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ORIGINAL ARTICLE

Safety and feasibility of elective liver resection in adult Jehovah's Witnesses: the Henri Mondor Hospital experience

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Abstract

Background: Elective liver resection (LR) in Jehovah's Witness (JW) patients, for whom transfusion is not an option, involves complex ethical and medical issues and surgical difficulties.

Methods: Consecutive data from a LR program for liver tumors in JWs performed between 2014 and 2017 were retrospectively reviewed. A systematic review of the literature with a pooled analysis was performed.

Results: Ten patients were included (median age = 61 years). None needed preoperative erythropoietin. Tumor biopsy was not performed. Major hepatectomy was performed in 4 patients. The median estimated blood loss was 200 mL. A cell-saver was installed in 2 patients, none received saved blood. The median hemoglobin values before and at the end of surgery were 13.4 g/dL and 12.6 g/dL, respectively ($p = 0.04$). Nine complications occurred in 4 patients, but no postoperative hemorrhage occurred. In-hospital mortality was nil. Nine studies including 35 patients were identified in the literature; there was reported no mortality and low morbidity. None of the patients were transfused.

Conclusions: By using a variety of blood conservation techniques, the risk/benefit ratio of elective liver resection for liver was maintained in selected adult JW patients. JW faith should not constitute an absolute exclusion from hepatectomy.

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Introduction

The Jehovah's Witness (JW) Society is an international religious organization with approximately 8 million members worldwide and a yearly increase of approximately 150,000 members (https://www.jw.org). JWs are forbidden from receiving i) primary blood components (red cells, white cells, platelets, and plasma) and ii) preoperative blood donation with the aim of later autotransfusion; however, the use of secondary blood components (such as albumin, cryoprecipitate, or clotting factors) is permitted according to individual beliefs. Autologous blood transfusion can be allowed if the blood has not been separated from the patient's blood at any time (as in the case of bypass and acute normovolemic hemodilution). Additionally, some forms of intraoperative cell salvage may be accepted by some JWs provided the extracorporeal blood remains in contact with the patient's circulation.

The medical management of JW patients raises medical, ethical, and legal concerns, especially in the setting of major operative procedures such as liver resection, when the risk of life-threatening bleeding is significant.

Despite tremendous progress in the perioperative management of liver resection, reports of this procedure in JW patients remain scarce; all the existing studies are case reports and small case series.[1–9] Yet, blood transfusion rate remains far from zero,

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even in the most recent period (3.7% and 7.6% for minor and major resections respectively.[10]

The aim of the present study was to report the Henri Mondor experience with liver resection in JWs and analyze it in terms of optimal management, feasibility and safety in light of current knowledge obtained through a systematic review of published studies.

Material and Methods

Decision to proceed with surgery

The liver surgery program for JWs at the Henri Mondor tertiary care liver center began in 2014. At that time, more than 1500 liver transplantations and more than 1500 liver resections had already been performed. If a patient met all standard requirements to proceed with liver resection for tumors, surgery proceeded provided two additional criteria were also fulfilled: (i) at the liver board meeting, all the senior doctors involved agreed to perform surgery, thus ensuring that the decision to perform surgery was based on consensus rather than on a majority vote, and (ii) the patient had signed a specific consent form. Adult JWs often attended outpatient visits in the presence of family members or JW elders. However, to obviate any duress in this situation, at least one discussion with the patient alone was required. All patients were required to sign a consent form that reflected their wishes formally refusing the use of blood products, even in case of life-threatening anemia. The local JW congregation had chosen the Henri Mondor center as the liver resection reference center for their members. The Hospital Institutional Review Board approved the present retrospective study.

Preoperative management

A standard preoperative workup for liver resection was used. However, i) all patients underwent a cardiac stress test, even in the absence of cardiovascular risk factors, and ii) in accordance with the patients' religion, tumor and/or non-tumor liver biopsy was never performed to obviate the risk of bleeding. Tumor diagnosis relied on the clinical history, biochemical and radiological investigations. Imaging criteria for the diagnosis of specific types of tumors were used.[11,12]

Portal vein embolization (PVE) was performed in patients with a future liver remnant to body weight ratio (LRBWR) < 1% according CT scan volumetry, i.e., the double of the acknowledged cutoff of 0.5% to reduce the potential risk of hemorrhage secondary to post-operative liver failure.[13]

Intra- and postoperative management

The most experienced surgeon and anesthesiologist available were present in the operating room for all patients. Low central venous pressure (<5 mmHg) was maintained during parenchymal transection to reduce venous hemorrhage. Neither acute normovolemic hemodilution nor acute hypervolemic hemodilution were used. No antifibrinolytic agents such as tranexamic acid were used.

The open or laparoscopic approach was chosen at the discretion of the senior surgeon. The Pringle maneuver was prepared for all patients. Vascular control was adapted to each patient during surgery with the aim of balancing regular monitoring of blood loss with the ischemia time for the remaining parenchyma. In cases of hemihepatectomy, early hemiliver devascularization was performed independent of the possibility of the later need for the Pringle maneuver during hepatic transection. The ultrasonic dissector (CUSA, Cavitron Ultrasonic Aspirator, Valley Lab, Inc., Boulder, CO) and/or crush clamping technique was used for parenchymal transection. Hemostasis was achieved using the Aquamantys® Bipolar Sealers System and bipolar coagulation, and vascular stapling was used for large vessels. Topical hemostatic agents containing human blood products were not used. The type of hepatic resection was defined according to the segmental terminology of Couinaud.[14]

The cell-saver device was available in the operating room for all patients. It was installed upon discussion among surgeons and anesthetists. According to the authors' institution policy and the experience-based evidence of the senior author, at least one abdominal drain was placed close to the cut surface of the liver at the end of surgery to detect any early hemorrhage.

Following surgery, the patients were routinely sent to the liver intensive care unit (ICU) and then transferred to the regular ward. Blood tests were performed immediately after surgery, once a day from postoperative day (POD) 1 to POD 5, at POD 7, and at discharge. Postoperative complications were classified according to the Clavien-Dindo classification and further categorized as minor (I-II) or major (III-IV).[15] The highest grade was used in patients with multiple complications. Postoperative morbidity and mortality were assessed within 90 days after surgery.

Definitions of blood loss, postoperative hemorrhage, and life-threatening anemia

Cumulative blood loss was calculated as the amount of blood loss collected via aspiration and the spinning of gauzes.

Postoperative hemorrhage was defined as a hemoglobin (Hb) level decrease > 3 g/dl postoperatively compared with the postoperative baseline level and/or the need for invasive re-intervention (e.g., embolization or re-laparotomy) to stop bleeding, according to the definition of the International Study Group of Liver Surgery (ISGLS).[16]

Life-threatening anemia was defined as a drop of the postoperative Hb level to below the threshold of 7 g/dL.[17]

Data analysis and systematic review

The data of the patients in the program were retrieved from a prospectively maintained specific database implemented at the beginning of the program. Data were evaluated on January 2, 2018. No patient was lost to follow-up. The results are given as medians and ranges.

A systematic review was performed in accordance with the PRISMA (Preferred Reporting Items for Systematic reviews and

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