Reminder of important clinical lesson

Aortic valve replacement in a Jehovah's Witness: a case of multi-disciplinary clinical management for bloodless surgery

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An 81-year-old female Jehovah's Witness (JW) patient with severe aortic stenosis required aortic valve replacement (AVR). However, the patient's religious beliefs precluded the use of primary blood components. Since the definitive treatment of AVR required bloodless open heart surgery, careful peri-operative plans were set forth by a multi-disciplinary team involving the cardiothoracic surgeon, haematologist and anaesthetist. The patient went on to successfully recover postoperatively. This case highlights: 1) The importance of carefully navigating through the most recent clinical and ethical protocol involved in the surgical management of JW's. 2) The importance of preparing individually tailored pre, intra and postoperative plans that are delivered through a multi-disciplinary clinical team to ensure the best and safest possible outcomes.

BACKGROUND

Jehovah's Witnesses (JW) consider taking primary blood products (whole blood, packed red cells, white cells, platelets and plasma) as an act of violation against their religious beliefs.¹ It is striking that despite adherents numbering 150 000 in the UK and Ireland, and 6 000 000 worldwide, the availability of successful bloodless surgical procedures and management of JW's seems to be generally under-recognised; this may be due, in part, to the limited clinical cases reported in the UK, and the lack of awareness of what clinical treatments JW's can and cannot receive, particularly since official JW Church guidelines have recently changed.²

This case highlights the availability of bloodless surgical procedures and peri-operative treatments that potentially improve outcomes for JW patients, and discusses the importance of delivering an individually-tailored package of care by a multi-disciplinary team that is both ethically and clinically appropriate.

CASE PRESENTATION

An 81-year-old female JW patient presented with angina and exertional breathlessness after 30–40 metres. On examination, she was found to have a loud systolic murmur (3/6) radiating to the carotids, consistent with aortic stenosis. In April 2008, percutaneous transluminal angioplasty was performed and drug-eluting stent was inserted to left anterior descending (LAD) for coronary artery disease.

The patient had a preserved diastolic function, did not have congestive heart failure and had no other pre-existing cardiac or respiratory disease. The patient's Auckland Anaemia Mortality Risk Score (AMRS) was 3. (The patient had the following Auckland AMRS risk factors: age ≥45, angina, and valvular heart disease).³

INVESTIGATIONS

Coronary angiography was performed before surgery. Angiography in July 2011 showed that the stent to LAD remained widely patent and the patient had no other stenotic or occlusive coronary disease. Biochemical and haematological investigations were unremarkable. Other relevant findings included a haemoglobin level, which was at the lower end of normal: 117 g/l (female reference range is 115–160 g/l). Echocardiogram confirmed severe aortic stenosis with a trans-valvar gradient of 75 mm Hg, mild aortic regurgitation and mild mitral regurgitation. Left ventricular systolic function was preserved.

TREATMENT

Preoperatively, the patient was seen by the haematology service to determine methods of optimising the patient's status to withstand blood loss and to determine precisely what agents the patient would be willing to receive to counteract blood loss. Vitamin B₁₂ and folate levels were unremarkable (reference ranges for Vitamin B₁₂: 251–900 ng/l; folate in serum: 2–20 µg/l). After discussion with the multi-disciplinary team, the patient agreed to accept erythropoietin, synthesised clotting factors, immunoglobulin and recombinant factors VIII.

Timing of surgery was tailored to allow for the administration of ferrous sulphate iron supplementation (200 mg three times a day) for 6 week preoperatively. The patient also received 600 units/kg of erythropoietin (EPREX) subcutaneously every week for 3 weeks before the operation with the fourth dose administered on the day of surgery.

Intraoperatively – particular care was taken to ensure minimal bleeding throughout the intraoperative procedure. Aortic valve replacement was performed in the standard fashion through a median sternotomy. Via aorto-atrial

cannulation the patient was placed on cardiopulmonary bypass and cooled to 32°C. The aorta was cross-clamped and myocardial protection provided by means of cold antegrade and retrograde blood cardioplegia drawn directly from the cardiopulmonary bypass machine. Cross-clamp time was 49 min and cardiopulmonary bypass time was 78 min. From the perfusion records, the immediate, prebypass haemoglobin was 141 g/l and the lowest it fell to was 97 g/l as a consequence of the temporary haemodilution by the cardiopulmonary bypass machine. Ten millilitres of a biological glue called BioGlue, made from bovine serum albumin and glutaraldehyde, was used as a haemostatic agent. The heart was vented by means of a trans-mitral left ventricular vent. Following excision of the native valve, a 21 mm Carpentier-Edwards supra-annular valve seated in the supra-annular position. Following closure of the aortotomy and de-airing, the patient came off bypass with epicardial pacing and epinephrine support, and was decannulated uneventfully. Once protamine was administered to reverse the heparin, cardiotomy return of shed blood to the bypass machine ceased and subsequent intrathoracic blood captured by means of cell salvage. The cardiopulmonary bypass machine was then emptied into the cell saver to further salvage red cells.

Postoperatively-iron supplementation (ferrous sulphate 200 mg three times a day) continued 6 weeks postoperatively.

OUTCOME AND FOLLOW-UP

Post and preoperative haemoglobin levels (g/l):

Preop – day 1: 146 g/l

Postop – day 1: 125 g/l; day 2: 111 g/l; day 5: 124 g/l; day 6: 130 g/l.

Subsequent recovery was uneventful and the patient was discharged home on the 7th postoperative day. Other than a transient period of atrial fibrillation, she remained well on review at 1 month postoperatively.

DISCUSSION

Since the first successful bloodless cardiothoracic surgical procedure on a JW patient which was described by Cooley *et al*⁴ numerous blood conservation techniques have developed and dedicated centres of bloodless surgery have even opened in USA.⁵

In comparison, progress has been relatively slower in the UK, and it is only within the last 10 years that there have emerged reports on JW's surgical management from UK bodies including the Royal College of Surgeons in England and the Association of Anaesthetists.^{6,7}

We report a case of a JW patient who successfully underwent aortic valve replacement without primary blood transfusion, and accordingly discuss what we feel were the two key elements that were integral to the successful care of the JW patient, as outlined in the case summary above. First, (a) it is crucial to be fully aware of the up-to-date clinical and ethical guidance involved in the surgical management of JW's before making clinical preparations, and, second, (b) one must ensure there is in place an engaged and specialised multi-disciplinary clinical team, involving the surgeon, haematologist and anaesthetist. This ensures the safest and best possible clinical outcomes for the patient and the multi-disciplinary team.

Up-To-Date clinical and ethical guidance

The term bloodless surgery encompasses the care of the patient peri-operatively; that is, pre, intra and postoperatively. Each step should aim to reduce the requirement for allogeneic blood transfusion, and to improve outcomes. Following this framework, the clinical team in charge of the JW patient's surgery should prepare rigorous surgical and anaesthetic management protocols, and treatment specifically tailored to the needs and requirements of the individual patient.⁵ At present, the best recommendations are outlined in the *Code of Practice for The Surgical Management of Jehovah's Witnesses*, published by The Royal College of Surgeons of England. While also providing the most relevant ethical guidance (described below in (b)), the key clinical guidance which was followed in our case can be summarised as follows:

- ▶ The minimum number of blood samples taken for investigation;⁸
- ▶ The use of iron replacement;⁹
- ▶ The use of recombinant human erythropoietin to correct intraoperative anaemia;^{10,11}
- ▶ Controlled intraoperative hypotension¹² and regional anaesthesia;¹³
- ▶ Meticulous attention to haemostasis throughout the procedure and the use of pharmacological agents¹⁴ including, where appropriate, activated factor VII;^{15,16}
- ▶ Policies on blood substitutes and artificial oxygen transporters;^{17–19}
- ▶ The acceptability of blood salvage²⁰ and haemodilution techniques²¹, and possibly the use of albumin, globulins, clotting factors or preparations containing these;
- ▶ Appropriate techniques for cardiopulmonary bypass using non-haematogenous priming solutions.^{22,23}

It is best practice to follow the most up-to-date clinical published data on bloodless surgery, and while these aforementioned guidelines still largely hold relevant, one must be made aware of new developments and clinical evidence that may have arisen in the meantime which may alter future bloodless surgical management.

The multi-disciplinary clinical team

The multi-disciplinary clinical team involves the cardiothoracic surgeon, the anaesthetist, and the haematologist. If it is agreed that surgery holds the best outcome for the patient, then first, the JW patient if willing to undergo the bloodless procedure must sign a document explicitly refusing the treatment of primary blood components, called the Advanced Decision to Refuse Specified Medical Treatment. To administer blood products once the JW patient has signed this document is unlawful, representing assault or the tort of trespass to the person and the surgeon is then liable to criminal and/or civil proceedings.²⁴ Second, the opinion of the lead surgeon should be sought, and any surgery of a JW be preceded by a full discussion and assessment between the surgeon, haematologist, anaesthetist and the patient. The clinical team must decide whether to accept the constraints of bloodless surgery, and decide whether the procedure for the JW patient has an acceptable mortality risk. Preferably, therefore, the surgeon should be experienced in treating JW patients, or be familiar with bloodless surgical techniques, and if not suitably trained or experienced, the surgeon may choose to refer the JW patient for a

further opinion.⁵ Once the full implications of the risks and benefits of the procedure and of alternative treatments, are discussed, the clinical preparations should then made.

SUMMARY

Multi-disciplinary clinical care in the individual JW patient

A lack of experience and exposure to surgical management of JW patients, may result in a general tendency to conjoin all JW's according to official Church guidelines or group them as those who generally refuse surgical treatments. In fact, the very opposite is true.^{2–25} It is important to highlight that while the transfusion of primary blood components is generally considered unacceptable, JW's may be open to accepting autologous transfusion and the use of some blood components, including albumin, haemoglobin-based oxygen carriers, clotting factors and other immune globulins may be considered acceptable depending on individual choice, as permitted by relatively recent changes in official JW Church guidelines.^{26–28} The possibility of using supportive non-primary blood components offers greater optimisation strategies which may reduce risk and improve chances of success of surgery. Our patient was able to make an informed decision about accepting erythropoietin, synthesised clotting factors, immunoglobulin, and recombinant factors VIII, making possible some degree of preoperative optimisation and planning. In summary, the multi-disciplinary clinical team should carefully manage the peri-operative measures deemed necessary as according to the most up-to-date clinical guidance, and these preparations should critically be centred upon the individual ethical acceptability needs of the JW patient.

Learning points

- It is essential to be aware of the most up-to-date clinical and ethical guidance in the surgical management of the JW patient before bloodless peri-operative planning to avoid clinical errors during the process of care and provide a legal 'flak-jacket' should there be any actions raised.
- While JW's will usually reject primary blood components, different autologous blood products may be considered acceptable depending on the individual choice of the JW patient, as permitted by relatively recent changes in official JW Church guidelines.
- The multi-disciplinary care should ideally involve clinical colleagues with a special interest in managing the JW patient. In this case, the surgeon and haematologist's particular interest in managing JW patients ensured a greater safety net in the provision of care for both the patient and multi-disciplinary team.
- The surgical procedures should preferably be performed by a senior cardiothoracic surgeon with experience in managing JW patients, or in bloodless surgical techniques, and also ideally possess a track record of low operative mortality in the particular surgical procedure to be undertaken, in this case, aortic valve replacement via open heart surgery, for best and safest possible outcomes.

Competing interests None.

Patient consent Obtained.

REFERENCES

1. Doyle DJ. Blood transfusions and the Jehovah's Witness patient. *Am J Ther* 2002;**9**:417–24.
2. Gohel MS, Bulbulia RA, Slim FJ, et al. How to approach major surgery where patients refuse blood transfusion (including Jehovah's Witnesses). *Ann R Coll Surg Engl* 2005;**87**:3–14.
3. Beliaev AM, Marshall RJ, Gordon M, et al. Clinical benefits and cost-effectiveness of allogeneic red-blood-cell transfusion in severe symptomatic anaemia. *Vox Sang* 2011 (In Press).
4. Cooley DA, Beall AC Jr, Grondin P. Open-heart operations with disposable oxygenators, 5 per cent dextrose prime, and normothermia. *Surgery* 1962;**52**:713–9.
5. Sniecinski R, Levy JH. What is blood and what is not? Caring for the Jehovah's Witness patient undergoing cardiac surgery. *Anesth Analg* 2007;**104**:753–4.
6. The Royal College of Surgeons of England. *Code of Practice for the Surgical Management of Jehovah's Witnesses*. London: The Royal College of Surgeons of England 2002.
7. Association of Anaesthetists of Great Britain and Ireland. *Management of Anaesthesia for Jehovah's Witnesses*. London: The Association of Anaesthetists of Great Britain and Ireland 1999.
8. Smoller BR, Kruskall MS. Phlebotomy for diagnostic laboratory tests in adults. Pattern of use and effect on transfusion requirements. *N Engl J Med* 1986;**314**:1233–5.
9. Andrews CM, Lane DW, Bradley JG. Iron pre-load for major joint replacement. *Transfus Med* 1997;**7**:281–6.
10. Goodnough LT, Monk TG, Andriole GL. Erythropoietin therapy. *N Engl J Med* 1997;**336**:933–8.
11. Busuttill D, Copplestone A. Management of blood loss in Jehovah's Witnesses. *BMJ* 1995;**311**:1115–6.
12. Petrozza PH. Induced hypotension. *Int Anesthesiol Clin* 1990;**28**:223–9.
13. Bonnett CA, Lapin R, Docuayan GB. Total hip replacement in Jehovah's Witnesses under spinal anesthesia without transfusion. *Orthop Rev* 1987;**16**:43–7.
14. Morecroft JA, Lander AD, Sury MRJ, et al. Sacrococcygeal teratoma: improved haemostasis after aprotinin? *Paediatr Surg Int* 1993;**8**:366–7.
15. Hedner U, Erhardtsen E. Potential role for rFVIIa in transfusion medicine. *Transfusion* 2002;**42**:114–24.
16. White B, McHale J, Ravi N, et al. Successful use of recombinant FVIIa (Novoseven) in the management of intractable post-surgical intra-abdominal haemorrhage. *Br J Haematol* 1999;**107**:677–8.
17. Winslow RM. Blood substitutes: refocusing an elusive goal. *Br J Haematol* 2000;**111**:387–96.
18. Prowse CV. Alternatives to standard blood transfusion: availability and promise. *Transfus Med* 1999;**9**:287–99.
19. Vlahakes GJ. Haemoglobin solutions in surgery. *Br J Surg* 2001;**88**:1553–5.
20. Benson KT. The Jehovah's Witness patient: considerations for the anesthesiologist. *Anesth Analg* 1989;**69**:647–56.
21. Trouwborst A, van Woerkens EC, van Daele M, et al. Acute hypervolaemic haemodilution to avoid blood transfusion during major surgery. *Lancet* 1990;**336**:1295–7.
22. Olsen JB, Alstrup P, Madsen T. Open-heart surgery in Jehovah's Witnesses. *Scand J Thorac Cardiovasc Surg* 1990;**24**:165–9.
23. Rosengart TK, Helm RE, Klemperer J, et al. Combined aprotinin and erythropoietin use for blood conservation: results with Jehovah's Witnesses. *Ann Thorac Surg* 1994;**58**:1397–403.
24. Re T. *All England Law Reports* 1992;**4**:647–70.
25. Sacks DA, Koppes RH. Blood transfusion and Jehovah's Witnesses: medical and legal issues in obstetrics and gynecology. *Am J Obstet Gynecol* 1986;**154**:483–6.
26. Watchtower Bible and Tract Society of Pennsylvania. How do Jehovah's Witnesses view medical procedures using one's own blood? *The Watchtower* 2000:30–1.
27. Watchtower Bible and Tract Society of Pennsylvania. Do Jehovah's Witnesses accept any medical products derived from blood? *The Watchtower* 2000:29–31.
28. Muramoto O. Bioethical aspects of the recent changes in the policy of refusal of blood by Jehovah's Witnesses. *BMJ* 2001;**322**:37–9.

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