



Extensive cytoreductive surgery in a Jehovah's Witness patient

A case report



Ann. Ital. Chir.

Published online (EP) 13 March 2015

pii: S2239253X1501960X

www.annitalchir.com

Carlo Vallicelli*, Fausto Catena*, Claudio Ghermandi**, Annalisa Amaduzzi*, Federico Coccolini***, Lucia Cipolat**, Matteo Martignani**, Daniel Lazzareschi°, Michele Cucchi*, Riccardo Schiavina°, Antonio Di Pinna*

*Unit of General and Transplant Surgery, Sant'Orsola-Malpighi University Hospital, Bologna, Italy

**Unit of Anaesthesiology, Sant'Orsola-Malpighi University Hospital, Bologna, Italy

***General and Emergency Surgery Department, Ospedali Riuniti, Bergamo, Italy

°Department of Integrative Biology, University of California, Berkeley

°°Unit of Urology, Sant'Orsola-Malpighi University Hospital, Bologna, Italy

Extensive cyrtoreductive surgery in a Jehovah's Witness patient. A case report

Jehovah's Witnesses are a well-known patient demographic in medicine because of their religious-based refusal of blood transfusion. This case report outlines the treatment of a Jehovah's Witness patient in need of an extensive cytoreductive surgery due to a peritoneal carcinomatosis of ovarian origin. The surgeons carried out all the recommended surgical and anaesthetic measures concluding that extensive cytoreductive surgery on a Jehovah's Witness is possible and that a complete cytoreduction can be safely performed.

KEY WORDS: Jehovah's carcinoma, Peritoneal carcinoma, Transfusions

Background

Jehovah's Witnesses are a well-known patient demographic in medicine because of their religious-based refusal of blood transfusion and other blood-related products and derivatives. In order to respect and uphold these patients' stringent religious beliefs, many clinical strategies have been developed to effectively treat such patients without compromising their religious values. These

strategies include minimizing oxygen consumption and demand, maximizing oxygen delivery, and enhancing erythropoiesis 1. Sedatives, analgesics, neuromuscular blockade, hypothermia 2, inotropic agents, hyperbaric oxygen therapy 3, recombinant human erythropoietin 4, ferrous fumarate, folic acid, and G-CSF are important prognostic factors and treatment options that must be considered when treating patients of the Jehovah's Witness faith. Given the unconventional constraints within this particular contest, surgery has proven to be an especially challenging task. Methodical, minimally invasive surgical techniques are required in order to minimize blood loss, while other effective strategies include acute normovolemic hemodilution 5, induced hypotension and, if the patient is willing, blood salvage techniques and correction of coagulopathies. The patient's hemoglobin concentration must never decline below 6 g/dL 7. In the last decade, several studies have described major surgical procedures performed on Jehovah's Witnesses 8-21. This case report outlines the surgical treatment of a Jehovah's Witness patient in need of an extensive cytoreductive

Pervenuto in Redazione Aprile 2012. Accettato per la pubblicazione Settembre 2012

Correspondence to: Carlo Vallicelli, M.D., Unit of General and Transplant Surgery, Sant'Orsola-Malpighi University Hospital, Bologna, Via Massarenti, 40138, Bologna, Italy (e-mail: carlovallicelli@hotmail.it)

surgery. The authors of this paper believe that this case may be one of the most extensive surgical procedures ever successfully performed on a Jehovah's Witness patient as reported in peer-reviewed literature.

Clinical presentation and radiological findings

The patient in question was a 58-year-old female suffering from hypertension and mitral valve prolapse with mild mitral regurgitation. Previous operations included a tonsillectomy and appendectomy during childhood as well as a laparoscopic cholecystectomy to address issues of lithiasis twelve years prior.

The patient presented with continuous pain in the upper abdomen, which spread radially to the patient's back. Ultrasonography revealed a hypoechoic neof ormation with a 15-mm diameter between the 7th and the 8th hepatic segments. A subsequent CT scan of her upper abdomen revealed an enlarged and fatty liver with an area of contrast enhancement within a posterior subcapsular region of the 3rd segment positioned amidst other hypodense areas. Furthermore, an additional hypodense formation with a 23-mm diameter and without contrast enhancement was present in the tail region of the pancreas. A fluid nodular lesion was observed following a MR cholangiopancreatographic analysis; the lesion featured a 22-mm diameter in connection with a secondary duct in the pancreatic tail and a similar formation with a 7-mm diameter in the pancreatic head. This appeared to be compatible with an IPMN type II. Other important observations included three triangular areas (8,16,19,20 mm) beneath the Glisson's capsule in the 6th and 7th hepatic segments, which were hypointense in T1 and hyperintense in T2, as well as a 9-mm nodule in the 7th segment with similar characteristics. EUS demonstrated about six cysts adjacent to the secondary ducts between the pancreatic body and tail, ranging from 5 to 15 mm in size, as well as a triangular lymph node of approximately 1 cm adjacent to the pancreatic body. EUS confirmed that these images were compatible with a IPMN. EUS also revealed two hypoechoic hepatic lesions with contrast enhancement, which were indicators of possible malignancy. The planned surgical outline consisted of a distal pancreatectomy and a subsequent wedge hepatic resection.

Anaesthetic management

Radical aggressive abdominal surgery poses an enormous challenge for the anaesthesiologist when the patient in question is a Jehovah's Witness and requires specific procedural constraints⁹.

Advancements in the safety and efficacy of general anaesthesia are due largely to key improvements in surgical equipment, particularly in the development and use of

new techniques such as end-tidal capnography, pulse oximetry, and others, all of which are described in any standard anaesthesia reference handbook¹⁰.

The patient in question was a 58-year-old female with a BMI of 18,6; she was considered to be ASA 3¹¹ NYHA 2¹² for her co-morbidities. The patient suffered from hypertension and mitral valve prolapse with mild mitral regurgitation. Previous operations included a tonsillectomy and appendectomy during childhood as well as a laparoscopic cholecystectomy to address issues of lithiasis twelve years prior.

Premedication and other prescribed medications (beta-blockers etc.)^{13,14} were administered pre-operatively. The patient underwent general anaesthesia by means of intravenous propofol (2 ml/Kg⁻¹) and fentanyl (1,5 µg/Kg⁻¹), followed by a non-depolarizing neuromuscular blocking agent (in this case vecuronium 100 µg/Kg⁻¹) to facilitate orotracheal intubation. Mechanical ventilation using an air-oxygen mixture was applied and anaesthesia was maintained by inhalation agents (in this case sevoflurane (MAC 0,8%-1%) and opioids (fentanyl 1,3 µg/Kg⁻¹). Neuromuscular blocking agents for muscle relaxation were administered by means of a continuous intravascular infusion of vecuronium (0,8-1,4 µg/Kg/min). The monitoring set-up should include a five-lead ECG, invasive systemic arterial and central venous pressures, capnography, pulse oximetry, and core temperature. At least two peripheral infusion lines should be set in place. A central venous catheter should be used for prompt delivery of drugs into the central circulation, thereby managing intravascular fluids both intra and post-operatively. Neuromuscular monitoring using accelerometry (train-of-four ratio) reduces the risk of post-operative residual curarization¹⁵. Central venous pressure measurements or monitoring respiratory variation on arterial line tracings may be unreliable indicators of intravascular volume when addressing sizable tumors¹⁴. Acting surgeons must play close attention to the surgical field (including the fullness of the heart); urine output as well as blood gas and haematocrit measurements are useful feedback metrics.

Intra-operative anaesthetic management

The entire surgical procedure lasted 510 minutes, including 40 minutes for surgical preparation (anaesthetic induction, patient positioning) and 15 minutes for post-operative protocol after the procedure was completed.

The principal objective of the anaesthesiologist is to maintain mean artery pressure (MAP), CV, oxygen delivery, and urine output.

As one can discern from Fig. 1, MAP values are included between 61 mmHg and 110 mmHg, with a mean value of 80 mmHg (±10 mmHg). Heart rate is also taken into account: it ranges from 48 bpm to 72 bpm, with a mean value of 56 bpm (±6 bpm), and CVP is

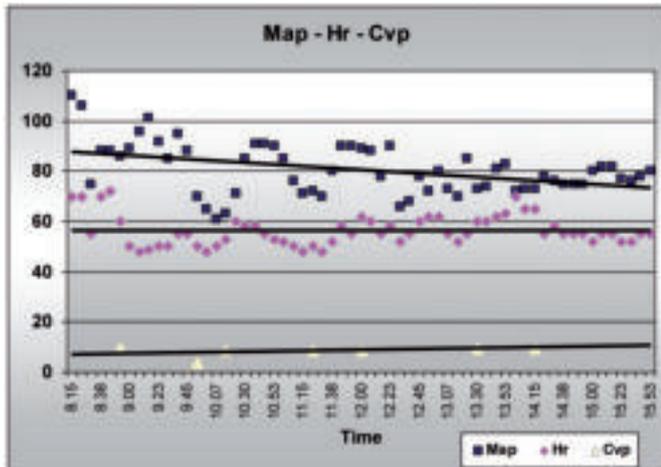


Fig. 1.

included between 4 mmHg and 10 mmHg, with a mean value of 8.7 mmHg (± 2 mmHg). These values were maintained by means of adequate fluid therapy, with 4000 ml of crystalloids and 500 ml of colloids infused gradually during the 8 hours of surgical intervention; given this fluid therapy, total diuresis amounts to 655 ml (about 0,8 ml/kg/hour), and as such, diuretics were not required.

A 250-ml solution of 5% glucose was infused gradually throughout the duration of the surgical procedure. Circulatory optimization is able to effectively prevent exacerbated morbidity and mortality rates only when implemented at an early stage before the threat of organ failure ensues as a result of increased tissue vulnerability¹⁶. Monitoring of the extent of blood loss during the procedure required hyper-vigilance on behalf of the surgical team and seamless communication between the acting surgeons and surgical staff¹⁷. Repeated boluses of 5 mg ephedrine were infused when needed to further support the patient's hemodynamic status and cardiac output.

Intra-operative surgical management

The patient refused all of the proposed transfusion modalities. The planned surgical outline consisted of a distal pancreatectomy and a subsequent wedge hepatic resection. During the procedure, surgeons identified traces of the disease in the transverse mesocolon. Exploring the abdomen, the surgeons detected two secondary lesions in the 7th hepatic segment and a malignant neof ormation in the left ovary infiltrating the sigmoid colon and rectum. The lesions of the transverse mesocolon were removed and sent to the lab for intra-operative pathological examination. These lab results indicated an adenocarcinoma of possible ovarian origin.

The surgeons then isolated and opened the omental bursa and carefully explored the pancreas, discovering a mucinous-cystic lesion in the organ's tail region. A distal pancreaticosplenectomy was then performed before proceeding with a double wedge resection of the two hepatic lesions. One of the lesions was in close proximity to the diaphragm, and as such a diaphragmatic resection was required. Ultimately, the surgical team carried out a hysterectomy with a bilateral ovariectomy and an aorto-iliac and obturator lymph node dissection, followed by a resection of the sigmoid colon and an anterior resection of rectum. The patient did not require any blood transfusion during the course of the surgery.

Postoperative management

The patient remained in the ICU for thirteen days following the surgical procedure. The post-operative course was somewhat problematic given the leakage of pancreatic material from the drain adjacent to the pancreatic stump. Moreover, the development of post-splenectomy thrombocytosis required an antiplatelet therapy. The patient's histological examination indicated an IPMN, as well as a high-grade serous papillary carcinoma of ovarian origin.

Discussion

Due to their religious beliefs, Jehovah's Witnesses refuse to partake transfusions of whole blood, packed erythrocytes, platelets, white cells or plasma; the use of derivatives of these blood products and organ transplantation, however, are matters of individual choice. As such, each Jehovah's Witness patient has his or her own set of "individualized" beliefs, which must be acknowledged and respected by the medical staff, thereby posing a variety of procedural constraints on the attending surgeons. Many strategies have been devised for the pre-, intra- and post-operative periods in order to reduce the likelihood of requiring blood transfusion or blood products-related therapies¹⁵. In the pre-operative period iron, folate and vitamin B12 supplements are necessary to address coagulopathies and anemia. During the intra-operative period, surgery must be performed very methodically with surgeons paying particularly close attention to issues of haemostasis. During the procedure, the use of advanced techniques and equipment such as diathermy dissection, harmonic scalpel and, whenever possible, minimally invasive techniques are all important steps to ensure minimal blood loss. Haemostatic aids such as bone wax or absorbable cellulose or collagen are also useful in these situations. Anaesthetic techniques include controlled hypotension, acute normovolemic haemodilution and, if the patient is willing, autologous blood transfusion.

In the post-operative period, surgeons must be wary of the possibility of secondary haemorrhage. At this point, it is important to increase both hemopoiesis and oxygen delivery. As such, iron, folate, and vitamin B12 supplements as well as human recombinant erythropoietin, breathing exercises and oxygen therapy are potentially useful countermeasures. Additionally, an optimized analgesia can often be used to lower the patient's metabolic rate. And finally antibiotic prophylaxis regimens should be implemented to prevent post-operative infections.

Adherence to these guidelines in the surgical management of Jehovah's Witness patients has enabled many surgeons to perform extensive operations without compromising the patient's religious belief. In the last decade, many of these surgical procedures have been cited as case reports in peer-reviewed literature.

For religious reasons, Jehovah's Witnesses consistently refuse blood transfusions and other blood-related products but, depending on the patient in question, certain Jehovah's Witnesses may be willing to consider organ transplantation¹⁹⁻²¹. Liver transplants in Jehovah's Witnesses have been reported in which the authors described a strategy of pre-operatively increasing haematocrit and platelets levels in cirrhotic patients, thereby reducing the intra-operative need for blood products during the liver transplant¹⁹. Kidney, pancreatic²², and even simultaneous kidney-pancreatic transplants²³, have also been successfully performed in Jehovah's Witness patients. In many of these cases, the patient and surgeons had to discuss the possibility of a non-lifesaving transplant being compromised to the point of becoming life-threatening without the therapeutic recourse of blood transfusions. As such, many surgeons accept to treat only those patients who agree to last-resort blood transfusions²². Additionally, major liver resections in Jehovah's Witness patients have been reported in literature^{24,26}. In these cases, important strategies to consider include bloodless liver transaction techniques with inflow clamping, careful dissection, meticulous haemostasis and low central venous pressure during liver transaction (which can be achieved by minimizing fluid intake). Moreover, in highly experienced hands, the use of minimally invasive surgical procedures to remove benign liver tumors from the anterior and peripheral segments can also decrease the overall risk of blood loss²⁶. An emergency laparoscopic splenectomy to address general splenic trauma is another minimally invasive surgical procedure performed on a Jehovah's Witness patient that has been reported in today's literature²⁷. Other major surgeries, such as pancreaticoduodenectomies, have been performed to address either pancreatic masses [28] or chronic pancreatitis²⁹. In the event of neoplasm, especially with effacement of the superior mesenteric vein, a neoadjuvant chemotherapy may reduce blood loss by inducing a more fibrotic field and by eliminating the need for vascular resection and reconstruction. Intra-operative

strategies that can be used to maintain haemostasis and control bleeding include low central venous pressure, electrocautery and suture ligation of vessels²⁸. Modified orthopaedic³⁰, gynaecological³¹ and vascular³² surgical techniques have been described for treating Jehovah's Witness patients.

This particular paper recounts the case of a Jehovah's Witness patient who came to the authors' medical centre requiring a distal pancreaticosplenectomy with wedge hepatic resection. In the intra-operative period, the planned surgical procedure was modified at the last minute after identifying peritoneal carcinomatosis confirmed to be of ovarian origin. The surgeons performed a distal pancreaticosplenectomy, two wedge hepatic resection, a diaphragmatic resection, a hysterectomy with a bilateral ovariectomy, an aorto-iliac and obturator lymph node dissection, a resection of the sigmoid colon and an anterior resection of rectum. To the best of the authors' current knowledge, this case represents the most extensive surgical procedure ever successfully performed on a Jehovah's Witness patient as reported in today's literature.

Conclusion

As surgeons of an oncological surgical centre, the surgeons discussed in this case report have had extensive experience with peritonectomy procedures and cytoreductive surgery. This is the first reported case of a Jehovah's Witness patient requiring such extensive surgery. The surgeons carried out all the recommended surgical and anaesthetic measures to minimize blood loss concluding that, in experienced hands, extensive cytoreductive surgery on a Jehovah's Witness is in fact possible and that a complete cytoreduction can be safely performed.

Author's contribution

VC and CF: Contributed equally to this work, participating in study conception, in analysis and interpretation of data, in manuscript draft and revision and in giving the final approval. GC, CL, MM: Participated in manuscript draft and revision and in analysis and interpretation of anaesthetic data AA, CF, CM, SR: Participated in analysis and interpretation of surgical data and in literature's review. LD: Participated in drafting of manuscript. PAD: Participated in critical revision and in giving the final approval.

Riassunto

I Testimoni di Geova rappresentano una minoranza di pazienti che per motivi religiosi non possono accettare trasfusioni di sangue e, a seconda delle scelte individuali, anche di prodotti emoderivati come eritrociti, piastrine, globuli bianchi o plasma.

L'articolo illustra il trattamento di citoriduzione condotto su una paziente affetta da carcinomatosi peritoneale di origine ovarica, allo scopo di dimostrare che seguendo correttamente i protocolli e tutte le misure preventive in campo anestesilogico e chirurgico è possibile portare a termine un intervento di questa portata.

Paziente di 58 anni con ipertensione e insufficienza mitralica, lamentava dolore di carattere continuo localizzato all'addome superiore e irradiato posteriormente. All'ultrasonografia è stata rilevata una neoformazione di 15 mm di diametro localizzata tra il 7 e l'8 segmento epatico. In seguito a TC dell'addome superiore e MR colangiopancreatografia sono state individuate numerose altre lesioni in sede epatica e nella testa e coda del pancreas compatibili con diagnosi di IPMN.

Il planning chirurgico prevedeva una pancreatectomia distale e, successivamente, una resezione epatica a cuneo nella sede della lesione. Durante la procedura sono state identificate delle lesioni maligne sul mesocolon trasverso. Inoltre, l'esplorazione addominale ha permesso di individuare un'ulteriore lesione in corrispondenza del 7 segmento epatico e una neoformazione maligna nell'ovaio sinistro, infiltrante sigma e retto. È stato effettuato l'esame istologico dei tessuti in sede intra-operatoria che ha permesso di porre diagnosi di adenocarcinoma di probabile origine ovarica. Infine, erano presenti lesioni non precedentemente identificate a carico del pancreas e del diaframma.

Alla luce di tutto ciò si è proceduto ad una pancreatico-splenectomia con doppia resezione a cuneo del fegato, resezione del diaframma, isterectomia totale con ovariectomia bilaterale, resezione del sigma, della parete anteriore del retto e dei linfonodi aorto-iliaci e otturatori. Nel complesso l'intervento è durato 510 minuti e non è stato necessario ricorrere a trasfusioni di sangue.

Dal punto di vista anestesilogico è stato necessario monitorare attentamente la paziente per tutta la durata della procedura, sostenendo lo stato emodinamico e la gittata cardiaca tramite l'infusione di soluzione glucosata al 5% e di efedrina per prevenire fenomeni di insufficienza d'organo secondari all'instaurarsi di stati ipovolemici. I parametri vitali sono stati mantenuti nella norma con pressione arteriosa tra 61 e 110 mmHg e la pressione venosa centrale tra 4 e 10 mmHg, grazie all'infusione di 4000 ml di cristalloidi e terapia fluida. La paziente è rimasta in terapia intensiva per 13 giorni dopo l'intervento. Il decorso post-operatorio è stato complicato a causa della fuoriuscita di materiale pancreatico dal drenaggio in prossimità del moncone pancreatico.

In conclusione è stato portato a termine senza complicazioni uno degli interventi più estesi eseguiti su un paziente testimone di geova, dimostrando che è possibile eseguire procedure di questa portata potendo, allo stesso tempo, rispettare il credo religioso.

Di fondamentale importanza sono la preparazione e l'esperienza degli operatori in sala operatoria e l'adozione di tutte le misure preventive al fine di minimizzare i rischi di perdite di sangue.

References

1. Kulvatunyou N, Heard SO: *Care of the injured Jehovah's witness patient: Case report and review of the literature*. J Clin Anesth, 2004; 16:548-53.
2. Mann MC, Votto J, Kumbe J, McNamee MJ: *Management of the severely anemic patient who refuses transfusion: lessons learned during the care of a Jehovah's witness*. Ann Intern Med, 1992; 117:1042-48.
3. McLoughlin PL, Cope TM, Harrison JC: *Hyperbaric oxygen therapy in the management of severe acute anaemia in a Jehovah's witness*. Anaesth, 1999; 54:891-95.
4. Corwin HL, Gettinger A, Rodriguez RM, Pearl RG, Gubler KD, Enny C, et al.: *Efficacy of recombinant human erythropoietin in the critically ill patient: a randomized, double-blind, placebo-controlled trial*. Crit Care Med, 1999; 27:2346-350.
5. Goodnough LT, Despotis GJ, Merkel K, Monk TG: *A randomized trial comparing acute normovolemic hemodilution and preoperative autologous blood donation in total hip arthroplasty*. Transfusion, 2000; 40:1054-1057.
6. Patel NJ, Patel BS, Paskin S, Lauder S: *Induced moderate hypotensive anesthesia for spinal fusion and Harrington-rod instrumentation*. J Bone Joint Surg Am, 1985; 67:1384-387.
7. Carson JL, Novek H, Berlin JA, Gould SA: *Mortality and morbidity in patients with very low postoperative Hb levels who decline blood transfusion*. Transfusion, 2002; 42:812-18.
8. Gohel MS, Bulbulia RA, Slim FJ, Poskitt KR, Whyman MR: *How to approach major surgery where patients refuse blood transfusion (including Jehovah's witnesses)*. Ann R Coll Surg Engl, 2005; 87:3-14.
9. Dettmeyer R, Reber A: *Death on the operating table. Anesthesiologic and medicolegal aspects*. Anaesthesist, 2003; 52:1179-188.
10. Miller RD: *Miller's anaesthesia*. Vols 1-2, 6th ed. Philadelphia: Elsevier Churchill Livingstone; 2005.
11. The criteria Committee of the New York Heart Association: *Nomenclature and criteria for diagnosis of diseases of the heart and great vessels*. 9th ed. Boston, Mass: Little, Brown & Co, 1994; 253-56.
12. American Society of Anesthesiologists. ASA Relative Value Guide 2002, page XII, Code 99140
13. Eagle KA, Berger PB, Calkins H, Chaitman BR, Ewy GA, Fleischmann KE, et al.: ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery: *Executive Summary A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (Writing Committee to Revise the 2002 Guidelines on Perioperative Cardiovascular Evaluation for Noncardiac Surgery)* - Developed in Collaboration With the American Society of Echocardiography, American Society of Nuclear Cardiology, Heart Rhythm Society, Society of Cardiovascular Anesthesiologists, Society for Cardiovascular Angiography and Interventions, Society for Vascular Medicine and Biology, and Society for Vascular Surgery Anesthesia & analgesia, 2008; 106(3)
14. ACCF/AHA Focused Update on Perioperative Beta Blockade Incorporated. Into the ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery: A

- Report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *Circulation*, 2009; 120:e169-e276.
15. Claudius C, Viby-Mogensen J: *Acceleromyography for use in scientific and clinical practice*. *Anaesthesiology*, 2008; 108:1117-140.
16. Habler O, Voss B: *Perioperative management of Jehovah's Witness patients. Special consideration of religiously motivated refusal of allogeneic blood transfusion*. *Anaesthesist*, 2010; 59:297-311.
17. Grocott MPW, Mythen MG, Gan TJ: *Perioperative fluid management and clinical outcomes in adults*. *Anesth Analg* 2005; 100:1093-1106.
18. Layon AJ, D'Amico R, Caton D, Mollet CJ: *And the patient chose: medical ethics and the case of the Jehovah's Witness*. *Anesthesiology*, 1990; 73:1258-262.
19. Detry O, De Roover A, Delwaide J, Kaba A, Joris J, Damas P, et al.: *Liver transplantation in Jehovah's witnesses*. *Transp Int*, 2005; 18(8):929-936.
20. Jabbour N, Gagandeep S, Mateo R, Sher L, Genyk Y, Selby R. *Transfusion free surgery: Single institution experience of 27 consecutive liver transplants in Jehovah's witnesses*. *J Am Coll Surg*, 2005; 201(3):412-17.
21. Jeffrey GP, McCall J, Gane E, Mitchell AW, Gibbs NM, Beavis V, et al.: *Liver transplantation in Jehovah's witness patients in Australasia*. *Med J Aust*, 2007; 187(3):188-89.
22. Boggi U, Vistoli F, Del Chiaro M, Croce C, Signori S, Marchetti P, et al.: *Kidney and pancreas transplants in Jehovah's witnesses: Ethical and practical implications*. *Transplant Proc*, 2004; 36(3):601-02.
23. Figueiro J, Vaidya A, Ciancio G, Olson L, Miller J, Burke GW: *Simultaneous pancreas-kidney transplantation in Jehovah's witness patients*. *Clin Transplant*, 2003; 17:140-43.
24. Barakat O, Cooper JR Jr, Riggs SA, Hoef JW, Ozaki CF, Wood RP: *Complex liver resection for a large intrahepatic cholangiocarcinoma in a Jehovah's witness: A strategy to avoid transfusion*. *J Surg Oncol*, 2007; 96:249-53.
25. Nishida S, Madariaga JR, Santiago S, Quintini C, Palaios E, Gyamfi A, et al.: *Right trisectionectomy of the liver for intrahepatic cholangiocarcinoma with bile duct invasion in a Jehovah's witness*. *J Hepatobiliary Pancreat Surg*, 2007; 14:312-17.
26. Giulianotti PC, Addeo P, Bianco FM: *Robotic right hepatectomy for giant emangioma in a Jehovah's witness*. *J Hepatobiliary Pancreat Sci*, 2011; 18:112-18.
27. Ayiomamitis GD, Alkari B, Owera A, Ammori BJ: *Emergency laparoscopic splennectomy for splenic trauma in a Jehovah's witness patient*. *Surg Laparosc Endosc Percutan Tech*, 2008; 18(6):626-30.
28. Magner D, Ouellette JR, Lee JR, Colqhoun S, Lo S, Nissen NN: *Pancreaticoduodenectomy after neoadjuvant therapy in a Jehovah's witness with locally advanced pancreatic cancer: Case report and approach to avoid transfusion*. *Am Surg*, 2006; 72(5):435-37.
29. Bonatti H, Dougetty M, Martin K, Hinder RA, Nguyen JH.: *Whipple procedure for chronic pancreatitis in a Jehovah's witness*. *Am Surg*, 2007; 773(9) 935-36.
30. Dhanoa A, Singh VA, Shammugam R, Rajendram R: *Major surgery in an osteosarcoma patient refusing blood retransfusion: A case report*. *World J Surg Oncol*, 2010; 8:96.
31. Nagarsheth NP, Shander A, Malovany R, Tzeng R, Ibrahim I: *Surgery in a Jehovah's witness patient with a 12,7 - kg uterine leiomyosarcoma*. *J Surg Educ*, 2007; 64(4) 217-19.
32. Bayam L, Tait WF, Macartney ID: *Successful repair of a giant abdominal aortoiliac aneurysm in a Jehovah's witness*. *Vasc Endovascular Surg*, 2007; 41(5):460-62.