

Transfusion Requirements in Microsurgical Reconstruction in Maxillofacial Surgery: Ethical and Legal Problems of Patients Who Are Jehovah's Witnesses

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Abstract

Objective To study transfusion requirements in patients with cancer undergoing head and neck reconstructive surgery and to discuss surgical and anesthetic strategies to reduce blood loss when the patient is a Jehovah's Witness.

Material and Methods A descriptive study to expose the percentage of blood transfusions performed in patients with cancer undergoing microsurgical reconstructions in the department of oral and maxillofacial surgery of the referred hospital in the past 9 years.

Results Two hundred thirty-seven microsurgical reconstructions were performed in head and neck tumors between January 2001 and December 2009. Statistical analysis shows a significant decrease ($p = 0.035$) in the number of patients needing transfusions patients in recent years.

Conclusions The treatment of patients who are Jehovah's Witnesses is an ethical and moral dilemma for the clinician and in particular for surgeons.

Keywords

- ▶ microvascular surgery
- ▶ head and neck cancer
- ▶ Jehovah's Witnesses
- ▶ blood transfusion

The doctrine of the Jehovah's Witnesses was founded in 1870 and currently has the legal consideration of religion; it has been recognized by Spanish law.¹ Jehovah's Witnesses is the fastest-growing religious institution in the Western world, with ~ 7 million active members in over 130 countries (150,000 members in Britain and 100,000 members in Spain).^{2,3}

The refusal of its members to accept blood transfusion or blood products dates back to 1944. Transfusion without the patient's consent is considered a violation of the rights of individuals' and their families' ethics, morality, and spirituality and could inflict psychological trauma.⁴

When a Jehovah's Witness suffers from head and neck cancer, doctors are exposed to a conflict between the two fundamental ethical goods: the principle of patient autonomy (the freedom to accept or refuse medical treatment) and the physician's duty to safeguard the patient's life by dispensing the necessary treatments (right to life). Other principles of bioethics are also involved: charity (doctor must act seeking the patient's well-being), nonmaleficence (the physician's obligation to do no harm, both physical and moral), and justice (care resources are limited and "therapeutic privilege" must be avoided).⁵

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We examine the rights of patients to refuse medical therapy recommended by the physician, the particular problem of needing perioperative blood transfusion in microsurgical reconstruction of head and neck oncology (a procedure with a high rate of blood loss in maxillofacial surgery), and potential strategies to avoid the need for transfusion.

Materials and Methods

A retrospective review was performed of medical records of patients undergoing reconstructive surgery in the aftermath of cancer surgery in the head and neck area from January 2001 to December 2009 in the Department of Oral and Maxillofacial Surgery in La Paz University Hospital. From these patients, data on the type of microvascular flap used for reconstruction, incidence of Jehovah's Witness patients, and data on the use of recombinant human erythropoietin (rHuEPO) is included.

Once these patients were identified in the files of the blood bank at our hospital, the subgroup of patients who required perioperative transfusion was registered as well as the amount of packed red blood cells (PRBC) or other blood products required in each case.

We review the Spanish legislation regarding the right to life and freedom to develop a discussion on the rights and duties of the Jehovah's Witnesses and their doctors, and we propose a protocol of care for these patients.

Results

Between January 2001 and December 2009 in the Department of Oral and Maxillofacial Surgery of La Paz University Hospital, 237 microsurgical reconstructions were documented in patients with tumors in the head and neck area (→Fig. 1).

A total of four patients, with an age range from 46 to 67 years old, were Jehovah's Witnesses. Of these patients, three presented tongue squamous cell carcinoma T2N0M0, and one presented squamous cell carcinoma of floor of mouth T2N0M0. The treatment of choice in all of them was surgical resection of the tumor and microvascular free flap reconstruction. The preoperative management of these patients was properly performed by the anesthesiology committee specialized in alternative methods to transfusion. None of the patients received rHuEPO.

Of the 231 cases with no opposition to blood transfusion, 135 (57%) received perioperative transfusion with an average of 8 U of PRBC (median: 6 U; standard deviation 2.7; range 1 to 21 U). The surgical time ranged between 8.5 and 15.5 hours with an average of 11 hours.

The distribution of the percentage of transfusions in the years of study is shown in →Fig. 2.

Statistical analysis by chi-square test showed a statistically significant difference ($p = 0.035$) in the number of patients transfused in recent years compared with the early years (→Fig. 3).

Discussion

Despite the fact that incidence of patients who are Jehovah's Witnesses in head and neck oncology is pretty low, in the

MICROVASCULARIZED FREE FLAP FOR RECONSTRUCTION	NUMBER OF PATIENTS	PERCENTAGE OF TOTAL (%)
RADIAL FOREARM FLAP	96	40
FIBULA OSTEOMYOCUTANEOUS FLAP	61	34
DCIA ¹	7	3
LATISSIMUS DORSI FLAP	4	2
PARASCAPULAR OSTEOMYOCUTANEOUS FLAP	3	2
LATERAL BRACHIAL FLAP	2	1
OMENTUM FLAP	2	1
GROIN FLAP	1	0
DIEAP ²	9	4
ALT ³	24	10
RECTUS ABDOMINIS FLAP	7	3
RADIAL FOREARM FLAP+FIBULA FLAP	1	0
	237	100

¹ Deep Circumflex Iliac Artery osteomyocutaneous flap
² Deep Inferior Epigastric Artery Perforator flap
³ Anterolateral Thigh flap

Figure 1 Distribution of the type of microvascularized free flap used for reconstruction after the excision of a tumor between the years 2001 and 2009 in the Department of Maxillofacial Surgery of La Paz University Hospital.

presented series of cases (2% of patients), the moral and ethical problems were a challenge for surgeons who treated them.

We present statistics on patients with tumors undergoing head and neck reconstructive microsurgery in the department of oral and maxillofacial surgery from a national referral hospital. This allows estimation of the potential transfusion risk of patients with similar pathology, a fact particularly important when the patient is a Jehovah's Witness considering alternative treatments such as radiotherapy in combination or not with chemotherapy.

How does a maxillofacial surgeon approach the surgical treatment of a patient who is a Jehovah's Witness with potential risk of intraoperative blood loss? First, it is important to determine the likelihood that a transfusion may be needed during surgery.

Studies of blood transfusion in surgery of malignant head and neck cancer have focused primarily on the relationship between tumor recurrence and blood transfusion. However, in the literature of the past 20 years, there is a single article specifically focused on transfusion requirements in head and neck surgery.⁶ Our article would be the second documented study that analyzed the transfusion requirements in surgery

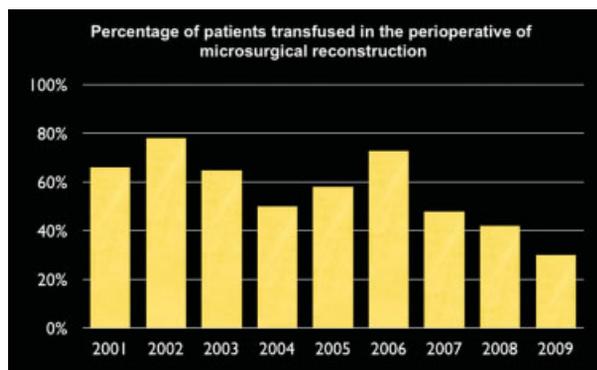


Figure 2 Distribution of the percentage of transfusions in patients undergoing surgery for cancer of head and neck microsurgical reconstruction between the years 2001 and 2009 in the Department of Maxillofacial Surgery of La Paz University Hospital.

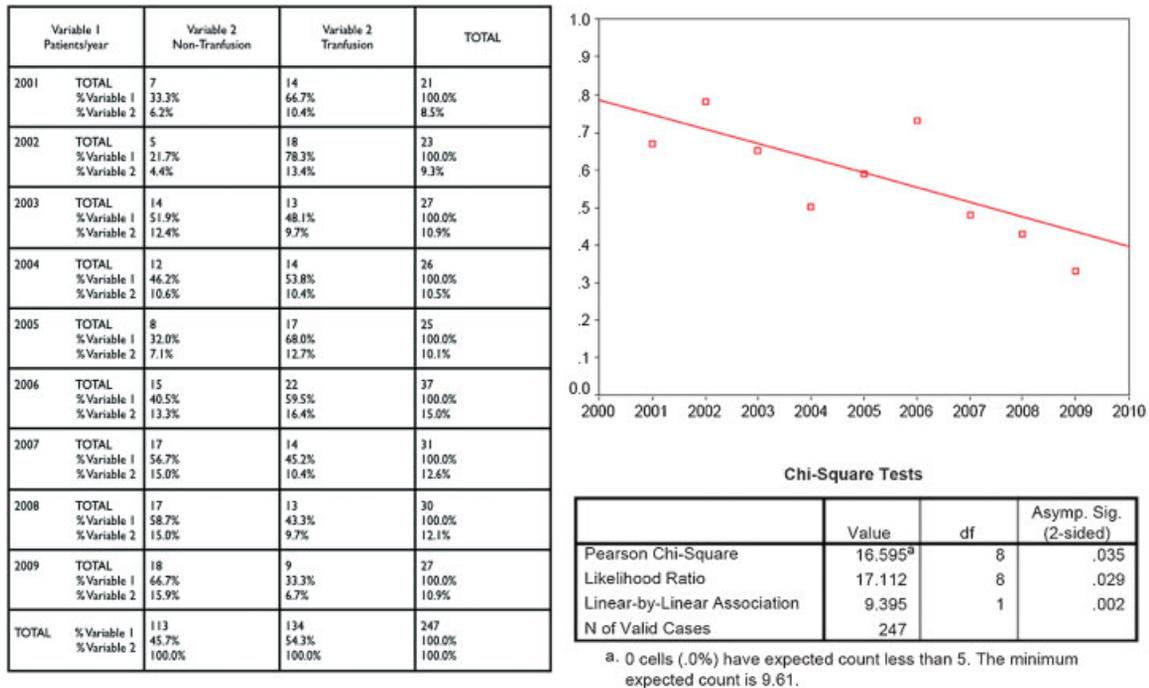


Figure 3 Statistical analysis of the study.

for head and neck cancer, and more specifically that studied patients who underwent microvascular reconstruction and surgical procedures with distinguishing characteristics (long duration of intervention, two simultaneous surgical fields, presumably a more invasive surgery than usual with special postsurgical hemostatic requirements, such as antiplatelet and anticoagulation treatment).

On the other hand, the immunosuppressive effects of blood transfusions (first described in 1973 in patients with renal transplants) must be taken into account in the patient with head and neck cancer.⁷

The patient with a maxillofacial tumor has a compromised immune system, resulting in anemia that will slow the recovery of iron and hemoglobin levels. All this will impact add surgical procedures, radiotherapy, and/or adjuvant chemotherapy in the treatment of these patients, to strengthen the patient's immunosuppressive status.² On the other hand, the refusal of transfusion in oncological surgery could lead to referral to chemotherapy and radiotherapy, with consequent

limitations on the therapeutic outcome and morbidity and complications associated with this alternative treatment.

Studies of patients undergoing surgery for colorectal malignancies or cancer of lung, breast, or extremities have shown an increase of relapses in patients who were hemotransfused perioperatively.²

In patients of head and neck surgery, the evidence is not clear. Four studies of the literature suggest an increased risk of tumor recurrence,⁸⁻¹¹ whereas three studies show no increased adverse effects on survival of transfused patients.¹²⁻¹⁴

From here, with the balance slightly in favor of increased risk of relapse, the debate that arises is: Can we transfuse less, better, and with lower risk?

With the development of knowledge about the problems associated with transfusion and the greater availability of alternatives to blood transfusion, it could be argued that the blood might not be necessary. Liberal transfusion strategies against restrictive regimens have shown that higher hemoglobin levels are not necessarily better, and clinical studies

PREOPERATIVE	Planning Ahead Assessment and treatment of preoperative anemia / iron deficiency Assessment and treatment of coagulation disorders Suspension or substitution of drugs acting on haemostasis Treatment with erythropoietin \pm and iron
INTRAOPERATIVE	Proper positioning of the patient Surgical techniques and instruments to minimize bleeding Anesthetic techniques to reduce the bleeding (hypotension controlled pneumatic tourniquet...) Systemic haemostatic drugs (antifibrinolytic, desmopressin, factor VIIa, etc) Topical hemostatic agents and local Acute normovolemic and hypovolemic hemodilution
POSTOPERATIVE	Hemostatic agents Early detection and treatment of postoperative bleeding Restrictive transfusion threshold Treatment with erythropoietin \pm and iron

Figure 4 Blood-saving measures at different stages of cancer surgery. Abbreviation: EPO, erythropoietin.

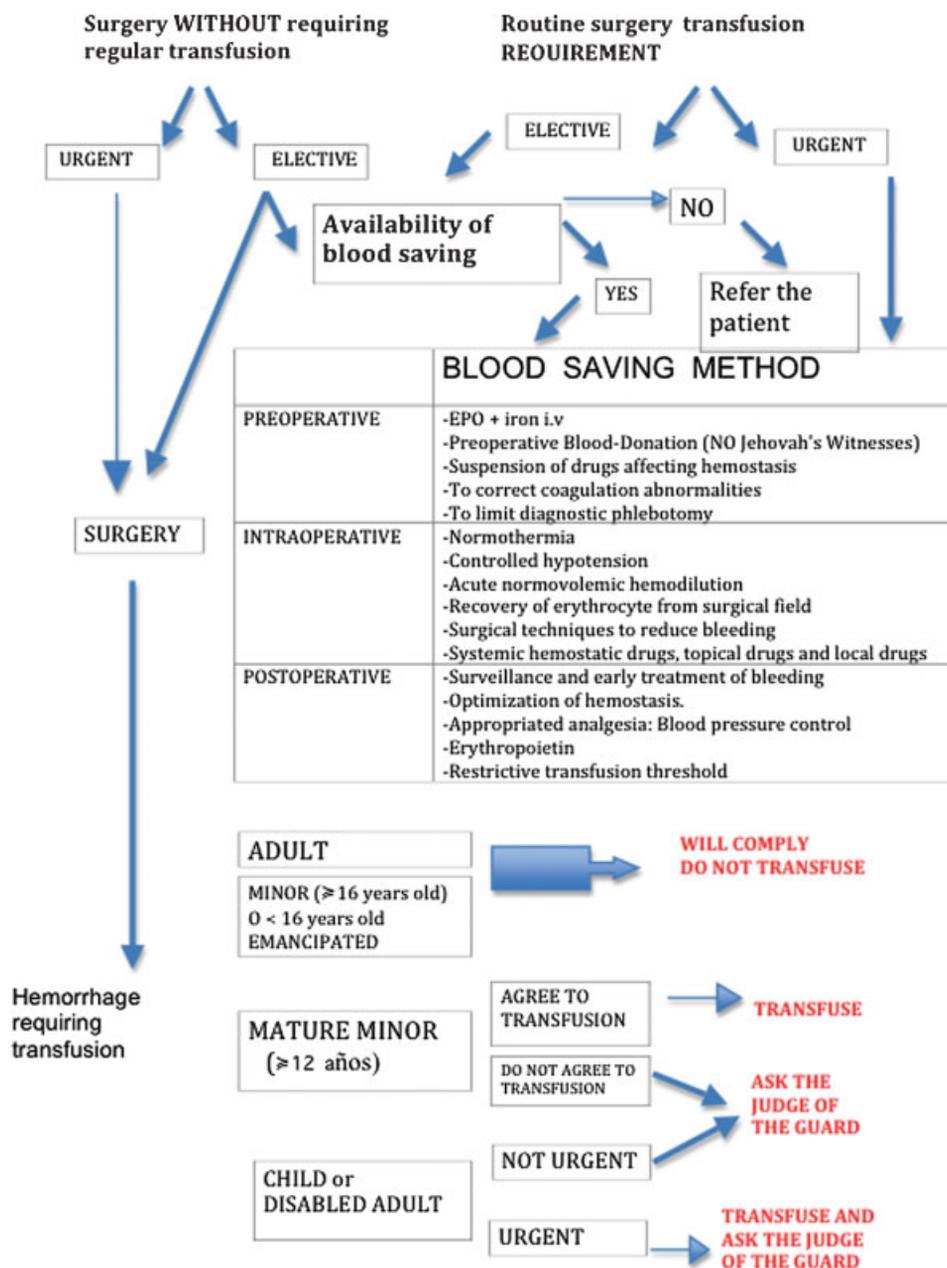


Figure 5 Algorithm for the options in the case of patients refusing blood transfusion. Abbreviation: EPO, erythropoietin.

have shown that surgery to minimize blood loss is effective in preventing transfusion.²

Critical limits for tissue oxygenation are not well defined, so the doctor is guided by the patient’s signs and symptoms, nutritional status, estimated blood loss, and hemoglobin levels.

Relatively recent studies have shown that after acute blood loss in patients without prior heart disease, the myocardium is capable of working with 5 g/dL hemoglobin levels, leading to myocardial dysfunction with levels below 3 g/dL.¹⁵ In patients with heart disease, baseline functional deficits, or myocardial oxygen delivery, these figures would increase by two points, so that the function of oxygenation would be acceptable to 7 g/dL levels of hemoglobin, producing the dysfunction with levels below 5 g/dL.

On the other hand, hemodilution improves the prognosis of microvascular grafts, which should not keep patients with a hematocrit above 38 to 40% or above a hemoglobin level of 12 to 13 g/dL.

The aim is to prevent the compromise of tissue oxygenation, and if this occurs, implement other strategies to avoid the need for transfusion. In most patients undergoing surgery for cancer of the head and neck, preoperative planning is possible to avoid the need for transfusion (or reduce the number of transfused PRBC). But regardless of whether the patient is a Jehovah’s Witness, a real debate remains over whether to transfuse should be done to prevent health problems largely legal.

In certain circumstances, postoperative transfusion can be avoided by administration of rHuEPO. Synthesis of red blood

cells by the bone marrow increases by up to 60% following administration of recombinant human erythropoietin (rHuEPO erh). Increased erythropoiesis clinically manifests in 3 days with rHuEPO, and ~ 7 days without.

The prevalence of anemia in cancer patients has been estimated at 20 to 60%, constituting an independent prognostic factor that worsens the quality of life of these patients and contributes to increased morbidity and mortality. In addition, hypoxia enhances tumor growth and aggressiveness, stimulating development and fostering microvascularization and intratumoral metastasis. The correction of anemia by rHuEPO improves quality of life and, by increasing tumor oxygenation, improves the response to cancer treatment, both chemotherapy and radiotherapy, and supports locoregional tumor control.

However, the risk of thrombotic complications increases and there are doubts about how tumor control and survival are affected by these drugs.¹⁶ Some authors report an increased risk of mortality associated with the use of rHuEPO to increase hemoglobin levels in patients with solid tumors; specifically increased tumor progression, treatment resistance, and reduced survival. Therefore, the Committee for Medicinal Products for the European Medicines Agency concluded that the benefit of drugs that stimulate erythropoiesis was not worth the risk of tumor progression and, therefore, blood transfusion should be the preferred method of treating symptomatic anemia.¹⁶

Simultaneous administration of intravenous iron maximizes the erythropoietic response in patients with anemia, but its effect on individuals with normocytic anemia is still debated.¹⁷ In the case of patients treated with rHuEPO, the response to treatment may be limited by the availability of iron, even in patients with normal deposits. To avoid a relative deficit during the administration of rHuEPO, iron supplements are advised, aiming to maintain plasma transferrin saturation sufficient to achieve optimal erythropoiesis.¹⁶

In maxillofacial surgery, the best way to avoid the need for transfusion is to prevent acute hemorrhage. Careful handling of tissues, diagnosis, prevention of potential bleeding situations, and rapid control of bleeding are the best methods to achieve it (► Fig. 4). The patient's position on the operating table, the use of local vasoconstrictors, topical hemostatic, and direct control of bleeding and cauterization are the most useful methods to prevent acute blood loss. In addition, given the prolonged surgical procedures of some head and neck surgeries (such as oncology and reconstructive surgery), anesthesia techniques must be used to promote this objective (hemodilution, controlled hypotension, normothermia, etc.).

The results indicate a downward trend in the number of patients transfused and the amount of blood used in each transfusion. From a surgeon's perspective, this may be due to several factors: the greater experience of the surgical team over the years minimizes surgical time, tissue trauma, and blood loss; the indication for treatment with microsurgical flaps can be extended to smaller defects than in the past, thereby introducing a selection bias of patients throughout the study period; the improvement of the quality of primary care in recent years could have conditioned a lower average size of

surgical defects (for an earlier diagnosis). In relation to these factors, it is clear to our hospital that one member changes the demographic profile of patients, as lately referrals from other provinces with lower economic development (and presumably later diagnosis) have been reduced through the implementation of maxillofacial surgery departments in Spain.

From the standpoint of the anesthesiologist, there is a clear improvement of surgical techniques under controlled hypotension, and also possibly transfusion criteria have become more restrictive in recent years. Postoperatively, close monitoring of bleeding, the optimization of oxygenation, performing an adequate fluid therapy, early nutritional support, and minimizing phlebotomy help prevent blood loss.

In the evolution of surgical procedures in the head and neck, enteral and parenteral nutrition will be crucial for maintaining levels of iron, folate, and vitamin B₁₂ (essential for erythropoiesis and adequate hemostasis).

In severe acute bleeding, the primary objective is to stop the bleeding. Direct compression and surgical treatment must be the first step in stopping acute bleeding. Systemic antifibrinolytic agents (tranexamic acid), platelet activators (desmopressin, vasopressin), drugs that increase the synthesis of clotting factors and the number of clotting factors (vitamin K and recombinant factors, respectively), topical hemostatic agents (fibrin thrombin topical hemostatic oxidized cellulose, gelatin sponge, and calcium alginate), and vasoconstrictors (adrenaline, phenylephrine, and cocaine topical) can be used. The use of these agents depends on the location of bleeding and the availability of the product.

Surgeon's Performance Key to a Jehovah's Witness Patient

Given this complex situation from the standpoint of legal ethics, the physician should bear in mind the following guidelines³:

1. Interview the patient to ensure that his or her decision to reject blood is firm, without being influenced by family or friends. The surgeon should inform the patient of the available alternatives and the risks of not being transfused if a serious situation is presented, as well as the risks of alternative treatments such as tumor progression after the administration of rHuEPO.
2. It can be helpful, patient permitting, to contact the Liaison Committee of the Hospitals of the Jehovah's Witnesses (LCH). The LCH is composed of volunteer members of this doctrine whose mission is to promote physician-patient cooperation and serve as intermediaries providing support to these patients on ethical issues relating to health care. The LCH can provide medical documentation of blood-saving methods and alternatives to blood transfusion. Currently there are 40 LCH in Spain coordinated by the Hospital Information Service of the Jehovah's Witnesses.
3. The surgeon can make use of the right to conscientious objection, but his or her duty is to delegate and refer the case to be appropriately treated by another specialist.
4. It is very important that anesthesia service and intensive postoperative care maximize savings measures.

In the case of microsurgical reconstruction of the head and neck, the need for transfusion is very high, and the surgeon must take this into account.

We propose an optional pattern of behavior in the case of patients refusing blood transfusion (► Fig. 5). Currently, there is a clear answer from the enactment of Law 41/2002,¹⁸ regulating the patient's autonomy and rights and obligations regarding information and clinical documentation. It enshrines the principle of patient autonomy to the traditional welfare, requiring the patient's informed consent for any medical intervention or research. It also includes the right of patients to refuse treatment, except when there is a risk to public health or immediate serious risk in the physical or mental integrity of patients who are unable to give permission. In the latter case, the principle of beneficence prevails and practitioners may perform the necessary operations for the health of the patient without his consent.

From the study of Spanish legislation concerning patient rights and the principles of autonomy and beneficence, three separate cases were analyzed, depending on age and patient autonomy: the child, the mature minor, and the emancipated minor or adult patient. The right to life and health of a child prevails over freedom of conscience or objection of the parents. Parents cannot make a decision that could damage their children's health. Therefore, if the probability of transfusion is high, legal permission will be acquired for the administration of blood products for life-threatening situations. In vital emergency situations requiring blood transfusion, the transfusion will be administered and reported to the coroner, the prosecuting authority, and, subsequently, to the family.¹⁹

In the case of a minor mature patient (12–16 years), his or her opinion should be heard and taken into account. The wishes of a nondisabled child who is emancipated or 16 years old should be respected, similar to adult patients who have the right of patient autonomy. However, in case of emergency with grave medical risk, parents will be informed and their views taken into account when making the corresponding decision (Article 9 of Law 41/2002; ► Fig. 4).¹⁸

Conclusion

The treatment of patients who are Jehovah's Witnesses is a moral and ethical dilemma for the clinician and, in particular, for surgeons. Blood loss in head and neck surgery occurs, so the individual patient's risk must be considered when planning surgery in an attempt to avoid blood transfusion.

This article documents the reduction of the transfusion requirements in reconstructive and head and neck oncological surgery, documents the strategies to achieve this, and exposes the surgeon's performance key to a Jehovah's Witness patient.

Adult Jehovah's Witnesses may refuse this treatment and, although parents cannot object to the processing of their children, alternatives should be considered.

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