Peri-operative anaemia management in major orthopaedic surgery: the need to find a pathway

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Patients undergoing major orthopaedic surgery may be exposed to the effects of anaemia, blood loss and allogeneic blood transfusion (ABT), all of which may adversely influence postoperative outcomes, although there is not agreement on the relative contribution of each of them1.

Pre-operative anaemia is a frequent condition which is usually regarded as no more than a surrogate marker of the severity of the pathology requiring surgical treatment, and will resolve after it. Obviously, although this can sometimes be true (e.g., anaemia associated with colon cancer), it is not always the case (e.g., anaemia associated with ulcerative colitis in a patient who needs a coronary artery bypass)1,2.

It is also frequently believed that pre-operative anaemia does not entail an increase in a patient’s risk and, therefore, it is not always adequately treated before surgery2. In contrast, the association between pre-operative anaemia and worse clinical outcome (longer time spent in hospital, increased rates of postoperative complications and higher mortality) was already described by Lunn and Elwood in 19703. A recent meta-analysis including over 900,000 patients who underwent major surgical procedures (including a large number of orthopaedic operations) confirmed that pre-operative anaemia, even if mild, is an independent risk factor for poorer post-operative outcomes4.

Pre-operative anaemia, or sub-optimal haemoglobin level (<13 g/dL for both genders), is an independent factor predicting the need for peri-operative ABT. In patients undergoing major orthopaedic surgery, perioperative blood loss and blunted erythropoiesis in the post-operative period may lead to acute severe anaemia5,6 especially in those whose haemoglobin concentration was low prior to the operation2. ABT is usually prescribed to avoid the deleterious effects of anaemia. ABT produces a quick, albeit transient, increase of haemoglobin levels, but its effectiveness in decreasing oxygen tissue debt and/or increasing oxygen consumption in selected patients has rarely been documented4.

There is great inter-centre variability in the percentages of patients who receive perioperative ABT when undergoing a particular major orthopaedic procedure7. In order to reduce this variability different European scientific societies have recommended a more rational, individualised and "restrictive" use of ABT8-12. However, even if restrictive criteria are used, ABT is frequently associated with a worse post-operative outcome in surgical and critically ill patients13-15. Moreover, in certain settings, such as cardiac surgery, the negative effects of blood loss, ABT and pre-operative anaemia seem to be synergistic16.

Despite its clinical and economic disadvantages, ABT remains the most frequently used treatment for acute perioperative anaemia. This is likely related to the belief that ABT is innocuous while ABT alternatives are expensive. However, it must be borne in mind that ABT is an expensive therapeutic resource, since the costs of processing, testing, storing and distributing (acquisition costs), as well as those of administering red blood cell units, are high1. A systematic review of the literature estimated that the cost of a two-unit transfusion in Western Europe was around € 80017. Allogeneic blood is also scarce, as the availability of this product is dependent exclusively on voluntary donors' good will.

Although indispensable, the sole application of restrictive transfusion criteria may not, therefore, be sufficient or adequate, and additional blood-sparing strategies should be implemented. These include optimisation of a patient’s pre-operative haemoglobin concentration and reduction of surgical and iatrogenic blood losses. All these measures should be delivered within the context of a multidisciplinary and multimodal "Patient Blood Management” (PBM) programme. However, a patient-centred PBM programme should not be focused only on reducing the probability of ABT, but also on ensuring continuity of care to improve clinical outcomes and, at the same time, reducing treatment costs18-21.

The review of the efficiency of these measures shows that their use translates into a trend towards improved clinical results (lower ABT requirements, fewer post-operative complications and mortality, shorter time spent in hospital and/or improved quality of life). However, the evidence supporting their safety and efficacy derives
from studies that are very heterogeneous in design and quality. In addition, most studies have evaluated the efficacy or safety of a particular strategy (along with the application of restrictive transfusion criteria in the most recent ones). Although this significantly influences the strength of the recommendations on their use, we must bear in mind that, as designing and carrying out a randomised trial on PBM is extremely challenging, we should measure the impact of this multimodal and multidisciplinary approach on outcomes through registries of treated patients rather than randomised controlled trials, since the former more closely resemble those patients we come across in daily clinical practice.

Although it is not simple to implement a PBM programme, the benefits for both the patient and the healthcare system, seem indisputable and it is well-known that failure to treat patients with pre-operative anaemia, with the intention of obviating avoidable transfusions, is equivalent to providing sub-optimal healthcare. There are numerous barriers to overcome (planning, leadership, institutional support, funding, legal framework, professional involvement, knowledge). Implementation of a PBM programme will not occur spontaneously because, simply, it is too easy ask for one or two units of blood from the blood bank. As a consequence, PBM implementation in Europe is variable and inconsistent. While some countries, such as the Netherlands, have been using PBM strategies for years, these measures have been adopted sparsely in other countries. In Spain, many hospitals have implemented some blood-saving strategies for specific interventions, but rarely a genuine PBM programme. Along with the cited barriers, the lack of widely accepted implementation guidelines may be behind the observed variability in the development of PBM programmes.

Stimulation of erythropoiesis to optimise pre-operative haemoglobin levels or correct post-operative anaemia constitutes one of the fundamental pillars of a PBM programme. Whenever feasible, pre-operative anaemia should be corrected before an elective major surgical procedure. This may entail re-scheduling surgery, if possible. It is presently unknown whether correction of pre-operative anaemia may completely offset the risk of post-operative complications, but it will at least reduce those associated with ABT and should, therefore, always be attempted. Various clinical guidelines have issued recommendations on the detection, classification and management of pre-operative anaemia. However, this is probably the PBM strategy with the most logistical problems for implementation, highlighting the difficulties that arise in the process of moving from guideline recommendations to daily clinical practice.

A survey on the use PBM strategies conducted among Anaesthesiology Departments in Spanish hospitals revealed that peri-operative anaemia management (the first pillar of PBM) was less frequently implemented (40%) than the use of cell salvage (67%) and tranexamic acid (75%) (the second pillar of PBM), or restrictive transfusion criteria (the third pillar of PBM). In this issue of Blood Transfusion, Bisbe and collaborators present a practical tool for the optimisation of peri-operative haemoglobin in surgical patients at risk of requiring red cell transfusions, based on available clinical evidence and their own experience. To this purpose, they developed an algorithm for the diagnosis and treatment of anaemia which will help anaesthesiologists to make patient-tailored decisions, according to the type of surgical procedure (oncological, orthopaedic, obstetric, gynaecological, cardiac, etc.). The economic aspects of the different treatment alternatives are also considered.

We must thank the authors for providing this anaemia management tool. However, they reported that, in the United Kingdom, multidisciplinary collaboration between surgeons, anaesthesiologists, haematologists, physiotherapists and nurses has allowed the implementation of PBM programmes in major orthopaedic surgery which resulted in better outcomes. In Italy, a multidisciplinary PBM programme for major orthopaedic surgery has been recently developed and regulatory guidelines are forthcoming thanks to the endorsement of PBM by the Ministry of Health. At the end of 2015, the Italian Health Minister issued a Decree: according to art. 25 of this Decree (dated November 2, 2015), "for the prevention of avoidable transfusions and with particular reference to the preparation of the patient who will undergo pre-scheduled surgical treatments, specific programmes shall be defined and implemented nationwide (Patient Blood Management) on the basis of guidelines to be issued by the National Blood Centre".

In contrast, the proposal by Bisbe et al. is basically an anaesthesiologist-centred approach to peri-operative anaemia management. Although this is operatively acceptable, the contributions from others specialists and general practitioners would have provided their approach to PBM with the important added value of multidisciplinarity.

In conclusion, we believe that a clear-cut, multidisciplinary peri-operative anaemia diagnostic-therapeutic care pathway can still not be taken for granted even though several useful international, multidisciplinary recommendations aimed at preventing avoidable transfusions and ensuring better outcomes for patients are available.
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References


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