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Incidence and risk factors associated with a high comprehensive complication index score after splenectomy in cirrhotic patients with hypersplenism

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ABSTRACT

Background: Postoperative complications after splenectomy are not rare and can be serious in cirrhotic patients. The purpose of this study was to assess postoperative complications using the comprehensive complication index (CCI) after splenectomy in cirrhotic patients and identify risk factors for those who developed a high postoperative CCI score.

Materials and methods: This retrospective study included 208 adult patients with viral hepatitis-related cirrhosis, who underwent elective splenectomy at our hospital from January 2002 to June 2012. The primary outcome was the CCI score. A CCI score >30 was considered to be a high CCI score.

Results: The median CCI score in this cohort was 25.6 (range: 8.7-62.9), and 66 patients (31.7%) had a CCI score >30. Univariable and multivariable analyses showed that the risk factors independently associated with a high CCI score were a history of hypertension and a model for end-stage liver disease (MELD) score ≥10 prior to splenectomy.

Conclusions: A high CCI score is common in cirrhotic patients undergoing splenectomy. The CCI is a useful grading system to assess postoperative morbidity in cirrhotic patients undergoing splenectomy. Preoperative blood pressure control is recommended and cirrhotic patients with an elevated MELD score should consider other treatment options for hypersplenism.

Introduction

Hypersplenism is common in patients with liver cirrhosis. The presence of hypersplenism indicates more advanced liver disease and is associated with anemia, leukopenia, thrombocytopenia, bleeding tendency, and portal hypertension. Splenectomy corrects cytopenia, improves liver function, and expands treatment choices for the underlying liver disease.[1-4]

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Therefore, it remains a therapeutic option for patients with hypersplenism due to liver cirrhosis.[5-8] However, the indications for splenectomy in cirrhotic patients are somewhat controversial.[9] One of the major reasons for this controversy is that postoperative complications after splenectomy are not rare and can be serious in cirrhotic patients.[10] However, few studies have comprehensively evaluated postoperative complications in patients with liver cirrhosis undergoing splenectomy for hypersplenism.

The comprehensive complication index (CCI) was recently developed to document postoperative complications.[11] It measures surgical morbidity by adding up all complications attributable to a surgical procedure and weighting them according to their severity.[12] Thus, the CCI reflects the summative severity of all major and minor postoperative complications in a single patient. By avoiding underreporting minor complications, the CCI is a robust system to evaluate postoperative morbidity. Due to its consistency and completeness, the CCI has become one of the standard ways to report postoperative complications in clinical trials. To the best of our knowledge, however, there have been no reports on the incidence of a high CCI score in cirrhotic patients undergoing splenectomy for hypersplenism.

The purpose of this retrospective study was to assess postoperative complications using the CCI in a large cohort of patients with viral hepatitis-related cirrhosis who received splenectomy for hypersplenism and identify risk factors for those who developed a high postoperative CCI score.

Methods

Study population

From January 2002 to June 2012, 1229 cirrhotic patients were hospitalized for the treatment of hypersplenism at the First Affiliated Hospital of Xi'an Jiaotong University. Of these, 241 patients (19.6%) who underwent elective splenectomy were enrolled in this study. The primary diagnosis of all cases was liver cirrhosis with hypersplenism and portal hypertension. Contraindications were uncorrectable coagulopathy and severe cardiovascular disease that prohibit the administration of general anesthesia. All clinical data of these patients, including demographics features, perioperative laboratory values, and postoperative complications were gathered from the digital medical records. Thirty-three patients had incomplete clinical data and were excluded from further analysis. The remaining 208 patients composed our study population. This retrospective, observational study was approved by the Ethics Committee of the First Affiliated Hospital of Xi'an Jiaotong University and the approval number was 2016-046. This work has been conducted in accordance with the Declaration of Helsinki of the World Medical Association. The patient's informed written consent was waived due to the retrospective nature of this study. All data were used only for statistical analysis in this study.

Evaluation of outcomes

The primary outcome was the comprehensive complication index (CCI) score.[12] The CCI was calculated as the sum of all postoperative complications that are weighted by their severity (available at www.assessurgery.com). Postoperative complications were defined as the occurrence of medical or surgical complications within 90 days of surgery. The severity of complications was evaluated using the Clavien-Dindo classification scale.[13]

Statistical analysis

For the continuous variables, we used mean ± standard deviation (SD) or median (range: min—max) to describe. And categorical variables were presented as frequency and percentage. The statistical difference between two groups was compared by the Student's t-test or Wilcoxon test for continuous data and the chi-squared test or Fisher's exact test for categorical variables. For the statistical analysis between three or more groups, analysis of variance was used. Factors showing significant difference in the univariate analysis were further analyzed in the final multivariate log-regression model. All statistical analyses were done using the IBM SPSS software (version 22.0). $P < 0.05$ was considered statistically significant.

Results

Patient demographics and characteristics

The demographics and baseline characteristics of the 208 cirrhotic patients who underwent splenectomy for hypersplenism were shown in Table 1. Of these patients, 151 were male (72.6%) and 57 were female (27.4%). The mean age of these patients was 44 years (range: 21-66). All patients in the study cohort had a history of viral hepatitis. There were 200 cases of hepatitis B virus (HBV)-related cirrhosis and eight cases of hepatitis C virus (HCV)-related cirrhosis. Twenty-three patients (11.1%) had a history of alcohol abuse, and 49 patients (23.6%) had a history of smoking. In terms of the underlying diseases, 33 patients (15.9%) had hypertension, and 15 patients (7.2%) suffered diabetes mellitus. On admission, 95 patients (45.7%) were found to have severe esophageal and gastric varices (>6 mm), and 13 patients (6.3%) had portal vein thrombosis. As for the liver function grade, Child-Pugh A was found in 58 patients (27.9%), Child-Pugh B in 134 patients (64.4%), and Child-Pugh C in 15 patients (7.2%). In this study, 183 patients (88.0%) underwent open splenectomy, whereas 25 patients (12.0%) underwent laparoscopic splenectomy. The total estimated blood loss and transfusion during the surgery were 384 mL (range: 50-1500 mL) and 619 mL (range: 0-1400 mL), respectively. By combining preoperative imaging results with intraoperative assessment, the spleen volume and diameter were 1513 mm^3 (range: 196-6800 mm^3) and 160 mm (range: 12-232 mm), respectively. As shown in Table 2, postoperative portal vein thrombosis (16.8%) and ascites (15.4%) were the most common complications after splenectomy. And surgical site infections happened in 10 patients (4.8%). Three patients (1.4%) were admitted to the intensive care unit due to severe postoperative complications or organ failure. One patient (0.48%) underwent reoperation due to intraabdominal bleeding and gastric leakage after splenectomy. The median length of