

The Jehovah factor in patient blood management in cardiac surgery

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Jehovah's Witnesses (JW) do not permit transfusion. Many JWs are referred to our Hospital for cardiac surgery. We show that cardiac surgery is very well possible in JW with good results. The experiences with Jehovah's Witnesses led to the introduction of an ongoing patient blood management programme which greatly improved transfusion requirements in the non JW population without ever achieving the same Zero Transfusion rate as with JW, while we now adopt the same medical and technical approach in JW as well as non-JW.

We recommend that all cardio-surgical patients be treated like JW. We postulate this might imply a change in attitude towards transfusion as well as change in sociological and psychological behaviour of the cardio-surgical team in and outside the Operating Theatre.

Introduction

Cardiac surgery continues to account for a substantial consumption of allogeneic blood products, although blood transfusion, in particular red blood cell (RBC) transfusion, is increasingly recognized as potentially harmful (1-4). RBC transfusion has been found to increase the risks of bacterial infections, post-operative morbidity, and reduced long-term survival after coronary artery bypass grafting (CABG). Recently it was established that RBC transfusion is strongly associated with infection risks and postoperative ischaemic morbidity in all types of adult cardiac surgery (3). The growing insights on adverse effects of blood transfusion, as well as financial and logistic considerations, have led many institu-

tions to initiate blood conservation measures. Studies have shown that CABG without any pre-operative or post-operative use of blood and without pre-donation is possible in a large majority of patients (5). It is also known that restrictive Hb transfusion triggers lead to a lower peri-operative mortality than liberal transfusion triggers (6).

At the same time low haemoglobin (Hb) levels are strongly associated with increased mortality and morbidity, in particular at very low Hb levels in cardiac patients (7). There is no doubt that RBC transfusion can adequately restore tissue oxygenation in case of severe anaemia. Still there exists no consensus on the trigger for RBC transfusion and transfusion practice varies considerably among institutions and practitioners. Jehovah's Witness (JW) patients therefore constitute a particular challenge for cardiac surgery as they categorically refuse blood products, while otherwise expecting the highest standards of medical care and full deployment of modern medical technology. Experience with cardiac surgery in JW patients has been built up since the 1960s, and it is nowadays quite common to undertake uncomplicated surgery in these patients (8,9).

Experiences with cardiac surgery in Jehovah's Witnesses

Many publications, mostly case reports or descriptions of series of JW, have been showing that JW may undergo cardiac surgery with good or acceptable mortality. Only a few publications describe larger series of JW, often from the Texas Heart Institute (8,9). Many

of these publications date from the early nineties or before with a younger cardio-surgical population with less comorbidity and less complex surgery than more recent patients. Furthermore most series are descriptive and do not provide a comparison group or do not provide reference to operative or bleeding risk.

Many JW patients are referred to the Amphibia Hospital for cardiac surgery. For the period of January 1st 1997 until April 30th 2006, 12414 patients underwent a first time, non-acute coronary artery bypass grafting (CABG) and/or heart valve operation in the Amphibia Hospital. 137 of these were Jehovah's Witnesses. In the JW group we aimed an adequate preoperative haemoglobin, we applied isovolaemic haemodilution, minimized perioperative losses and applied intra-operative cell salvage. Our results show that patients denied transfusion products can safely undergo primary CABG and/or valve surgery with similar postoperative mortality and morbidity as patients who were transfused. This can be accomplished by using a multimodality blood conservation protocol, consisting of evidence based measures. Furthermore this result is achieved with higher postoperative Hb levels including at discharge of hospital. This result was obtained without transfusion of any blood products while in the non JW up to 50% of patients were transfused with an average of 3.4 IU of PC, 1.06 of FFP and 2.5 donor units of thrombocytes.

Introduction of a multimodality blood management programme

This study taught us that the individual application of blood saving measures as well as the incidence of transfusion was widely and significantly variable among anaesthesiologists as well as cardiac surgeons.

As a result of these findings a multimodality blood management programme was designed and introduced at end 2006. This programme involved sensitization of all medical workers involved in cardiac surgery (Ward,

Theatre and ICU). The protocol aimed at optimization of preoperative coagulation, minimizing intra- and post-operative blood losses, minimizing logistic losses (blood bank) and standardization of transfusion according to a transfusion protocol including a haemoglobin trigger (between 5 and 6 mmol/L) which was set for each patient by the treating anaesthesiologist or intensivist. Grossly, the protocol corresponded with the recommendations that were published shortly after introduction of our blood management programme put forward in the Guidelines of the Combined Task Force of STS & SCA, with the exception of introduction of Thromboelastography (10). However, most attention was paid to application of simple and cheap methods, in particular avoidance of "bad habits".

The programme succeeded in almost doubling the number of transfusion free patients from 37.4 to 57.6% and a reduction in the average allogeneic donor exposure from 4.2 to 2.7 donor units and this without a decrease in Hb at discharge. The decrease in blood transfusion was shown for packed cells, fresh frozen plasma as well as for thrombocytes. The obtained results were impressive but it was still far from the zero transfusion rate obtained with the JWs. The number of patients with major blood loss (>1L in the first 12 hours postoperatively) diminished from 28.5 to 14.9%.

We continued to monitor systematically the transfusion exposure parameters in all patients. In 2008 aprotinin was banned from the markets and this led to a temporary increase in transfusion (11). Shortly after TEG monitoring was introduced here in 2009, more specifically a TEG based algorithm, a coagulation management programme was implemented including the introduction of fibrinogen substitution. The relevance of fibrinogen has recently been reviewed in a meta-analysis (12). The relevance of TEG monitoring is solid and has recently been implemented in an update of the STS & SCA guidelines (13). This led to a further decrease in transfusion requirements, a decrease that was more apparent with FFP and platelets

than with packed cells. We believe that the stagnating decrease in packed cell transfusion is related to an ongoing number of patients with major bleeding, often surgery related, but to a significant amount as well due to an obligatory loss of blood in the extracorporeal circuit and due to a high incidence of patients with preoperative anaemia in the present cardiosurgical population.

Conclusion

The initial experience with cardiac surgery in Jehovah's Witnesses led to a progressively expanding multimodality patient blood management programme that succeeded in a major reduction in allogeneic transfusion. The programme started with the implementation of basic measures but was later expanded with more technical measures. Component therapy based upon a TEG based algorithm succeeded in a significant decrease in requirements in transfusion of fresh frozen plasma and platelets. Patients with surgical bleeding and preoperative anaemia are now hampering a further decrease in red cell transfusion (14).

However it remains puzzling to notice and only partially to explain why all these measures have failed to banish transfusion completely in cardiac surgery. We postulate that this Jehovah factor involves psychological and sociological causes related to the team.

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