Hand-assisted laparoscopic colon mobilization for esophageal reconstruction

Analysis of seven cases

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Abstract

Background: New techniques for hand-assisted laparoscopic colon surgery have been adopted quickly for the treatment of numerous colorectal diseases. However, reports of laparoscopic colonic mobilization for esophageal reconstruction are rare. In this report we describe an improved procedure for esophageal reconstruction with transverse colon.

Methods: From January 1999 to April 2001, we recruited seven patients (5 women and 2 men) who acquired esophageal stricture after swallowing hydrogen chloride or lye. The mean age of the patients was 42.7 years. For surgery, the patients were placed in lithotomy position under single-lumen intubated anesthesia. First, hand-assisted laparoscopic colon mobilization was performed with the assistance of the Harmonic Scalpel (AutoSuture Company, Norwalk, CT, USA) through a 7-cm upper abdominal incision. Then using cervical esophagocolostomy through the retrosternal route, coloenterostomy and colocolostomy were achieved.

Results: The mean operative time was 3.9 h (range, 3.2–5 h). The mean hospital stay was 9.1 days (range, 8–13 days). Mean blood loss was 100 ml (range, 50–350 ml). All the patients obtained successful outcomes. There was one mild abdominal wound infection, and no surgical mortality. At this writing, the seven patients can eat solid food very well after a mean follow-up period of 18.2 months.

Conclusions: Hand-assisted laparoscopic colonic mobilization for esophageal reconstruction is a safe and feasible operation for treating patients with esophageal stricture.

Key words: Hand-assisted laparoscopic colon surgery — Esophageal reconstruction — Corrosive injury

Ingestion of caustic substances by adults frequently is intentional, resulting in ongoing serious problems such as hollow organ perforation and esophageal stenosis [11, 18]. The role of colon interposition for esophageal substitution has evolved significantly over the past 40 years [4, 8, 15, 16]. Advanced laparoscopic colonic surgery still is a complex and time-consuming operation. Recently, hand-assisted laparoscopy has been introduced to facilitate surgical maneuvers involving the liver, stomach, spleen, kidney, pancreas, and uterus. These maneuvers are tedious, dangerous, or undesirable by purely endoscopic methods [1–3, 5–7, 9, 10, 13, 17].

Reports concerning esophageal reconstruction with colon via hand-assisted laparoscopic surgery have been rare. Therefore, we present our experience with hand-assisted laparoscopic colonic mobilization for esophageal reconstruction.

Methods

From January 1999 to April 2001, we recruited seven patients (5 women and 2 men) undergoing hand-assisted laparoscopic colon mobilization for esophageal reconstruction. The mean age of the patients was 42.7 years (range, 19–67 years). Six patients swallowed 20 to 100 ml of lye, and one female patient swallowed two mouthfuls of hydrogen chloride. All the patients suffered from dysphagia 3 weeks to 3 months later. Esophagogram and upper gastrointestinal studies showed that six patients had long segmental stenosis of the esophagus, and that two patients also had severe deformity of the gastric antrum and pylorus. Feeding jejunostomy was initiated for nutritional support before esophageal reconstruction. Hand-assisted laparoscopy for esophageal reconstruction with the transverse colon was arranged 6 months after the esophageal burn because dysphagia did not improve, despite aggressive esophageal dilation via mercury bougienage dilatation.

The operations were performed under standard antibiotic prophylaxis, colon preparation, and single-lumen intubated anesthesia. The patient was put in the lithotomy position and draped, leaving enough room to position the Dexterity device. The surgeon took his position between the lower limbs of the patient. Standard pneumoperitoneum was established. The Pneumo Sleeve system (Dexterity, Blue Bell, PA, USA) was mounted to the 7-cm vertical laparotomy incision just 2 to 3 cm cranial to the umbilicus. A camera port was
placed approximately 5 cm below the umbilicus. Another two accessory 10-mm ports for the ultracision device (AutoSuture Company, Norwalk, CT, USA) were placed in the bilateral flank (Fig. 1).

First the surgeon’s right hand was gloved conventionally, inserted into a plastic sleeve with finger perforation (PneumoSleeve), and covered with a second conventional glove. The rigid plastic ring that forms the open end of this sleeve was locked to the base, creating an airtight seal. Pneumoperitoneum was restored with the conventional 15 mmHg of pressure. The Harmonic Scalpel was used to mobilize the colon to decrease blood loss.

After mobilization of the ascending, transverse, and descending colon, the Dexterity pneumo device was removed, and the colon was exteriorized through the protector. The pneumoperitoneum usually is lost once the hand is withdrawn from the peritoneal cavity. As in open surgery, division of the mesentery between the middle colic and right colic vessels completely freed the transverse colon segment for transposition. Thereafter, the esophageal substitute, which included the left colon segment extending from the region of the hepatic flexure to the splenic flexure of the colon based on the ascending branch of the left colic artery (Fig. 2), was carried up to the left side neck through the retrosternal route for cervical esophagocolostomy.

Results

The mean operative time was 3.9 h (range, 3.2–5 h), and the mean hand-assisted laparoscopic colonic mobilization took only 62 min (range, 45–75 min). The estimated blood loss was less than 100 ml.

All the patients obtained successful anastomoses without any leakage. Of the seven patients, extracorporeal cologastrostomy and colocolostomy were performed in five patients without gastric outlet obstruction. Two patients received cologastrostomy and additional gastrojejunostomy because of severely deformed gastric antrum and pyloric stenosis. One patient experienced mild abdominal wound infection without major problem. There were no surgical mortality cases. The mean hospital stay was 9.1 days (range, 8–13 days). At this writing, all seven patients can eat solid food very well after a mean 18 months of follow-up evaluation.

Discussions

Liquid lye is unusual in that not only is it one of the most frequently ingested caustics, but it also is responsible for the greatest morbidity [11]. In addition, esophageal reconstruction after lye-induced injuries to the esophagus is more difficult because of the length of involvement and severity of the injury [4, 18]. Long segments of colon, transposed on a vascular pedicle, have been used for esophageal substitution since the early part of the past century [8, 15, 16].

Despite a lack of clear scientific data, there is a growing consensus that laparoscopically assisted colorectal surgery is associated with less postoperative pain, earlier tolerance of food, less immunosuppression, and shorter hospital stay [1, 6, 9]. The laparoscopic approach entails a number of restrictions in the execution of major operations associated with appropriate exposure during complex dissection, delivery of malignant specimens, loss of tactile palpation, and the achievement of complex anastomoses necessary to restore the continuity of the gastrointestinal and biliary tract [1, 9, 12; 14]. If a malignant specimen is carried out of the abdominal wall through the PneumoSleeve device, direct contamination from the specimen to the skin and abdominal wound could be reduced. All anastomoses could be performed manually on the outside will to save the operative time.

Several published reports describe the benefits afforded by hand-assisted laparoscopic surgery (HALS) in the performance of various operations including gastrectomy, transhiatal esophagectomy, splenectomy, nephrectomy, colorectal surgery, hysterectomy, and hepatic and pancreatic resection [2, 3, 5–7, 10, 13]. Nevertheless, reports of the colonic interposition for esophageal reconstruction by hand-assisted laparoscopic surgery after lye ingestion are rare. The Dexterity Glove and Pneumo Sleeve are recent adjuncts in laparoscopic surgery that allow hand manipulation, with easier exposure of the structures by the