Intraoperative autotransfusion in abdominal aortic aneurysm surgery: meta-analysis of randomized controlled trials

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CRD summary
The authors concluded that intra-operative autotransfusion reduces the risk of allogeneic blood transfusion in patients undergoing elective surgery for infrarenal abdominal aortic aneurysm. In view of the limited amount and quality of the data, the rather narrow literature search and the inadequate reporting of review methods, this conclusion should be interpreted with some degree of caution.

Authors' objectives
To evaluate the use of intra-operative autotransfusion in abdominal aortic aneurysm (AAA) surgery.

Searching
MEDLINE was searched from 1966 to November 2006; the search terms were reported. The references of retrieved articles and other secondary sources were handsearched.

Study selection
Randomised controlled trials (RCTs) of autotransfusion versus no autotransfusion among patients undergoing elective surgery for infrarenal AAA were eligible for inclusion. The mean or median age of patients in the included studies was 63 to 73 years (range: 54 to 82) and, where stated, their mean or median pre-operative haemoglobin (Hb) concentration was 13.5 to 13.9 g/deciliter (dL). A range of autotransfusion devices were used in the included studies. In one study the intervention group also underwent preliminary haemodilution to reduce their Hb concentration to below 11 g/dL. Where studies included patients undergoing other procedures or with different indications for surgery, data for these patients were excluded. Eligible studies were required to report the incidence of allogeneic blood transfusion (ABT) as a primary outcome. ABT was defined as receiving at least one unit of allogeneic red blood cells. The indications for ABT differed in the included studies. One study adhered to guidelines recommending intra-operative transfusion for haemodynamic instability and/or an Hb concentration less than 10 g/dL, and post-operative transfusion for patients with an Hb concentration less than 8 g/dL (or 8 to 10 g/dL in the case of cardiopulmonary risk). Other studies administered transfusions if the haematocrit fell to less than 25%, if the Hb concentration fell below 8 g/dL and/or if ischaemic electrocardiographic changes did not respond to correction of hypovolaemia.

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 following validity criteria were assessed: allocation concealment, blinding and objectivity of outcome assessment.

The authors did not state how the validity assessment was performed.

Data extraction
Risk ratios (RRs) with 95% confidence intervals (CIs) were calculated for the outcome of interest. Unpublished data were obtained from study authors where necessary.

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

Methods of synthesis
The data were meta-analysed to obtain a pooled RR with 95% CI. Statistical heterogeneity was assessed using \( \chi^2 \) tests \((p<0.05\) taken to denote statistical significance). Where significant heterogeneity was identified, the random-effects
model of DerSimonian and Laird was used. Sensitivity analyses were conducted to assess the effect of excluding individual studies from the meta-analysis. Publication bias was assessed using a funnel plot and Begg's rank correlation test.

**Results of the review**

Four RCTs (n=292) were included.

No studies described the use of allocation concealment or blinded outcome assessment. Two trials were single-blind, one was not blind and one did not provide this information.

There was no evidence of statistically significant publication bias.

Patients receiving autotransfusion were significantly less likely to require ABT (RR 0.63, 95% CI: 0.41, 0.95, p=0.03). There was statistically significant heterogeneity in this result using a random-effects model (p=0.02). A sensitivity analysis excluding the studies with the lowest and highest RRs did not change the statistical significance of the results.

**Authors’ conclusions**

Intra-operative autotransfusion reduces the risk of ABT in patients undergoing elective surgery for infrarenal AAA.

**CRD commentary**

The review objective and inclusion criteria were clearly defined, but only one database was searched and some studies might have been missed. The authors noted that some data from a fifth study was unobtainable, and that although a formal assessment showed no evidence of publication bias, it could not be excluded given the small number of studies. It is not clear whether steps were taken to minimise the risk of error and bias in the study selection, validity assessment and data extraction processes, such as having more than one reviewer make decisions independently. Relevant criteria were used to evaluate study quality, although the results were not reported in detail for each study. The pooling of studies appears appropriate and suitable steps were taken to assess statistical heterogeneity, although the likely cause for the significant heterogeneity found was not addressed in the text. Although the authors’ conclusions appear to be supported by the evidence presented, they should be interpreted with some degree of caution given the limited amount and quality of the data, the rather narrow literature search and the inadequate reporting of review methods.

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

The authors did not state any implications for practice or further research.

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