



CIRUGÍA ESPAÑOLA

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Editorial

New Paradigms in the Management of Perioperative Transfusion in Elective Surgery[☆]

Nuevos paradigmas en el manejo de la transfusión perioperatoria en cirugía electiva

The indication for blood crossed-matching tests and the mandatory ordering of blood products follow historical rules. For many surgical procedures, the sole criteria use for preoperative blood ordering is prevention. In absolute terms, only 21% of pre-surgical stored blood is used.¹

A more accurate assessment of the use of preoperative ordered blood is expressed by the transfusion rate, which is the ratio between the number of transfused packed red blood cells and the number of packed red blood cells prepared and reserved (ideally, it should be equal to or greater than 0.5) and its inverse, the ratio of reserved cross-matched and transfused RBC units (the C/T ratio: the optimum value should be less than or equal to 2).

More efficient preoperative blood utilization is achieved in liver transplantation and cardiovascular surgery. Paradoxically, the surgical procedures where more progress has been made in reducing operative bleeding, such as abdominal and gastrointestinal procedures, are exactly where the greatest inefficiency in preoperative blood ordering is seen.¹ In a study on colorectal surgery, where 26.8% of patients were transfused, the ratio between prepared and used blood was suboptimal (3.7%).² The authors concluded that blood was being requested for unjustifiable preoperative cross-matching tests and elective colorectal resections. The blood should be prepared by group and cross-matched only if the need arises. This would reduce the number of inappropriate tests as well as costs, while helping to improve blood bank management. It would also be useful if each hospital evaluated their use of packed red blood cells per surgical procedure.

In the study published in the current issue of *Cirugía Española* by Feliu et al.,³ 16.2% of patients were transfused and the prepared/used blood ratio was 5.34. This is a good reflection of the current use of blood in elective colon surgery.

Preoperative blood ordering protocols generally do not contemplate the differences between patients with high and low risks of bleeding. In order to improve the selection of patients requiring preoperative tests for compatibility and blood banking, it is vital to determine factors associated with transfusion. Hemoglobin levels are the most influential factor in perioperative blood transfusion.^{1,2} In the study by Feliu,³ 95% of patients with hemoglobin below 10 g/dl were transfused. In this same study, surgical time, which is directly related to the anatomic extent of colon resection, was associated with transfusion.

It would probably be more important to assess the influence of the surgical technique itself instead of its duration. In two patient cohorts in colon surgery comparing surgical procedures (laparoscopy vs laparotomy), disparate results were observed with regard to intraoperative transfusion.^{4,5}

An added value of the Feliu study³ is that it identified respiratory comorbidity and the use of anticoagulant drugs as factors associated with transfusion, regardless of hemoglobin levels. These data would allow us to construct algorithms for more efficient preoperative blood collection.

In the process of preparing and administering blood, the risk of no cross-matching identification or preparation of the preoperative blood reserve in certain patients is greater than the risk of a transfusion reaction.⁶ At the same time, administering universal blood (group 0) in situations of unexpected acute bleeding has an extremely low risk for hemolytic reaction.^{7,8} Therefore, given these considerations, blood supply protocols are starting to be reviewed on a per-procedure basis. With the important implications in health-care costs, this approach should also be adopted by institutional agencies.

[☆] Please cite this article as: Sabate A. Nuevos paradigmas en el manejo de la transfusión perioperatoria en cirugía electiva. *Cir Esp*. 2014;92:1-3.

Although major gastrointestinal surgery is currently being performed with a lower use of blood products,¹ the global consumption of blood is constantly increasing. This means that not only does the blood supply need to be maintained, but also more efforts must be made to reduce its consumption. In addition, blood transfusion in colorectal surgery has been associated with perioperative mortality and morbidity as well as lower survival rates.⁹

The Global Vision of Perioperative Transfusion Management

The objective of multidisciplinary and multimodal management of blood transfusion is to reduce transfusion requirements and improve surgical outcomes through measures aimed at avoiding preoperative anemia, reducing intraoperative blood loss and promoting tolerance of anemia.¹⁰

Anemia has been identified as an independent risk factor for perioperative complications, especially in older patients and in those with alterations on the preoperative electrocardiogram.¹¹ An improvement in red blood cell mass can be achieved with oral supplements of ferrous sulfate, with a minimum 2-week treatment before the intervention.^{12,13} This reduces the need for intraoperative blood transfusion but does not modify the results or surgery.¹⁴ In contrast, preventive blood transfusion and erythropoietin administration adversely affect the results, and are therefore not recommended.^{14,15} Perioperative blood loss can be reduced with restrictive fluid therapy, which prevents tissue edema¹⁶ and hemodilution of coagulation factors.¹⁷ Although there is no suitable marker for anemia-induced hypoxia, tolerance of anemia, and therefore the hemoglobin transfusion threshold, can be determined by integrating the hemodynamic data and oxygenation values, such as mixed venous oxygen saturation (or central venous oxygen saturation) and tissue oxygen. The latter has been shown to be an adequate transfusion marker in cardiac surgery models with cardiopulmonary bypass, reducing the percentage of intraoperative transfusions.¹⁸ The clinical value of tissue oxygenation in other surgical models, especially in abdominal surgery, must be duly researched.

In short, along with new transfusion strategies, new paradigms have emerged. On one hand, the aim is to reduce the number of patients requiring blood transfusion by applying protocols¹⁹; on the other hand, and in light of the evidence provided by procedure-by-procedure analyses,¹ we should reconsider which patients require preoperative blood ordering.

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Received 6 September 2013

Accepted 6 September 2013

2173-5077/\$ – see front matter

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