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International Journal of Surgery Case Reports

journal homepage: www.casereports.com

Laparoscopic gastric devascularization without splenectomy is effective for the treatment of gastric varices

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ARTICLE INFO

Article history:

Received 10 November 2015

Received in revised form

26 November 2015

Accepted 19 December 2015

Available online 24 December 2015

Keywords:

Devascularization

Gastric varices

Laparoscopy

Minimally invasive surgery

Liver cirrhosis

Splenectomy

ABSTRACT

INTRODUCTION: Laparoscopic gastric devascularization of the upper stomach in patients with gastric varices has rarely been reported. Perioperative clinical data were compared with patients who underwent open surgery.

PRESENTATION OF CASES: From 2009 to 2012, we performed laparoscopic gastric devascularization without splenectomy for the treatment of gastric varices in eight patients. The patients included four males and four females. Peri-gastric vessels were divided using electrical coagulating devices or other devices according to the diameter of the vessels. Two patients underwent conversion to open surgery due to intraoperative bleeding.

DISCUSSION: Intraoperative blood loss in patients who accomplished laparoscopic devascularization was very small (mean 76 ml). However, once bleeding occurs, there is a risk of causing massive bleeding.

CONCLUSION: With further improvement of laparoscopic devices, laparoscopic gastric devascularization without splenectomy must be an effective and less-invasive surgical procedure in the treatment of gastric varices.

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1. Introduction

The combination of devascularization of the lower esophagus and proximal stomach, with splenectomy and pyloroplasty (Hassab's operation) was first reported as an effective surgical treatment for esophago-gastric varices in 1964 [1]. Hassab's operation is highly invasive and is associated with severe postoperative complications including portal vein thrombosis and refractory ascites.

There are several reports of laparoscopic or hand-assisted laparoscopic surgery for esophago-gastric varices [2–7], but operative procedures without splenectomy have rarely been reported [8–10]. We previously performed devascularization of the proximal stomach in a limited area without splenectomy as an open procedure to reduce the invasiveness of the operation compared to Hassab's operation, and obtained acceptable result [12]. In order to further limit the invasiveness of the operation, we developed the laparoscopic procedure described here.

2. Presentation of cases

From 2009 to 2012, we performed laparoscopic gastric devascularization for gastric varices in eight patients, including four males and four females, ranging in age from 46 to 76 years (mean 65 years). The causes of liver cirrhosis were HCV in three patients, idiopathic portal hypertension in one, non-alcoholic steatohepatitis in two, alcohol abuse in one, and unknown in one. Five patients were Child-Pugh Class A, and three patients Class B. Three patients had hepatocellular carcinoma (Table 1). We limited the indication for surgery to patients with gastric varices that could not be treated using balloon-occluded retrograde transvenous obliteration (B-RTO) because a gastro-renal shunt has not developed, esophageal varices well controlled by endoscopic treatment, Child-Pugh classification A and B, and a platelet count of $5 \times 10^4/\text{mm}^3$ or more. All patients were treated with endoscopic variceal ligation for esophageal varices preoperatively and followed up with CT scans and endoscopy after surgery. All patients provided informed consent.

2.1. Surgical procedure

Laparoscopic gastric devascularization was performed in the supine position with pneumoperitoneum using carbon dioxide at

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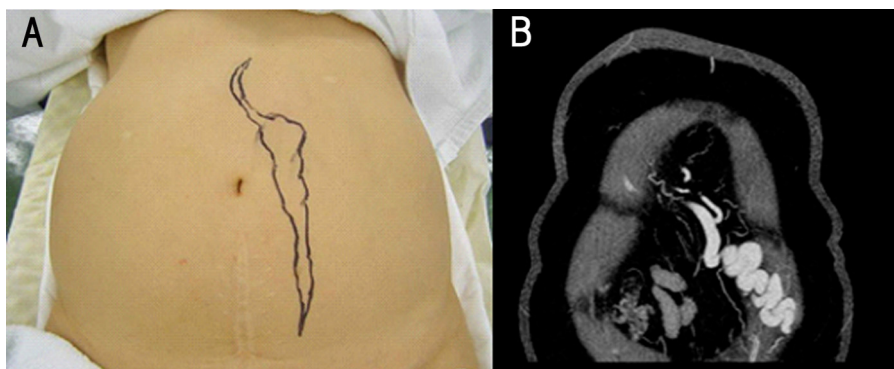


Fig. 1. (A) Dilated subcutaneous collateral veins are marked preoperatively using ultrasonography. (B) CT scan shows a dilated subcutaneous vessel connecting with the ligamentum teres hepatis.

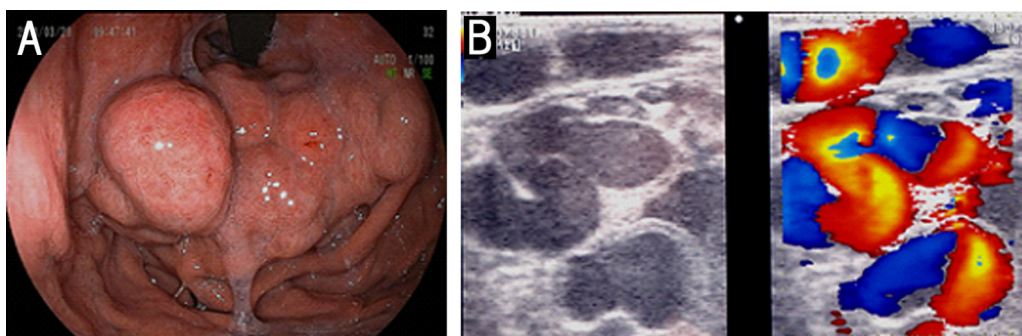


Fig. 2. (A) Endoscopic imaging of a patient who underwent intraoperative conversion to open surgery showed large gastric varices at the fornix. (B) Intraoperative color Doppler laparoscopic ultrasonography imaging outside the gastric wall. It showed high blood flow in the variceal vessels before devascularization.

a pressure of 11 mmHg. The first trocar was inserted through the umbilicus using the open technique. Five trocars were used for the procedure, which is performed using a flexible laparoscope. Patients with dilated subcutaneous veins on the abdominal wall due to liver cirrhosis, were marked preoperatively using ultrasonography and the trocar sites selected to avoid injury to the collateral veins (Fig. 1A and B). The position and blood flow of gastric varices which diagnosed preoperatively under endoscopy (Fig. 2A) were evaluated using color Doppler laparoscopic ultrasonography (Fig. 2B). Devascularization was then begun on the lesser curvature of the proximal stomach along the gastric wall, to preserve the anterior gastric branch of the vagus nerve. Small branches of the left gastric vessels were divided using the LigaSure™ vessel sealing system (COVIDIEN Japan, Tokyo, Japan) near the gastric wall to avoid a truncal vagotomy. The left gastric vein was divided using a combination of vascular clips and the LigaSure™. The omentum was divided and the omental pouch opened to approach the posterior gastric vessels. The short gastric vessels of the gastrosplenic ligament were divided using vascular clips and the LigaSure™ or the linear stapler. The posterior gastric vessels and collateral veins at the upper posterior part of the stomach were divided using the LigaSure™, vascular clips, or the linear stapler based on the caliber of the vessels (Fig. 3). After dividing the vessels, interruption of blood flow in the varices was ascertained using color Doppler laparoscopic ultrasonography. Since there is a defect in the muscular layers of the stomach at the sites where the large varices penetrate, the seromuscular layer was reinforced with sutures to prevent delayed postoperative gastric perforation (Fig. 4).

2.2. Postoperative course

For the eight patients who underwent laparoscopic gastric devascularization, the operative time ranged from 174 to 459 min

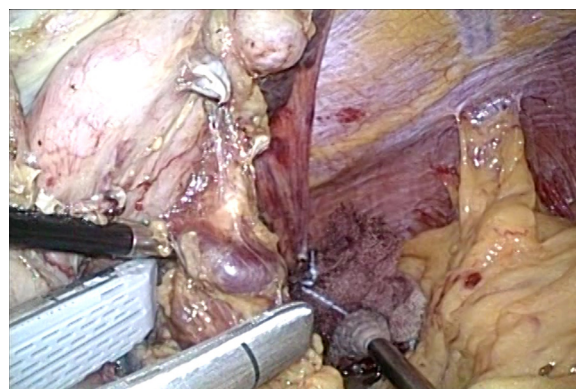


Fig. 3. The posterior gastric variceal vessels are approached from the omental pouch and divided with the linear stapler.

(mean: 266 ± 91 min). Intraoperative blood loss ranged from 0 to 3080 ml (median: 105 ml, mean: 825 ± 1390 ml). Two patients underwent conversion to open surgery because of significant intraoperative bleeding from gastric varices (Table 1, patient nos. 5 and 6). In one of these patients, bleeding occurred when the posterior gastric vein was divided using the LigaSure™ alone. In the second patient, an enlarged meandering posterior gastric vein ruptured when connective tissue on the dorsal part of the vein was dissected (Fig. 5).

Reviewing the six patients who accomplished laparoscopic gastric devascularization (excluding the two patients who were converted to open surgery intraoperatively) the estimated blood loss ranged from 0 to 250 ml (mean: 76 ± 97 ml).

Postoperative complications occurred in four patients: ascites in two, pleural effusion and atelectasis in one, and gastric stasis in

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