A meta-analysis and metaregression analysis of factors influencing mortality after endovascular repair of ruptured abdominal aortic aneurysms

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CRD summary
The authors concluded that mortality rate from endovascular repair in patients with ruptured abdominal aortic aneurysms was acceptable, and patients who received the bifurcated approach were less likely to die. Methodological concerns for potential error and bias in the review process, possible missed studies and unclear study quality, means that the reliability of the authors' conclusion is uncertain.

Authors' objectives
To evaluate the mortality rate following endovascular repair in patients with ruptured abdominal aortic aneurysms.

Searching
MEDLINE and EMBASE were searched to February 2010. Search terms were reported and the reference lists of relevant studies were scanned. The search was limited to studies written in English.

Study selection
All studies that reported mortality figures following endovascular surgery in patients with ruptured abdominal aortic aneurysms (true ruptures) were eligible for inclusion. Case reports and studies of selected groups of patients (such as octogenarians) were excluded.

Most studies were conducted in Europe or the USA, with five located in the UK. Most studies were observational designs. Where reported, the age range of patients was 68 to 82 years. The primary outcome assessed was perioperative mortality (defined as all perioperative, in-hospital and 30-day mortality).

One reviewer selected the studies for inclusion.

Assessment of study quality
The authors did not refer to any assessment of study quality.

Data extraction
Mortality data were extracted to enable the presentation of proportions (%) and 95% confidence intervals (CIs).

One reviewer carried out the data extraction.

Methods of synthesis
Proportions were pooled in a random-effects meta-analysis. Statistical heterogeneity was assessed using $I^2$. Random-effects meta-regression analyses were carried out to explore the potential influences of age, mid-time study point, anaesthesia, endograft configuration, haemodynamic instability, intra-aortic balloon occlusion, conversion to open repair and abdominal compartment syndrome. Multivariate regression was used to explore relationships between the covariates. Publication bias was assessed using a funnel plot.

Results of the review
Forty-six studies (1,397 patients) were included in the review. There was one randomised controlled trial of endovascular repair versus open surgery (data was used only from 13 patients undergoing endovascular repair); the remainder were observational study designs.

The pooled result for mortality was 24.3% (95% CI 20.7 to 28.3%; 46 studies; $I^2= 49.4\%$, which indicated substantial heterogeneity). Meta-regression analysis showed the only statistically significant association was between endograft configuration (bifurcated approach) and a reduction in perioperative mortality ($p=0.005$; 36 studies). Further results of the meta-regression analysis were reported in the paper.
There was evidence to suggest the presence of publication bias. Re-analysis excluding the largest study did not substantially change the pooled result.

**Authors’ conclusions**

Endovascular repair of ruptured abdominal aortic aneurysms was associated with acceptable mortality rates. Patients having a bifurcated endograft were less likely to die.

**CRD commentary**

The review question was clear and inclusion criteria were specified. Two relevant electronic databases were searched, but there was no apparent search for unpublished material and language restrictions were applied. Publication bias was assessed and appeared to have been present. The process of study selection and data extraction were not conducted with attempts to minimise error and bias; the lack of any reported quality assessment of included studies meant that their reliability was uncertain.

Some study details were presented. Substantial heterogeneity and partial reliance on a multivariable regression model meant that there was a high degree of uncertainty in the results (acknowledged by the authors). The chosen method of synthesis appeared to have been appropriate in light of the reported heterogeneity. The absence of direct comparisons in this review limited the utility of the findings for decision-making. Potential for error and bias in the review process, together with the possibly of missed studies, and the unclear quality of included studies, meant that the reliability of the authors' conclusion was uncertain.

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

**Practice:** The authors did not state any implications for practice.

**Research:** The authors referred to three good-quality randomised controlled trials were underway to evaluate the role of endovascular repair for ruptured abdominal aortic aneurysms.

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