



# Revista Colombiana de Anestesiología

## Colombian Journal of Anesthesiology

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### Essay/Comment

## Blood storage and transfusion injury<sup>☆</sup>

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#### ARTICLE INFO

##### Article history:

Received 23 January 2012

Accepted 27 July 2012

Available online 18 September 2012

##### Keywords:

Transfusion

Red blood cells

Storage lesion

#### ABSTRACT

**Introduction:** The purpose of this paper is to offer some thoughts regarding the review article «Blood-sparing surgical techniques» published by doctors Rivera and Perez, and to comment some relevant aspects pertaining to red blood cell transfusions.

**Methods:** After reading the review article on «Blood-sparing surgical techniques», a literature search was done on articles related to blood product transfusions and their complications. Comments are made to complement the paper by doctors Rivera and Pérez.

**Results:** The literature recommends adopting a conservative attitude as far as the use of blood products is concerned, and to always individualize and assess the patient's own clinical and tissue perfusion status. There is no consensus regarding hemoglobin values, which range between 6 and 10 g/dl.

**Conclusion:** The decision to transfuse or not must be based on the patient's own individual parameters, clinical assessment, hemodynamic and tissue status. Studies are still needed regarding the value range between 6 and 10 g/dl.

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### La lesión por almacenamiento y la transfusión sanguínea

#### RESUMEN

**Introducción:** El objetivo de este manuscrito es realizar una reflexión sobre la publicación realizada por los Drs. Rivera y Pérez en su artículo de revisión «Técnicas de ahorro sanguíneo en cirugía» y comentar algunos aspectos relevantes relacionados con la transfusión de glóbulos rojos.

**Métodos:** Luego de realizar una lectura del artículo de revisión «Técnicas de ahorro sanguíneo en cirugía», se hizo una búsqueda en la literatura de artículos relacionados con transfusión de hemoderivados y sus complicaciones. Se hace un comentario y complemento con el artículo de los Drs. Rivera y Pérez.

**Resultados:** La literatura recomienda tomar una actitud restrictiva con el uso de hemoderivados, siempre individualizando y evaluando el estado clínico y de perfusión tisular en cada paciente. No hay consenso entre valores de hemoglobina entre 6 y 10 g/dl.

##### Palabras clave:

Transfusión

Glóbulos rojos

Lesión por almacenamiento

<sup>☆</sup> Please cite this article as: Aristizabal JP. La lesión por almacenamiento y la transfusión sanguínea. Rev Colomb Anestesiología. 2012;40:266-7.

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**Conclusion:** La decisión de transfundir o no a un paciente debe ser tomada con criterios individuales, evaluando la clínica, el estado hemodinámico y tisular. Aún faltan estudios para valores entre 6 y 10 g/dl.

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In the November 2011–January 2012 issue, doctors Rivera and Pérez<sup>1</sup> published a review on blood-sparing techniques in surgery. In their paper, they provide a thorough discussion of the strategies used to lower transfusion thresholds, including pharmacological, anesthetic and surgical techniques. All these are in order to educate physicians and surgeons and implement and disseminate skills that will result in a lower need for using blood products during the perioperative period, thus reducing morbidity, mortality and costs.

It is important to add that storage of packed red blood cells *per se* has a deleterious effect that is directly proportional to the length of storage time. In 2008, Weinberg et al.<sup>2</sup> published a very interesting paper in which trauma patients who required more than 1 unit of red blood cells within the first 24 h were divided into groups that received blood cell units characterized as “young” with a storage period under 14 days, or “old” units that had been stored for more than 14 days. After gathering more than 1813 patients, the result was an increase in mortality that was directly proportional to the number of units given. This factor was potentiated in those patients who received units stored for more than 14 days, despite leukoreduction. This result was confirmed by Koch et al.<sup>3</sup> who assessed the impact of red blood cell transfusion and storage time. In patients who received units that had been stored for more than two weeks there was higher hospital mortality, a need for longer mechanical ventilation, and a higher incidence of acute renal failure and sepsis. The physiological explanations for storage injury are many: diminished deformability, increased fragility, lower levels of 2,3 di-phosphoglycerate, increased anti-oxidant release and increased pro-inflammatory effects, among others.<sup>4</sup>

There has been a growing interest in the immune depressing and storage effects of the group of blood products, but finally everything boils down to a reduction in the indiscriminate use of blood components. Since Hebert published in 1999<sup>5</sup> his paper in favor of restrictive blood transfusions (hb greater than 7 g/dl), with a lower use of packed red blood cells and a reduction in hospital deaths, countless reviews have been published supporting these premises. For example, the CRIT trial<sup>6</sup> in which 284 ICUs in the United States showed clearly that the number of packed red blood cell units transfused is an independent predictor of worse hospital outcomes.

Finally, I would like to highlight that the trend at the present time should be toward the least possible use of perioperative blood transfusions, not only because of cost considerations because of the clear evidence regarding increased morbidity and 30-day mortality as reported by Glance et al.<sup>7</sup> in a

retrospective study of 10,100 patients. The big question is, what is the transfusion threshold? In accordance with the guidelines of the American Society of Anesthesiologists (ASA task force), the decision of using between 6 and 10 g/dl must be individualized and based on the clinical and paraclinical parameters that reflect tissue hypoperfusion.<sup>8</sup> In the issue of the Colombian Journal of Anesthesiology (Revista Colombiana de Anestesiología), doctors Rivera and Pérez offer great tools for achieving this ultimate objective.

### Source of funding

Authors' own funds.

### Conflict of interest

None declared.

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