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EDITORIAL

Transfusion strategy

Blood transfusion used to appear straightforward, but the increasing realization of its potential deleterious effects has changed that. There is now a widespread acceptance that restricting the amount of blood given to patients to the minimum necessary is good practice [1]. However, what is this minimum? The universal 10/30 rule (haemoglobin/haematocrit ratio) is no longer appropriate and the search continues for an updated paradigm. Setting a lower level for the minimum acceptable haemoglobin concentration, the value at which the decision to transfuse is triggered, has been shown to alter the practice of whole hospital units and to be one of the most effective ways to instigate a blood conservation programme [2]. The hope that a lower universal figure, say, 7.0 g dL^{-1}, would find acceptance in standard texts is dashed by the discussion of a new Transfusion Strategy by Van der Linden [3].

Measurement of haemoglobin concentration is a simple, widely available and frequently performed test. It is easy to comprehend, but only one of a number of possible triggers for transfusion [4]. Excluding some of the important logistical considerations, what is actually required physiologically is a measure of the patient's tissue oxygenation. Mixed venous oxygen saturation and oxygen extraction ratio require invasive monitoring, and gastric tonometry and near-infrared spectroscopy are still being evaluated.

Human volunteers can tolerate haemoglobin levels as low as 5.0 g dL^{-1} [5] because of the systemic and microcirculatory compensatory mechanisms, which Van der Linden describes. However, when caring for patients, clinical factors such as reduced cardiac output response, decreased oxygen extraction response, altered gas exchange and increased oxygen demand will need to be taken into account. These will vary for each individual case and be difficult to predict. Van der Linden points out that clinical signs such as tachycardia, postural hypotension and ST segment changes on the electrocardiogram can be unreliable in this context. The minimum haemoglobin concentration tolerated without organ dysfunction, the 'critical haemoglobin', is an individual value and a generally valid 'transfusion trigger' does not exist [6].

A previous principle of blood conservation was never to transfuse only a single unit of blood on the basis that if only one was required it was probably not necessary to give any blood at all [7]. However, in the present state of knowledge and monitoring, it now seems logical when transfusing blood in nonemergency situations to give single units one at a time with a clinical evaluation of the patient's response between each unit. Haemoglobin concentration, for all the reasons given, is only one of the factors to be taken into account. The time it takes for a unit of blood to have its maximum effect is still unknown and so, therefore, the best time for this evaluation is also unknown. If this is not immediate the new strategy could still lead to patients receiving more blood than is absolutely necessary.

Many of the hazards of blood transfusion are also common to the administration of other blood products, such as fresh frozen plasma and platelets [8]. Again, the appropriate tests, as with haemoglobin concentration for blood, need to be placed in the correct context of the particular patient and regular clinical assessment performed. Autologous blood transfusion also is not without risk [9] and the new strategy would again be appropriate to follow. Changing practice in all of these matters requires an ongoing educational programme and appointment of a specialist transfusion nurse has been successful in some hospitals [10].

Understanding is increasing, but this is still an imprecise clinical science. If possible, it would be best to reduce the number of occasions when the decision to transfuse or not has to be made at all. How many times do clinicians think, 'I wouldn't have chosen to start from here?' The number of moderately anaemic patients undergoing surgery is currently thought to be 20% [11] and a low preoperative haemoglobin concentration is a major risk factor for transfusion [12]. Surgery almost inevitably leads to blood loss,

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but by starting the operation with the patient's own haemoglobin high, allogenic transfusion may never need to be considered.

The use of preoperative erythropoietin has until now been limited to special cases almost certainly on the grounds of cost. Erythropoietin is unique in that it alone has the potential to create more of the patient's own red cells within their vascular space. All other blood conservation techniques merely manipulate the existing and decreasing number of red cells. As the price of blood rises and clinical governance gathers momentum the case for erythropoietin, and concomitant iron, will become even stronger. The side-effects seen in renal patients receiving long-term erythropoietin treatment are uncommon in surgical patients receiving it for a limited period preoperatively [13]. If it is good enough for use in sport, why not in patients about to undergo surgery [14]? This use would need to be supervised and elective patients not admitted to hospital until they had achieved the chosen level. This upper preoperative haemoglobin concentration for each individual patient will need to be arrived at in the same thoughtful way that Van der Linden has considered the minimum. This is an area in need of timely study.

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