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Transumbilical single-incision laparoscopic subtotal gastrectomy and total intracorporeal reconstruction of the digestive tract in the treatment of benign peptic ulcers

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ABSTRACT

Background: Single-incision laparoscopic surgery is being applied increasingly in many surgical specialties. However, few reports are available regarding its use in the treatment of benign peptic ulcer disease.

Methods: We report here on nine patients with gastric or duodenal ulcers who underwent transumbilical single-incision laparoscopic subtotal gastrectomy (SILSG) between November 2010 and June 2013. All procedures were performed with conventional laparoscopic instruments placed through a single operating portal of entry created within the umbilicus. Total intracorporeal gastrojejunostomy or gastroduodenostomy was then performed for reconstruction of the digestive tract.

Results: Only one case required conversion from single-incision to multiple-incision surgery. Among the eight patients who successfully underwent SILSG, total intracorporeal gastroduodenostomy was performed in two and gastrojejunostomy in six. The mean operation time was 290 ± 50 min (range 230–360 min), and blood loss was 200 ± 66 mL (range 100–300 mL). The patients recovered fully, and the single umbilical scars healed well.

Conclusions: We believe this is the first report of SILSG with total intracorporeal gastrojejunostomy or gastroduodenostomy in the treatment of benign peptic ulcers. On the basis of this initial experience, SILSG for this indication in the hands of experienced surgeons appears to be feasible and safe.

1. Introduction

The history of surgery has witnessed evolution from major aggressive procedures to minimally invasive procedures. Laparoscopic surgery, which provides better cosmetic results, less incisional pain, and shorter hospital stay, has become the mainstream therapy for many gastrointestinal disorders. Current efforts in minimally invasive surgery are aimed at reducing the number and size of trocars used, or being "no scar" surgery, which, for laparoscopy, means the development of single-incision operations.

The single-incision approach has been applied in many surgical specialties [1–3]. However, we know of no reports of single-incision laparoscopic subtotal gastrectomy (SILSG),

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with total intracorporeal reconstruction, for the treatment of peptic ulcers. Thus, we report here nine patients who underwent this operation.

2. Methods

2.1. Patients

We retrospectively reviewed the records of nine patients who had undergone transumbilical SILSG from November 2010–June 2013 at Shengjing Hospital. Six patients were men and three were women, aged 42–76 y. Seven patients had gastric ulcer and two had duodenal ulcers. Among the patients with gastric ulcer, three had a previous history of upper gastrointestinal tract bleeding, and one had a large ulcer (>3 cm in diameter). Both the duodenal ulcer patients had developed stenosis; proper medical treatment failed to heal the ulcers. All the diagnoses were confirmed by preoperative endoscopy and postoperative histopathologic examination. The procedures were performed with conventional laparoscopic instruments placed via a single operating portal within the umbilicus. The patients, who had strong concerns about cosmetic consequences, had no history of abdominal operation or contraindications for laparoscopic surgery. The study was approved by the Institutional Review Board of our hospital.

2.2. Surgical procedure

Under general anesthesia, patients were placed supine with legs apart; the monitor was placed above the patient's left shoulder. The operating surgeon stood between patient's legs, while the camera holder stood on the patient's right side.

Carbon dioxide pneumoperitoneum was created by use of the closed method with a veress needle, and insufflation pressure was maintained at 13 mm Hg. A 3-cm superficial incision was made vertically within the umbilical fold for trocar access. Conventional trocars used were a 5-mm and a 10-mm standard trocar and an unbladed trocar (Xcel B12LT; Ethicon Endo-Surgery, LLC, Guaynabo, PR). All three trocars were introduced through the same incision at different fascial sites; entry sites were ~10-mm apart in a reverse triangular arrangement (Fig. 1A). A 30° 10-mm rigid laparoscope (Stryker Endoscopy, San Jose, CA) was used throughout the procedure.

After routine exploration of the abdomen, the diaphragmatic surface of the left lateral hepatic lobe was sprayed with cyanoacrylate glue (Beijing Compont Medical Adhesive, Beijing, China) and attached to the diaphragm (Fig. 1B). The glue suspension of the liver afforded a clear view of the gastric lesser curvature (Fig. 1C). The gastric antrum was lifted with intestinal forceps, and the gastrocolic ligament was divided and dissected by use of a harmonic scalpel toward the lower pole of the spleen (Fig. 1D). Division then was continued to the right side of gastrocolic ligament until the duodenal ampulla and right gastroepiploic vessels were divided between the clips (Fig. 1E). Adhesions to the posterior gastric wall were severed. The gastrohepatic ligament was opened, and the right gastric vessels were divided and double-clipped at the root. The left gastric artery and vein were exposed and severed from the root (Fig. 1F). For intracorporeal anastomosis, retrocolicgastrojejunostomy was performed in seven patients and gastroduodenostomy in two.

For gastrojejunostomy, the duodenum was transected 2 cm distal to the pyloric ring with an endoscopic stapler (Echelon 60 3. 5 mm; Ethicon Endo-Surgery) inserted with the assistance of the 12-mm trocar (Fig. 1G). A proximal loop of the jejunum was identified and brought upside across the transverse colon in a retrocolic way. Two small incisions were made: one was on the posterior wall of the stomach and the other on the antimesenteric side of the jejunum 10 cm distal to the Treitz ligament. In a step-by-step manner, a 60-mm endoscopic stapler was inserted through the incision in the gastric wall, passed along the bowel lumen, and out through the incision in the jejunum. The posterior wall of the stomach and the antimesenteric side of the jejunum were aligned together, and the endoscopic stapler was closed and fired (Fig. 1H). The common incision was united and closed with a running suture (3/0 absorbable; Fig. 1I). The stomach was transected at least 1 cm distal to the ulcer by endoscopic staplers.

Gastroduodenostomy was performed as described previously [4,5], with slight modification. Briefly, the duodenal bulb was dissected and then transected by use of an endoscopic stapler (Echelon 603. 5 mm; Ethicon Endo-Surgery). The stomach was dissected from the greater curvature to the lesser curvature. A small incision was made on the greater curvature of the remnant stomach and on the posterior side of the duodenal stump. The posterior walls of the stomach and duodenum were approximated, aligned, and joined with use of a 45-mm endoscopic linear stapler. The common channel through which the stapler had been inserted was closed longitudinally with an absorbable suture (Fig. 2A). By lifting the end of the suture, we were able to secure the anastomosis with one more application of the endoscopic linear stapler (Fig. 2B). Finally, we reinforced the closed common channel of the greater curvature side with additional suturing with VCP-316 (VICRYL*Plus VCP 316; Ethicon, Inc) (Fig. 2C).

The specimen was then transported from the peritoneal cavity in a specimen bag. A single, soft drainage tube was placed at the anastomosis site of the duodenum and brought out through the umbilical incision. The incision was suture closed in two layers, completing the operation (Fig. 1J).

3. Results

Due to poor condition of the duodenal stump, one case required conversion of the single-incision laparoscopic operation to a multiple-incision laparoscopic operation, with successful gastrojejunostomy. Among eight patients who successfully underwent SILSG, total intracorporeal gastroduodenostomy was performed in two and gastrojejunostomy in six. The overall mean operation time was 290 ± 50 min (range 230–360 min), and blood loss was 200 ± 66 mL (range 100–300 mL). The patients recovered fully after operation without perioperative complications, and their single umbilical scars healed well. During follow-up periods of 1–18 mo, no significant complications were identified (Table).