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[Intervention Review]

Prophylactic platelet transfusions prior to surgery for people with a low platelet count

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ABSTRACT

Background

People with thrombocytopenia often require a surgical procedure. A low platelet count is a relative contraindication to surgery due to the risk of bleeding. Platelet transfusions are used in clinical practice to prevent and treat bleeding in people with thrombocytopenia. Current practice in many countries is to correct thrombocytopenia with platelet transfusions prior to surgery. Alternatives to platelet transfusion are also used prior surgery.

Objectives

To determine the clinical effectiveness and safety of prophylactic platelet transfusions prior to surgery for people with a low platelet count.

Search methods

We searched the following major data bases: Cochrane Central Register of Controlled Trials (CENTRAL; 2017, Issue 2), PubMed (e-publications only), Ovid MEDLINE, Ovid Embase, the Transfusion Evidence Library and ongoing trial databases to 11 December 2017.

Selection criteria

We included all randomised controlled trials (RCTs), as well as non-RCTs and controlled before-and-after studies (CBAs), that met Cochrane EPOC (Effective Practice and Organisation of Care) criteria, that involved the transfusion of platelets prior to surgery (any dose, at any time, single or multiple) in people with low platelet counts. We excluded studies on people with a low platelet count who were actively bleeding.

Data collection and analysis

We used standard methodological procedures expected by Cochrane for data collection. We were only able to combine data for two outcomes and we presented the rest of the findings in a narrative form.

Main results

We identified five RCTs, all conducted in adults; there were no eligible non-randomised studies. Three completed trials enrolled 180 adults and two ongoing trials aim to include 627 participants. The completed trials were conducted between 2005 and 2009. The two ongoing trials are scheduled to complete recruitment by October 2019. One trial compared prophylactic platelet transfusions to no transfusion in people with thrombocytopenia in an intensive care unit (ICU). Two small trials, 108 participants, compared prophylactic platelet transfusions to

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other alternative treatments in people with liver disease. One trial compared desmopressin to fresh frozen plasma or one unit of platelet transfusion or both prior to surgery. The second trial compared platelet transfusion prior to surgery with two types of thrombopoietin mimetics: romiplostim and eltrombopag. None of the included trials were free from methodological bias. No included trials compared different platelet count thresholds for administering a prophylactic platelet transfusion prior to surgery. None of the included trials reported on all the review outcomes and the overall quality per reported outcome was very low.

None of the three completed trials reported: all-cause mortality at 90 days post surgery; mortality secondary to bleeding, thromboembolism or infection; number of red cell or platelet transfusions per participant; length of hospital stay; or quality of life.

None of the trials included children or people who needed major surgery or emergency surgical procedures.

Platelet transfusion versus no platelet transfusion (1 trial, 72 participants)

We were very uncertain whether giving a platelet transfusion prior to surgery had any effect on all-cause mortality within 30 days (1 trial, 72 participants; risk ratio (RR) 0.78, 95% confidence interval (CI) 0.41 to 1.45; very-low quality evidence). We were very uncertain whether giving a platelet transfusion prior to surgery had any effect on the risk of major (1 trial, 64 participants; RR 1.60, 95% CI 0.29 to 8.92; very low-quality evidence), or minor bleeding (1 trial, 64 participants; RR 1.29, 95% CI 0.90 to 1.85; very-low quality evidence). No serious adverse events occurred in either study arm (1 trial, 72 participants, very low-quality evidence).

Platelet transfusion versus alternative to platelet transfusion (2 trials, 108 participants)

We were very uncertain whether giving a platelet transfusion prior to surgery compared to an alternative has any effect on the risk of major (2 trials, 108 participants; no events; very low-quality evidence), or minor bleeding (desmopressin: 1 trial, 36 participants; RR 0.89, 95% CI 0.06 to 13.23; very-low quality evidence; thrombopoietin mimetics: 1 trial, 65 participants; no events; very-low quality evidence). We were very uncertain whether there was a difference in transfusion-related adverse effects between the platelet transfused group and the alternative treatment group (desmopressin: 1 trial, 36 participants; RR 2.70, 95% CI 0.12 to 62.17; very-low quality evidence).

Authors' conclusions

Findings of this review were based on three small trials involving minor surgery in adults with thrombocytopenia. We found insufficient evidence to recommend the administration of preprocedure prophylactic platelet transfusions in this situation with a lack of evidence that transfusion resulted in a reduction in postoperative bleeding or all-cause mortality. The small number of trials meeting the inclusion criteria and the limitation in reported outcomes across the trials precluded meta-analysis for most outcomes. Further adequately powered trials, in people of all ages, of prophylactic platelet transfusions compared with no transfusion, other alternative treatments, and considering different platelet thresholds prior to planned and emergency surgical procedures are required. Future trials should include major surgery and report on bleeding, adverse effects, mortality (as a long-term outcome) after surgery, duration of hospital stay and quality of life measures.

PLAIN LANGUAGE SUMMARY

Platelet transfusion before surgery for people with low platelet counts

Review question

We aimed to assess the safety and clinical effectiveness of administering platelet transfusions to people with a low platelet count who require surgery. We included three comparisons: giving platelet transfusion versus no platelet transfusion; giving platelet transfusion versus an alternative treatment (medicines that reduce the risk of bleeding or increase the platelet count) or giving platelet transfusions when the platelet count is below a set number (low platelet count e.g. $20 \times 10^9/L$ versus slightly higher e.g. $50 \times 10^9/L$).

Our target population was people with a low platelet count of any age who required surgery. We excluded studies on people with a low platelet count who were actively bleeding.

Key messages

There was not enough evidence to help guide the use of platelet transfusions prior to surgery in people with a low platelet count. There is no evidence for infants and children or prior to a major operation.

What was studied in this review?

Platelets are tiny cells in the blood that form clots to help stop bleeding. If a person with a low platelet counts requires surgery they are at increased risk of bleeding during and after surgery. A number of strategies are used to reduce the risk of bleeding, these include: giving platelet transfusions (injecting platelets into the bloodstream) to increase the platelet count, giving medicines to increase the platelet count and giving medicines that reduce the risk of bleeding. The current strategies are not based on good evidence, but based on individual clinical experience and expertise.

What are the main results of this review?

We found five randomised controlled trials (clinical studies where people are randomly put into one of two or more treatment groups) eligible for inclusion in this review. Two of these studies are still in progress. The three completed trials were small, with a combined total of 180 people. All were in adults who required minor surgery or an invasive procedure (a procedure that is carried out through the skin or a body cavity or anatomical opening). Two trials were in adults with liver disease and one trial was in adults in the intensive care unit. One trial compared platelet transfusion to no transfusion. One trial compared platelet transfusion to drugs that increased the platelet count. One trial compared platelet transfusion to a drug that decreased the risk of bleeding. We did not find any studies that compared the use of platelet transfusions using different platelet count levels as a guide for platelet transfusion.

There was not enough evidence to determine whether platelet transfusions affected the risk of death due to any cause, minor or major procedure-related bleeding, or the risk of a serious side effect. The only available evidence was of very-low quality because: the estimates were very imprecise, the studies were at risk of bias (participants and doctors knew which treatment they were receiving) and the evidence only applied to adults with liver disease requiring a dental procedure or liver biopsy (sample of the liver taken for analysis), or adults in intensive care units requiring insertion of a tube to help breathing (tracheotomy).

None of the studies reported: death due to any cause at 90 days after surgery; death due to bleeding, infection or a blood clot; number of red cell (cells that carry oxygen in the blood) or platelet transfusions each participant received; length of hospital stay or quality of life.

None of the trials included children or people who needed major surgery or emergency surgical procedures.

How up to date is this evidence?

We searched for studies published up to December 2017.