

Challenges in a Video-assisted Pulmonary Lobectomy in a Jehovah's Witness Patient

Samuel Loureiro Gontijo, Larissa Cristelli de Sena, Igor Alcântara Procópio, Lucas José Resende, Marina Ayres Delgado

Hospital das clínicas de Belo Horizonte, Universidade Federal de Minas Gerais. Av Alfredo Balena 110, Santa Efigênia, Belo Horizonte, Minas Gerais, Brasil Cep:30130-100.

Corresponding Author:

Dr Marina Ayres Delgado
Email: marina.ayres.delgado@gmail.com

This is an Open Access article distributed under the terms of the Creative Commons Attribution License (creativecommons.org/licenses/by/3.0).

Received : September 22, 2023
Accepted : January 2, 2024
Published : March 5, 2024

Abstract

Background: A Jehovah's Witness is a member of a religious group that forbids the transfusion of any blood component. Major surgery on a Jehovah's Witness is challenging for both the surgeon performing it and the interdisciplinary team caring for the patient. **Case Report:** In this case, a 56-year-old Brazilian man with lung adenocarcinoma was due for a lower left lobectomy, but being a Jehovah's Witness patient, he refused a blood transfusion. While he refused allogenic blood transfusions, he consented to intra-operative cell salvage and the administration of blood coagulation agents. **Discussion:** The patient underwent a successful thoracic surgery despite refusing blood transfusions. Anesthetic management involves the maintenance of hemodynamic stability and the use of conservative blood management techniques.

Keywords: Anesthesia, Blood Conservation, Intraoperative Blood Cell Salvage, Jehovah's Witnesses, Thoracic Surgery.

Introduction

Based on their interpretation of many biblical texts, the Jehovah's Witnesses are a religious group that does not, under any circumstances, accept blood transfusions, under the penalty of community ostracism. This is true even in instances where life is at risk. Transfusion of blood components such as packed red blood cells, platelets, and plasma is unacceptable. Even previous storage of one's own blood for the purpose of posterior auto-transfusion is usually forbidden, whereas cell salvage is sometimes authorized throughout the peri-operative period. Some blood products and fractions, on the other hand, can be accepted as they are considered "conscience items", which means that the individual can decide based on a review of his own conscience [1,2].

The medical team experiences the dilemma between respecting the patient's beliefs

or safeguarding life, especially when it means carrying out a blood transfusion. Although a bloodless surgery is desirable for any patient, it becomes exceedingly true when dealing with the specific requirements presented in this situation [3]. This Case Report delves into the challenges encountered during major thoracic surgery in a Jehovah's Witness patient.

Case Report

A 56-year-old Jehovah's witness male patient presented to our hospital to undergo a lobectomy of the left inferior lobe, due to pulmonary adenocarcinoma. He was infected by the SARS-CoV 2 virus, and a pulmonary mass was accidentally found in computer tomography (CT) scan. The patient had a history of heavy smoking in the past. No other co-morbidities or allergies were declared.

The patient did not take any medications that might increase blood loss. An assessment of lung function was made before the procedure, as well as an evaluation of cardiac and renal risks. Smoking cessation was confirmed prior to surgery. Laboratory tests showed hemoglobin 15.3 g/dL, with no cyanocobalamin or iron deficiency. Blood clotting tests were within normal limits. Chest CT scan showed a 2.1×1.6 cm mass in the left inferior lobe with no significant mediastinal lymph node enlargement. The functional respiratory test was made (FEV1 73% and FVC 83%). Although the patient had good functional capacity, the predicted risk of post-operative pulmonary complications was increased due to previous SAR-CoV 2 infection and smoking. The patient gave informed consent for the surgery after being thoroughly explained the risks of refusing a blood transfusion.

Anesthesia induction and maintenance were accomplished with propofol and targeted controlled infusion of remifentanyl. Neuromuscular blockade was obtained with rocuronium. The patient received intravenous tranexamic acid 1g. One-lung ventilation was obtained to facilitate surgical exposure. We used a single lumen endotracheal tube, due to the impossibility of intubation with a double lumen tube (both Carlens 39 Fr and Robert Shaw 37 Fr tubes were used). We confirmed the single lumen tube position with fiberoptic bronchoscopy. After anesthetic induction, a central venous catheter was placed in the left subclavian vein, and right radial artery cannulation was carried out.

Lobectomy was performed via video-assisted thoracic surgery, to minimize blood loss [Fig.1]. During surgery, controlled hypotension was employed to aid in effective hemostasis. Intra-operative blood samples were collected in pediatric-sized tubes. As there was no profuse bleeding, the cell salvage did not need to be used. The estimated blood loss during the surgery was around 180 ml. Post-operative analgesia was achieved using a thoracic epidural catheter with continuous infusion of ropivacaine.

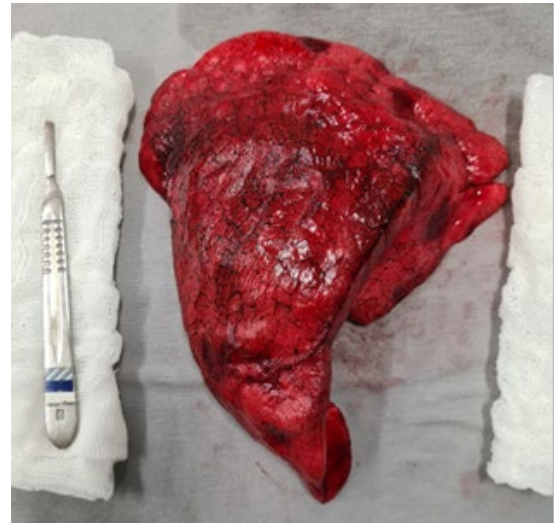


Fig.1: Surgical piece of the left inferior pulmonary lobe.

Discussion

Red blood cells, platelets, and plasma are the main blood components that are forbidden for all Jehovah's Witnesses, whereas depending upon individual beliefs, transfusion of albumin and blood clotting factors are sometimes accepted by the patients [4,5]. Carson *et al.* showed increased 30-day mortality in the presence of decreased pre-operative hemoglobin concentration, especially when hemoglobin is below 6 g/dL. Patients who had both pre-existing heart illness and hemoglobin levels under 8 g/dL were at higher risk of dying [6]. Our patient had hemoglobin levels of 15.3 g/dL and therefore was not prescribed iron nor erythropoietin. Data show that patients with normal iron stores do not benefit from iron administration [4].

There are currently a number of methods in use to reduce the transfusion of blood products, including increasing red cell mass prior to surgery, preventing anemia, reducing intra-operative bleeding, and using recombinant coagulation factor concentrates [3]. Techniques like hemodilution, peri-operative blood salvage, and medication that lowers blood loss can all be employed to preserve blood [3]. Tanaka *et al.* showed that when treating

patients who refuse blood transfusions, raising red cell mass with erythropoietin and iron therapy to a target hemoglobin level of 12 g/dL corresponded with a decrease in severe adverse events [7].

Cell salvage is one of these methods for preserving blood, which involves gathering any blood lost during surgery and preparing it right away for eventual return to the patient [4,8]. According to research published in the literature, autologous cell decreases allogenic transfusion. However, the prospect of hematologic dissemination of cancerous cells makes autologous cell salvage in cancer surgery debatable. Recent innovations like blood irradiation and leukocyte depletion filtering have the purpose of removing contaminating tumor cells to prevent this dissemination [4]. Moreover, it is well known that the metastatic process is not simple and requires an adequate number and viability of circulating tumor cells. During the filtration steps, the tumor cell's membrane loses its integrity and becomes dysfunctional with no replicative capacity. The few tumor cells in the filtered salvaged blood are significantly less than the number of circulating tumor cells in the patient's own blood and are not as potent as the cells in the circulating blood as far as metastatic seeding is concerned. This method worked well in thoracic and urologic operations [8]. According to the degree of evidence now available, cell salvage with the use of leukocyte filters is effective and safe [4,9]. Although we did not use the cell salvage in this case, this approach could be potentially used in a Jehovah's Witness patient to reduce transfusions, particularly during profuse bleeding. In conclusion, using salvaged blood in cancer patients should be regarded as an alternative to blood transfusion and, consequently, a valid strategy to avoid transfusion-related risks, such as immunomodulation, infections, and transfusion response. In patients undergoing thoracic surgery, hypovolemia and liberal fluid management should be avoided. For optimal fluid management, goal-directed therapy with crystalloids and adequate monitoring is a good

strategy for high-risk patients [10]. During thoracic surgery, excessive and sudden volume loss is not common and generally occurs if central vessels are injured. Hypotension during thoracic anesthesia is usually due to anesthesia induction, inflammatory response or thoracic epidural anesthesia. As there was no increased intra-operative bleeding, the cell salvage did not need to be used [10].

It is generally acknowledged that video-assisted thoracotomy lobectomy surgery has many advantages over traditional open thoracotomy lobectomy. Video-assisted lobectomy is less invasive than open thoracotomy and is related to fewer post-operative complications, a shorter hospital stay, less intra-operative blood loss, and less chest tube drainage. In individuals for whom blood transfusion is not an option, a video-assisted technique is especially advantageous due to its minimal invasiveness and less chest wall stress [11]. Since the Carlens tube was introduced in 1949, the double lumen tube (DLT) has been the most frequently used lung isolation device in thoracic anesthesia. It might be difficult to properly insert a DLT and isolate the lung in patients who have suspected or unexpectedly restricted airway [12]. Because DLT are larger and stiffer, the tracheal cuff may tear when passed over the upper teeth, especially with pronounced incisors [13]. Patients with restricted mouth opening, large upper incisors, retreating mandible, restricted cervical mobility, and a history of neck trauma are at risk for difficult DLT insertion. Securing the airway is the main objective in the clinical setting of a problematic airway and the need for lung isolation [12,13]. The video laryngoscope enables visualization of airway features during tube placement and passage, increasing the success rate of airway management. However, it was not available that day. Although awake fiberoptic intubation has been described, the large size of the tube may still constitute a problem. In order to provide appropriate lung isolation, an endobronchial blocker may be used safely if a single-lumen tube is used to secure the airway [13,14].

Strategies to reduce the risk of transfusion include intravenous iron, and erythropoietin, correcting coagulation defects, promoting proper hemostasis, effective post-operative analgesia, and optimizing cardiac and respiratory function to ensure adequate oxygen delivery. Critical hemoglobin levels vary from patient to patient, depending on their individual oxygen needs and adaptative response. Hemodynamic measurements such as central venous oxygen saturation, lactate levels, central venous-to-arterial carbon dioxide difference, and oxygen extraction should be taken into account and should be analyzed in order to assess the need for blood product administration [14,15].

Conclusion

Major operations can be performed without the need for blood components with the right planning, careful execution, and monitoring. It is best to focus on each individual situation when determining if a transfusion is necessary. Other physiological indicators in addition to hemoglobin levels should be considered before administering red blood cells, so as to decrease the number of needless blood transfusions.

Contributors: SLG: manuscript writing, patient management; LCS, IAP: manuscript editing, patient management; LjR, MAD: critical inputs into the manuscript. MAD will act as a study guarantor. All authors approved the final version of this manuscript and are responsible for all aspects of this study.

Funding: None; *Competing interests:* None stated.

References

- Rispoli M, Bergaminelli C, Nespoli MR, Esposito M, Mattiacci DM, Corcione A, *et al.* Major thoracic surgery in Jehovah's witness: A multidisciplinary approach case report. *Int J Surg Case Rep.* 2016;23:116-119.
- West JM. Ethical issues in the care of Jehovah's Witnesses. *Curr Opin Anaesthesiol.* 2014;27(2):170-176.
- D'Ambra MN, Fitzgerald D, Kaufman RM, Shekar P. Blood conservation: Why aren't we doing this for everyone? *J Thorac Cardiovasc Surg.* 2015;150(4):984-985.
- Khalili M, Morano WF, Marconcini L, Shaikh MF, Gleeson EM, Styler M, *et al.* Multidisciplinary strategies in bloodless medicine and surgery for patients undergoing pancreatectomy. *J Surg Res.* 2018;229:208-215.
- Valle FH, Pivatto Júnior F, Gomes BS, de Freitas TM, Giaretta V, Gus M. Cardiac surgery in Jehovah's witness patients: Experience of a Brazilian tertiary hospital. *Brazilian J Cardiovasc Surg.* 2017;32(5):372-377.
- Carson JL, Noveck H, Berlin JA, Gould SA. Mortality and morbidity in patients with very low postoperative Hb levels who decline blood transfusion. *Transfusion.* 2002;42(7):812-818.
- Tanaka A, Ota T, Uriel N, Asfaw Z, Onsager D, Lonchyna VA, *et al.* Cardiovascular surgery in Jehovah's Witness patients: The role of preoperative optimization Read at the 95th Annual Meeting of the American Association for Thoracic Surgery, Seattle, Washington, April 25-29, 2015. *J Thorac Cardiovasc Surg.* 2015;150(4):976-983.e3.
- Kumar N, Zaw AS, Kantharajanna SB, Khoo BL, Lim CT, Thiery JP. Metastatic efficiency of tumour cells can be impaired by intraoperative cell salvage process: truth or conjecture? *Transfus Med.* 2017;27(5):327-334.
- Klein AA, Bailey CR, Charlton A, Lawson C, Nimmo AF, Payne S, *et al.* Association of Anaesthetists: anaesthesia and peri-operative care for Jehovah's Witnesses and patients who refuse blood. *Anaesthesia.* 2019;74(1):74-82.
- Şentürk M, Sungur MO, Sungur Z. Fluid management in thoracic anaesthesia. *Minerva Anesthesiol.* 2017;83(6):652-659.
- Wang Z, Pang L, Tang J, Cheng J, Chen N, Zhou J, *et al.* Video-assisted thoracoscopic surgery versus muscle-sparing thoracotomy for non-small cell lung cancer: A systematic review and meta-analysis. *BMC Surg.* 2019;19(1):1-8.
- Collins SR, Titus BJ, Campos JH, Blank RS. Lung isolation in the patient with a difficult airway. *Anesth Analg.* 2018;126(6):1968-1978.
- Shoni M, Rodriguez G. Intraoperative Anesthetic management of the thoracic patient. *Thorac Surg Clin.* 2020;30(3):279-291.
- Campos JH. Guías, algoritmos y recomendaciones durante el manejo de la vía aérea difícil en el paciente sometido a cirugía torácica: ¿están respaldados por la evidencia científica? *Rev Esp Anesthesiol Reanim.* 2018;65(1):1-4.
- Tánczos K, Molnár Z. The oxygen supply-demand balance: A monitoring challenge. *Best Pract Res Clin Anaesthesiol.* 2013;27(2):201-207.