, 95% CI: 0.64, 1.25, p=0.53) or at one year (OR 0.93, 95% CI: 0.72, 1.20, p=0.57). No significant heterogeneity was found.

Stenting was associated with a statistically significant reduction in target vessel revascularisation at 30 days (3.1% versus 5.1%; OR 0.59, 95% CI: 0.46, 0.76, p<0.0001) and at one year (11.3% versus 18.3%; OR 0.56, 95% CI: 0.49, 0.65, p<0.0001). Significant heterogeneity was found for both analyses (p=0.03 and p=0.004). There was no relationship between the control group event rate and reinfarction or target vessel revascularisation.

Authors’ conclusions
In acute myocardial infarction patients undergoing primary angioplasty, coronary stenting (where anatomically and technically possible) may be considered to reduce mortality in patients classified as high risk by validated risk scores.

CRD commentary
The review question and inclusion criteria were stated clearly. Several relevant sources were searched. No language restrictions were applied. Attempts were made to minimise publication bias and on testing no significant evidence of it was found. Appropriate methods were used to minimise reviewer error and bias during the assessment of validity and extraction of data, but it was not clear whether similar steps were taken in study selection. Only RCTs were included and validity was assessed, although only the composite score was presented, making it difficult to comment independently on the reliability of the evidence presented.

Appropriate methods were used for the meta-analyses. Heterogeneity was assessed and the influence of the control group event rate was explored. The reported relationship between a validated patient risk score and mortality benefits associated with stenting appeared to be a reasonable inference. The review was generally well-conducted and the authors’ cautious conclusion appeared to reflect limited evidence from exploratory analyses.

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

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