Elective surgery of abdominal aortic aneurysms in octogenarians: a systematic review

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CRD summary
The review assessed the perioperative and late survival after abdominal aortic aneurysm repair of elderly participants. It concluded that mortality rates and long term survival after open or endovascular repair in carefully selected patients seems acceptable. Although this was a largely well-conducted review, methodological flaws within the included studies suggest that the authors' conclusion should be viewed with caution.

Authors' objectives
To compare open or endovascular repair for abdominal aortic aneurysms in elderly patients.

Searching
MEDLINE, EMBASE and the Cochrane Library were searched from 1966 to June 2006. Search terms were reported. There was no language restriction. PubMed was also used to find related articles and reference lists of retrieved articles were also searched. There was no systematic search for unpublished material and experts in the field were not contacted.

Study selection
Studies were eligible for inclusion if they reported mortality or life expectancy rates, or both, of participants aged over 80 years undergoing elective abdominal aortic aneurysm surgery or endovascular repair. Postoperative complication rates were also collected. Studies on surgery only for ruptured abdominal aortic aneurysms were excluded.

In the included studies, participants underwent either abdominal aortic aneurysm between 1975 and 2005 or endovascular repair between 2001 and 2005. The majority of participants, where reported, were male. The median aneurysm size was 6.7 cm (range 5.7 to 8.2 cm) for those undergoing abdominal aortic aneurysm repair and 5.9 cm (range 5.2 to 6.7cm) for those undergoing endovascular repair. Complications were poorly defined. Studies were mostly undertaken in Europe or North America.

Two authors assessed the eligibility of the identified studies, with disagreements resolved by discussion.

Assessment of study quality
Each study was assessed for the presence of selection bias, information bias and whether correction for confounding variables such as sex and comorbidities had been performed. Selection bias was defined as present when patients were selected based on their fitness for abdominal aortic aneurysm repair because of absence of severe comorbidities. Information bias was defined as present when follow-up was incomplete or complete follow-up was not explicitly reported. For each study, the three quality criteria were scored as: present; not present; or unclear.

Two authors independently assessed the methodological quality of the included studies, with discrepancies resolved by discussion.

Data extraction
Data were extracted from the included studies on 30 day mortality rate, postoperative complication rates and survival to calculate summary estimates and 95% confidence intervals (CIs). When only in hospital mortality rate was given, this was recorded as 30 day mortality. Data were transformed to a logit-scale after correction of 0.5 to cells containing a value of 0.

Two authors independently extracted data from the included studies, with discrepancies resolved by discussion.

Methods of synthesis
If no clinical heterogeneity was detected, data were pooled in a meta-analysis with a DerSimonian and Laird random-effects model to assess a summary risk of perioperative mortality, with 95% confidence intervals (CIs) calculated separately for open repair and endovascular repair. Heterogeneity was assessed by the $\chi^2$ test and the $I^2$ value. The distribution (median and range) of the other outcomes, postoperative complication rates and five year survival, was described in narrative format.

**Results of the review**

Thirty-four studies (n=1,534) of participants undergoing open abdominal aortic aneurysm repair and seven studies (n=1,045) of participants undergoing endovascular repair were included. The majority of studies had sample sizes of less than 100 participants. Eighty-seven percent of studies showed selection bias, 79% showed definite or possible information bias and 26% of studies corrected their results for confounding variables. Most of the studies had a retrospective design and were reports of single institutions. Heterogeneity was not detected in either analysis by the $\chi^2$ test or $I^2$ value.

For open abdominal aortic aneurysm repair, perioperative mortality ranged from 0% to 33% (summary risk: 7.5, 95% CI: 6.1, 9.0). The median postoperative complication rate was 31% (range: 8.6, 68.6) and the median five year survival rate in nineteen studies was 60% (range: 14, 86).

For endovascular repair, perioperative mortality rate ranged from 0 to 6% (summary risk: 4.6, 95% CI: 3.4, 6). The median post-operative complication rate was 11.5% (range: 1.8, 25) and the median five year survival rate could not be derived.

**Authors' conclusions**

Mortality rates after open or endovascular abdominal aortic aneurysm repair in carefully selected participants seems acceptable. Long-term survival rates are acceptable but are based on studies with methodological limitations.

**CRD commentary**

The review addressed a clear research question and inclusion criteria were clearly specified in terms of participants, interventions and outcomes. Several relevant sources were searched to identify potential studies and attempts were made to minimise language bias. There were no attempts to search for unpublished data or contact authors in the field to identify other studies, which mean that relevant studies may have been missed. There was no attempt to explore the possibility of publication bias and the authors acknowledged that this may have led to a biased selection of studies that presented acceptable results of surgery only. Methods were used to minimise bias and reviewer error in the selection of studies, quality assessment and data extraction.

The majority of studies had poor methodological quality, with evidence of selection and information bias and results uncorrected for confounding. The authors acknowledged that, due to the high rate of information bias, survival rates may be biased because of the possibility of deceased participants being lost to follow-up. The inability to correct for confounding suggests that the reported mortality rates may have been influenced by factors other than the surgery for abdominal aortic aneurysm repair. The small sample size of most of the included studies resulted in wide and imprecise confidence intervals around the estimated survival rates. The lack of clear reporting and definition of complication rates in the individual studies suggest that the summary figures should be treated with caution. The decision to pool studies for the assessment of perioperative mortality is appropriate, given the lack of evidence of statistical heterogeneity. However, the inclusion of older studies in the assessment of outcomes may have influenced the summary findings, as anaesthetic techniques, postoperative care and operation techniques are likely to have changed.

The review process was reported with adequate attempts to reduce errors and bias. The authors’ conclusion accurately related to carefully selected patients. However, limitations within the included studies, relating to poor quality and small sample size, means that this conclusion should be viewed with caution.

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

Practice: The authors stated that careful patient selection can result in an acceptable mortality rate for people over the age of 80 years requiring abdominal aortic aneurysm repair, but they did not define the criteria for selection.
Research: The authors stated that future studies should assess quality of life after abdominal aortic aneurysm surgery in people over the age of 80 years.

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