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CASE REPORT

Challenges of Thyroidectomy Anaesthesia for a Huge Retrosternal Goitre in a Jehovah's Witness: A Case Report

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Summary

In potential haemorrhagic surgical procedures, refusal of allogenic blood infusion poses a challenge to anaesthetists. This report is about a 65-year-old male, of the Jehovah's Witness (JW) religious sect, known hypertensive, who presented with an anterior neck mass with retrosternal extension of three years. Laboratory investigations were normal, and the haemoglobin concentration was 13gm/dl. He consented to acute normovolaemic haemodilution (ANH). Therefore, two units of blood were drawn and replaced with isoplasma. The patient had a general anaesthesia relaxant technique. Intravenous tranexamic acid, morphine, and paracetamol were administered. A right-lobal thyroidectomy and sternotomy were performed. After securing haemostasis, the two blood units were infused, and the estimated blood loss was 1.5 litres. The surgery lasted for five and a half hours. After surgery, the patient was reversed of the neuromuscular blockade, extubated, transferred to the intensive care unit (ICU), and monitored for 24 hours. He had supplemental oxygenation, analgesia, and other supportive care. He was discharged on postoperative day seven and had attended the outpatient clinic for two months.

Keywords: Acute Normovolaemic Haemodilution, Blood Transfusion, Haemorrhage, Jehovah's Witness, Thyroidectomy.

Introduction

Adherents of the Jehovah's Witness (JW) faith do not receive blood or any blood products in the course of medical or surgical care. [1] The administration of optimal anaesthesia care without the infusion of blood and blood products in potential massive haemorrhagic procedures poses an unusual challenge to the anaesthesia care providers while caring for the JW patient. [1,2] Various peri-operative blood conservation (BC) options have been described. [3,4] However, an evidence-based, systematic, and individualised approach to blood management is effective. The

triad of care regimens, which consists of treating anaemia, reducing volume loss, and maximising anaemia tolerance, has been described. [5] Good pre-operative optimisation, [6] the use of antifibrinolytics, [7] cell salvage, [8] meticulous surgical technique, [3] the use of diathermy, [4] the use of topical glue, [4] permissive hypotension, [1] neuraxial anaesthesia, [3] desmopressin, and procoagulants [2] have reduced blood transfusion (BT) need in many patients. [4, 8]

The anaesthesia concerns of a huge retrosternal thyroidectomy in a JW patient include optimising thyroid physiology, a potentially difficult airway, intraoperative haemodynamic fluctuations as well as postoperative airway obstruction from tracheomalacia, laryngeal oedema, and nerve palsies. [9] In particular, the potential for massive intraoperative bleeding while refusing allogenic BT is a major concern. Acute normovolaemic haemodilution (ANV) provides the advantage of limiting the physiologic effects of intra-operative blood loss and the acceptability of blood transfusion to some JW patients while precluding the problem of transfusion reactions such as allergies and immune suppression. [10] This report describes the challenges encountered and addressed in a man who had a thyroidectomy for a huge retrosternal goitre while refusing to have any blood or blood products due to his JW faith.

Clinical Description

A. F was a 65-year-old male JW who presented at the surgical outpatient clinic of the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria in August 2023. He had an anterior neck mass of three years duration, measuring 9 × 7 × 11 cm. The pre-anaesthesia visit revealed no history of heat or cold intolerance, weight loss, cough, or effort intolerance. He had been hypertensive for three years and was receiving oral Lisinopril 5mg daily. He was compliant with both the clinic and medication. On examination, he was alert and calm, with a body mass index (BMI) of 29kg/m^2. The pulse rates while resting and with activity were 68 beats per minute and 72 beats per minute, respectively. The supine blood pressure was 130/70 mmHg and 120/65 mmHg while standing. The first and second heart sounds were audible with no added sounds. There were no thickened arterial wall nor locomotor brachialis; no abnormality of pulse rhythm and volume, raised jugular venous pulse, or variability with the radial pulses when compared with the contralateral arm. He had a stable respiratory rate of 20 cycles/minute. There were no abnormalities on the chest examination. The examination of other systems, as well as the airway, was not remarkable.

The 12-lead electrocardiography (ECG) showed a sinus rhythm. The plain chest radiograph revealed a mass in the superior mediastinum and a left trachea deviation. A computerised tomographic (CT) scan revealed a retrosternal mass extension into the anterior mediastinum. The pre-operative haemoglobin concentration was 13gm/dl. The full blood count, thyroid function tests, fasting blood glucose, clotting profile, serum electrolytes, urea, and creatinine values were all within normal limits. He skipped the morning dose of Lisinopril to avoid the possible peri-operative complications of angiotensin receptor blockers (ARB). No alternative antihypertensives were needed. He had 5 mg of oral diazepam the night before surgery as an anxiolytic therapy.

Diagnosis: The patient was scheduled for a near-total thyroidectomy with sternotomy, for which he consented to acute normovolaemic haemodilution (ANH).

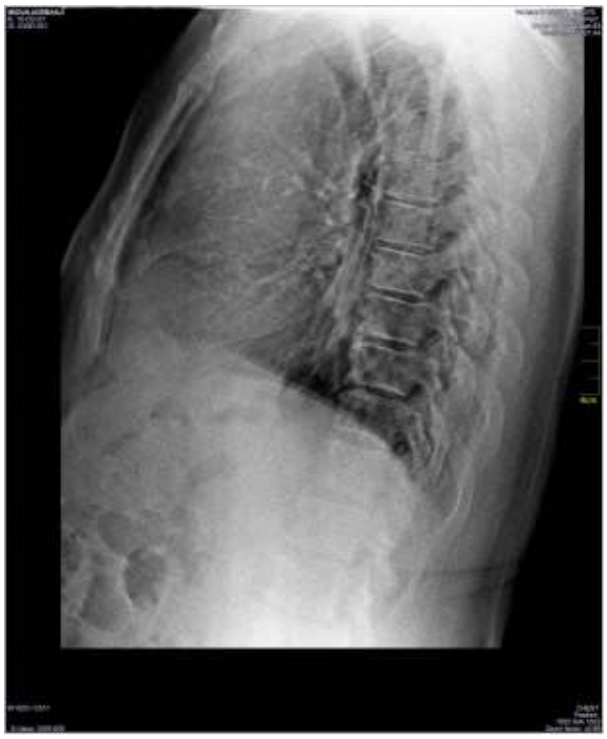

Figure 1: A plain chest radiograph – showing the lateral view of the mass

Figure 2: A plain chest radiograph – showing the antero - posterior view of the mass

Therapy: The WHO Surgical Safety Checklist and the cockpit drill for the Anaesthetics Machine were done on the morning of surgery. A difficult airway cart, as well as the emergency trolley, were prepared. All drugs were drawn and labelled appropriately. The baseline pulse rate, oxygen saturation, 5-lead ECG, and non-invasive blood pressure (NIBP) were recorded in the operating room. These were all unremarkable. The left radial artery cannulation was done for invasive blood pressure monitoring. Two units of whole blood were drawn and kept in the theatre. The patient was infused with 1 litre of 4% isoplasma solution afterwards. Intravenous tranexamic acid 1 gm, ceftriaxone 1 gm, and metronidazole 500 mg were administered before

the induction of anaesthesia. Preoxygenation was done for five minutes, and the patient was induced with intravenous (IV) midazolam 2 mg, propofol 140 mg, and fentanyl 100 mcg.

Figure 3: Three-dimensional reconstructed CT images of the huge retrosternal thyroid gland tumour in the neck and the anterior mediastinum

Tracheal intubation was facilitated with suxamethonium 100mg using a size 7.5mm cuffed endotracheal tube (ETT). The tube placement was confirmed with a capnograph. Anaesthesia was maintained using sevoflurane MAC 1 – 4 % in oxygen. A peripheral nerve stimulator (PNS) was not available to assess the depth of muscle relaxation. Still, an adequate level of neuromuscular blockade was ensured by administering the non-depolarising muscle relaxant to time and with adequate dosage: intravenous vecuronium 2 mg every 30 – 40 minutes and monitoring the continuous capnography tracing.

A right-lobal thyroidectomy with chest mass excision was performed. Diathermy was used to coagulate blood vessels. The patient received two litres of Ringer's lactate. After the haemostasis was secured, the two blood units were infused. The surgical duration was five and a half hours, with a blood loss of 1.5 litres. The total urine output was 900 ml. All intravenous fluids were warmed before administration using a Compact Blood and Fluid warming system, and the peripheral body temperature was monitored and kept at 36.6 – 37.1^{o}C. An intraoperative analgesia regimen consisting of intravenous morphine 2 mg and paracetamol 1 gm was given.

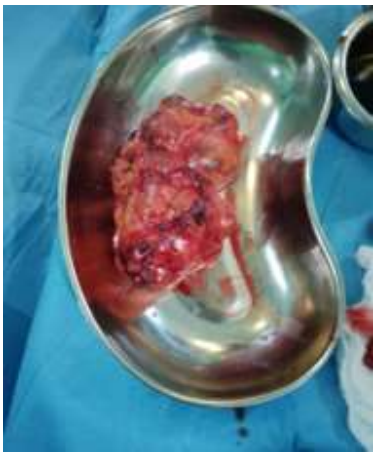

Figure 4: Surgical specimen showing *en-bloc* resection of the huge retrosternal thyroid tumor, measuring 9 x 7 x 11cm

The surgical wound was infiltrated with about 10–15 ml of 0.25 % plain Bupivacaine at the end of surgery. At the end of the surgery, the ETT was removed after the neuromuscular blockage was reversed using intravenous atropine 1.2 mg and neostigmine 2.5 mg. He was transferred to the intensive care unit (ICU) and monitored for 24 hours. He had supplemental oxygenation, using oxygen nasal prongs at a flow rate of 2 – 3 litre/minute. Multimodal analgesia was instituted for 24 hours with intravenous morphine 4 mg every 4 hours and paracetamol 1 gm every 6 hours given at alternate hours. The patient received other supportive care, including close monitoring of vital signs and urine output, chest physiotherapy, and graded oral nutrition.

Outcome: The subsequent part of the recovery was not eventful. He was discharged home on the seventh postoperative day and has attended the outpatient clinic for two months. The subsequent part of the recovery was not eventful. He was discharged on the seventh postoperative day has been seen in the outpatient clinic for two months. There were no new clinical complaints, regarding hyperthyroidism symptoms nor otherwise. The general physical and systemic examinations were unremarkable.

Ethics

The patient gave informed consent for the use of his clinical information, including images and pictures for this case report.

Discussion

Several techniques are used to avoid allogeneic blood infusion, which is the primary goal of blood conservation.[4] It is beneficial in JW patients [2] who refuse BT while undergoing massive haemorrhagic procedures. The JW religion is a distinctly Christian group that does not allow the transfusion of whole blood and or its primary products, such as plasma, platelets, and red and white cells, to her adherents. [1,10] Some sect members may accept albumin, globulin, cryoprecipitate, ANV, and cell salvage. [1,4,11] Each JW usually carries a document showing a written declaration of the intent of detailed information regarding the products and methods that are acceptable to them. [12] There are around 8.7 million JWs in 239 countries, with an expanding population in Africa. Anaesthesia care providers are increasingly likely to encounter this group in their practice in low-resourced environments. [11]

First is the possibility of substantial blood loss in thyroidectomy with retrosternal extension. [13,14] The contributing factors, as identified by Wojtczak *et al.* [13] and Chen *et al.* [14], are older persons, male, retrosternal mass, prolonged surgery, size of 3 cm or more, known hypertensive, extensive dissection, and toxic symptoms. Many of these factors were present in the index patient. Next are the challenges of refusing BT, which compound the peri-operative care. Cell salvage, ANH, hypotensive anaesthesia, and blood substitutes are useful BC options. [1, 3, 4] The index patient consented to ANH. Squire *et al.* [4] and Klein *et al.* [2] stated that ANH constitutes a viable BC option. It is considered when more than 20% volume loss is expected.[15] In our experience, we found this to be a reliable and low-cost intervention.

Acute normovolaemic haemodilution (ANH) allows patients to accommodate a considerable level of blood loss while precluding the need for allogeneic blood infusion.[15] It is effective and safe, even in complex procedures, such as advanced spine surgery with [7] or without the use of tranexamic acid,[16] and in abdominal aortic aneurysm repairs [17] where it produces better clotting profile and reduced stay in hospital. It is also effective in total knee arthroplasty procedures.[18] Zhou *et al.* [19], in a meta-analysis of 64 studies involving 3819 patients, stated that ANH effectively reduced allogeneic blood transfusion in surgical patients. Grant *et al.* [15] stated that ANH is effective, provided there is a good pre-operative haemoglobin level with the ability to tolerate maximal volume withdrawal in a setting of considerable volume loss. In ANH, the blood is taken from the patient into a bag containing anticoagulant before the start of surgery, kept in the operating room, and given back to the patient during or after surgery.[1] This protocol was followed in the care of the index patient.

Waqar *et al.* [20] identified pre-operative anaemia, American Society of Anaesthesiologists (ASA) physical statuses III and above, prolonged operative time, and unplanned re-operation as factors that promote peri-operative blood transfusion. All these factors should be avoided when confronted with a need to deploy ANH. Clotting derangements, hypothermia, hypocalcaemia, hyperkalaemia, lung injury, and sepsis are also known complications of ANH. [21] Fortunately, these factors were not encountered in the index patient.

Strength of the study

Blood conservation, especially ANH, can provide anaesthetists with a safe and helpful option in a low-resourced environment.

Limitation of study

Intraoperative cell salvage (ICS), another option, was not readily available in our centre when managing this case.

Conclusion

Anaesthesia care providers are concerned about the multimodal challenges of refusing allogenic transfusion while undergoing a potentially haemorrhagic procedure and providing balanced anaesthesia when managing a JW. ANH delivers an effective, low-cost, safe, and reliable option. The lack of allergies, immune suppression, cell-lysis, and acceptability to some JW patients are added advantages.

Authors' Contributions: All the authors conceived the research, gathered the data from clinical notes and did a literature review. IOM and OAK drafted the manuscript and revised it for sound intellectual content. All authors approved the final version of the manuscript.

Conflict of Interest: None.

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