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WILEY

[Intervention Review]

Pharmacological interventions to decrease blood loss and blood transfusion requirements for liver resection

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ABSTRACT

Background

Blood loss during liver resection is one of the most important factors affecting the peri-operative outcomes of patients undergoing liver resection.

Objectives

To determine the benefits and harms of pharmacological interventions to decrease blood loss and to decrease allogeneic blood transfusion requirements in patients undergoing liver resections.

Search methods

We searched *The Cochrane Hepato-Biliary Group Controlled Trials Register*, the *Cochrane Central Register of Controlled Trials (CENTRAL)* in *The Cochrane Library*, *MEDLINE*, *EMBASE*, and *Science Citation Index Expanded* until November 2008 for identifying the randomised trials.

Selection criteria

We included all randomised clinical trials comparing various pharmacological interventions aimed at decreasing blood loss and allogeneic blood transfusion requirements in liver resection. Trials were included irrespective of whether they included major or minor liver resections, normal or cirrhotic livers, vascular occlusion was used or not, and irrespective of the reason for liver resection.

Data collection and analysis

Two authors independently identified trials for inclusion and independently extracted data. We analysed the data with both the fixed-effect and the random-effects models using RevMan Analysis. For each outcome we calculated the risk ratio (RR), mean difference (MD), or standardised mean difference with 95% confidence intervals (CI) based on intention-to-treat analysis or available case-analysis. For dichotomous outcomes with only one trial included under the outcome, we performed the Fisher's exact test.

Main results

Six trials involving 849 patients satisfied the inclusion criteria. Pharmacological interventions included aprotinin, desmopressin, recombinant factor VIIa, antithrombin III, and tranexamic acid. One or two trials could be included under most comparisons. All trials had a high risk of bias. There was no significant difference in the peri-operative mortality, survival at maximal follow-up, liver failure, or other peri-operative morbidity. The risk ratio of requiring allogeneic blood transfusion was significantly lower in the aprotinin and tranexamic acid groups than the respective control groups. Other interventions did not show significant decreases of allogeneic transfusion requirements.

Authors' conclusions

None of the interventions seem to decrease peri-operative morbidity or offer any long-term survival benefit. Aprotinin and tranexamic acid show promise in the reduction of blood transfusion requirements in liver resection surgery. However, there is a high risk of type I (erroneously concluding that an intervention is beneficial when it is actually not beneficial) and type II errors (erroneously concluding that an intervention is not beneficial when it is actually beneficial) because of the few trials included, the small sample size in each trial, and the high risk of bias. Further randomised clinical trials with low risk of bias and random errors assessing clinically important outcomes such as peri-operative mortality are necessary to assess any pharmacological interventions aimed at decreasing blood loss and blood transfusion requirements in liver resections. Trials need to be designed to assess the effect of a combination of different interventions in liver resections.

PLAIN LANGUAGE SUMMARY

Aprotinin and tranexamic acid may show promise in decreasing blood loss and blood transfusion requirements

Blood loss during liver resection (partial removal of liver) is one of the important factors affecting the post-operative complications of patients. Allogeneic blood transfusion (using blood donated by a different individual) is associated with increased morbidity and lower survival in patients with liver cancer. This systematic review was aimed at determining whether any medical treatment decreased blood loss and decreased allogeneic blood transfusion requirements in patients undergoing liver resections. This systematic review included six trials with 849 patients. All trials had high risk of bias ('systematic error') as well as play of chance ('random error'). The trials included comparison of medicines (such as aprotinin, desmopressin, recombinant factor VIIa, antithrombin III, and tranexamic acid) with controls (no medicines). There was no difference in the death or complications due to surgery or long-term survival in any of the comparisons. Fewer patients required transfusion of blood donated by others when aprotinin or tranexamic acid were compared to controls not receiving the interventions. The other comparisons did not decrease the transfusion requirements. However, there is a high risk of type I errors (erroneously concluding that an intervention is beneficial when it is actually not beneficial) and type II errors (erroneously concluding that an intervention is not beneficial when it is actually beneficial) because of the few trials included and the small sample size in each trial as well as the inherent risk of bias (systematic errors). Aprotinin and tranexamic acid show promise in the reduction of blood transfusion requirements in liver resections. Further randomised clinical trials with low risk of bias (systematic errors) and low risk of play of chance (random errors) which assess clinically important outcomes (such as death and complications due to operation) are necessary to assess any pharmacological interventions aimed at decreasing blood transfusion and blood transfusion requirements in liver resections. Trials need to be designed to assess the effect of a combination of different interventions in liver resections.