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TECHNIQUES

Transumbilical single-incision laparoscopic intracorporeal anastomosis for gastrojejunostomy: case report

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Abstract

Background Laparoscopic gastrojejunostomy allows effective palliation and rapid recovery for the patient with limited survival due to advanced pancreatic cancer presenting with gastric outlet obstruction. Transumbilical single-incision laparoscopic surgery (SILS) offers excellent cosmetic results and may be associated with decreased postoperative pain, reduced need for analgesia, and thus accelerated recovery. The authors report the first transumbilical single-incision laparoscopic intracorporeal anastomosis for gastrojejunostomy.

Methods Preliminary experience with transumbilical single-incision, intracorporeal anastomosis for gastrojejunostomy for a patient with gastric outlet obstruction caused by advanced pancreatic cancer is reported.

Results Transumbilical single-incision laparoscopic intracorporeal anastomosis for gastrojejunostomy was performed with a linear endoscopic stapler using an omega loop. The operative time was 117 min. No intra- or postoperative complications were recorded.

Conclusion Transumbilical single-incision laparoscopic intracorporeal anastomoses are feasible using the endoscopic linear stapler. Transumbilical single-incision gastrojejunostomy for gastric outlet obstruction may improve cosmetic results and allow accelerated recovery for patients with limited survival. This anastomosis technique of single-incision laparoscopic surgery for other digestive tract procedures needs further evaluation.

Keywords E-NOTES · Gastric · Gastrojejunal · Intracorporeal anastomosis · Laparoscopy · NOTES · Scarless surgery · Single-incision laparoscopic surgery · Single port · Single-port access · Transumbilical

Laparoscopic gastrojejunostomy for palliation of gastric outlet obstruction caused by advanced cancer is shown to be safe and effective [1–3]. This approach allows rapid recovery for patients with very limited survival [1, 3, 4].

Single-incision laparoscopic surgery (SILS) is a rapidly evolving field [5, 6]. The SILS procedure offers excellent cosmetic results compared with standard multiport laparoscopy and may improve patients recovery because of possible decreased parietal trauma [7, 8].

Recently, digestive tract (i.e., colorectal and gastric) procedures using this approach with success have been described [9–15]. However, intracorporeal anastomoses through SILS have never been described because of difficulties with tissue exposition in complex maneuvers even for advanced laparoscopic surgeons [8, 11, 16–18]. However, mechanical laparoscopic anastomosis using the endoscopic stapler has been widely reported and shown to be safe [3]. We report the first intracorporeal anastomosis through transumbilical SILS for gastrojejunostomy.

Patient and methods

Case report

A 64-year-old man presented with gastric outlet obstruction caused by advanced pancreatic cancer. The patient was

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offered intracorporeal anastomosis through transumbilical single-incision laparoscopic gastrojejunostomy and gave his informed consent for this approach. The procedure was performed successfully using a side-to-side anastomosis with a jejunal omega loop. The total operative time was 117 min. No intra- or postoperative complications were recorded.

A normal low-residue diet was started on day 4. At this writing, the patient is doing well 6 months after surgery without umbilical incisional hernia and receiving a normal diet.

Surgical technique

The reported transumbilical single-incision laparoscopic gastrojejunostomy was performed using a surgical technique similar to the standard multiport laparoscopic approach except that it was conducted through a single umbilical incision (Fig. 1). A 12-mm umbilical port (Endopath Xcel Trocar; Ethicon Endo-surgery, Spreitenbach, Switzerland) was placed using an open approach, and a parallel 5-mm port was placed in the same 2-cm circular umbilical incision (Fig. 2). A 10-mm laparoscope with a 6-mm working channel and a 5-mm 30° laparoscope were used alternatively (Richard Wolf GmbH, Knittlingen, Germany).

Under laparoscopic vision, an adequate position was obtained by tilting the operation table to achieve correct exposition for the procedure. Gastric and then jejunal loop suspension and exposition were achieved by placing a transparietal sling suture in the left hypochondrium. They were passed in the gastric or small bowel wall, with great care taken not to be intraluminal, using a modified ski needle as described earlier [10, 11].

After the mobility of the jejunal loop had been chosen and controlled, a side-to-side gastrojejunal anastomosis was performed using a linear endoscopic stapler (Endopath endoscopic linear stapler; Ethicon Endo-surgery, Spreitenbach, Switzerland). A large gastrojejunal anastomosis was created using two 45-mm stapler cartridges. The gastrotomy and jejunotomy used for stapler insertion were closed with the linear endoscopic stapler. The gastrotomy and jejunotomy border were resected during their closure.

For completion of the anastomosis, the 5-mm laparoscope was placed in a 5-mm trocar positioned in the umbilical incision parallel to the 12-mm trocar. This allowed use of the 12-mm trocar for the stapler. Exposition and mobilization were achieved during anastomosis completion by transparietal sling suture placed before stapler insertion. The anastomosis was tested intraoperatively for leak using an air test through a nasogastric tube.

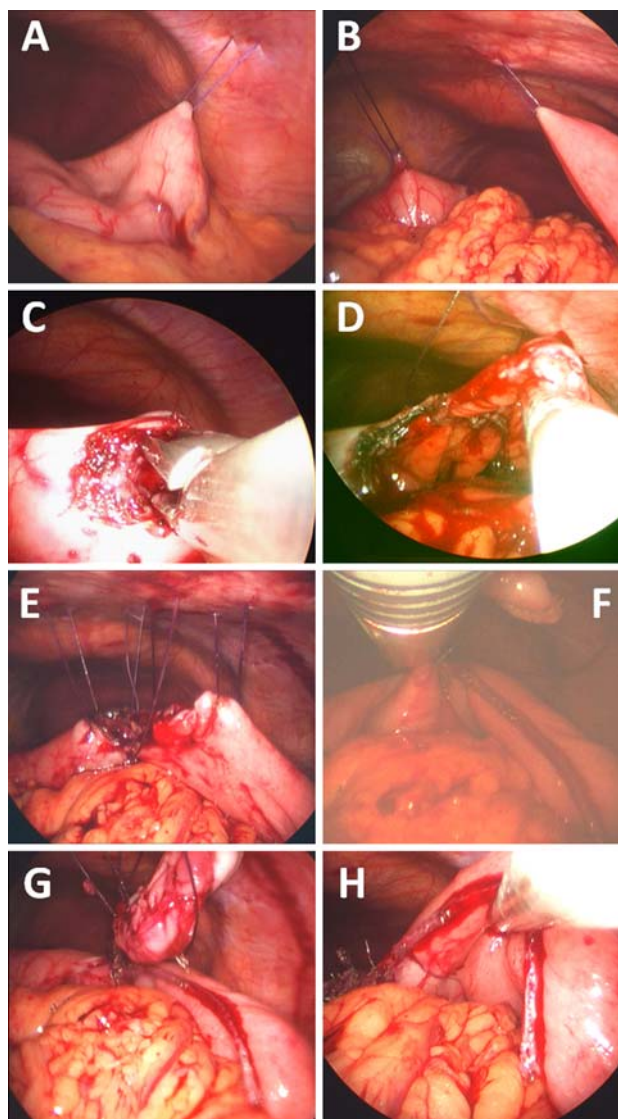


Fig. 1 Intraoperative view of single-incision laparoscopic gastrojejunostomy. **A** Gastric exposition with transparietal sling suture. **B** Jejunal loop mobilized and exposed with transparietal sling suture passed in the subserosal space of the jejunal wall. **C** Gastrotomy performed with laparoscopic scissors to allow endoscopic linear placement in the stomach for side-to-side gastrojejunostomy (an enterotomy is performed on the jejunum with the same technique). **D** Side-to-side endoscopic linear stapler gastrojejunostomy viewed through the gastrotomy and jejunotomy. **E** Suspension of the gastrotomy and jejunotomy border after completion of gastrojejunostomy, with transparietal suture to facilitate their closure with the endoscopic linear stapler. **F** Closure of gastrotomy and jejunotomy with the endoscopic linear stapler. **G** Gastrotomy and jejunotomy resected during closure with the endoscopic linear stapler. **H** Final view of the side-to-side gastrojejunostomy (posterior view)

Discussion

We describe the first intracorporeal digestive anastomosis through transumbilical SILS. The SILS intracorporeal gastrojejunostomy was feasible using an endoscopic linear

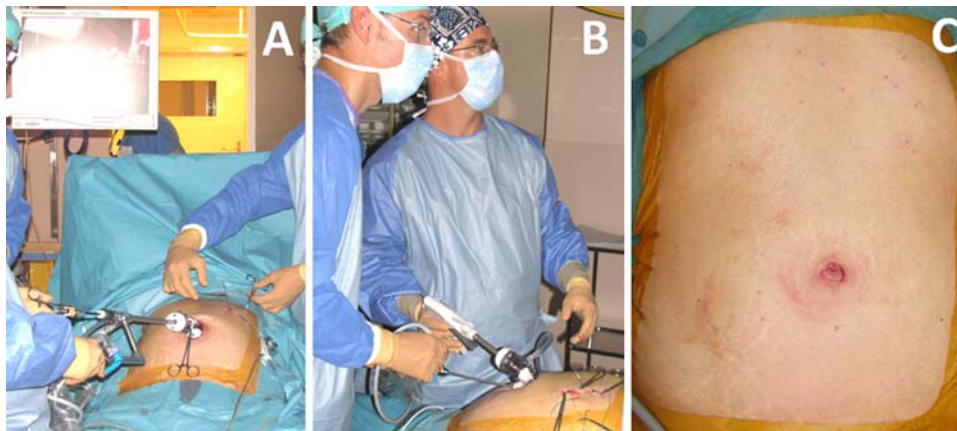


Fig. 2 Single-incision laparoscopic gastrojejunostomy. **A** General installation with transumbilical access and transparietal sling suture in the left hypochondrium (surgeon is on the right and assistant on the left). **B** Anastomosis performance with the endoscopic linear stapler.

Note the use of a 5-mm laparoscope to allow passage of the linear stapler in the larger trocar during this maneuver. **C** Abdominal view after completion of transumbilical single-incision laparoscopic gastrojejunostomy (note the invisible umbilical scar)

stapler. This surgical procedure reproduced standard multiport laparoscopic gastrojejunostomy, with the adjunction of some artifacts, and seems safe. In addition to possibly decreasing parietal trauma, SILS gastrojejunostomy offers a cosmetic advantage over the standard laparoscopic approach.

Laparoscopic gastrojejunostomy for palliation of gastric outlet obstruction caused by advanced cancer is shown to be safe and effective [1–3, 19]. Laparoscopic gastrojejunal derivation may ameliorate patient recovery by decreasing postoperative pain and thus the analgesia requirement compared with the open approach [1, 3, 19]. Moreover, the laparoscopic approach is shown to be associated with a lower inflammatory response than laparotomy for patients with gastric outlet obstruction [3].

The laparoscopic approach allows rapid recovery for patients with very limited survival [1, 3, 4]. Transumbilical single-incision laparoscopic gastrojejunostomy may be advantageous in this regard because it decreases parietal trauma and the risk of morbidity associated specifically with multiport laparoscopy (i.e., port-orifice infections, hemorrhage, incisional hernia) [7].

Recently, SILS has been described for gastric procedure including gastrotomy placement, gastric banding, and sleeve gastrectomy [13, 14, 20, 21]. However, none of these included gastric anastomosis, and digestive intracorporeal anastomoses through SILS have never been reported.

The current technique of transumbilical SILS gastrojejunostomy for gastric outlet obstruction is shown to be efficient and associated with rapid recovery. This technique reproduces the laparoscopic technique for side-to-side anastomosis using the endoscopic linear stapler [3, 22].

The difficulty with the SILS gastrojejunostomy is represented by the need for satisfying exposition of the stomach and jejunal loop during anastomosis completion. This may be achieved using transparietal sling suture, as described earlier for various SILS procedures [10, 11, 23–25]. These sutures should be placed on the mesentery, the omentum, or only the subserosa on the digestive tract, avoiding intraluminal passage to decrease the risk of contamination. However, great care should be taken with placement and manipulation of the transparietal sling suture to avoid digestive tract wall tears [11]. Future development of multiport single-access trocar and angulated laparoscopic instruments will facilitate complex SILS in the same manner as the current gastrojejunostomy technique [7, 8, 10–12, 26].

Conclusion

Transumbilical single-incision laparoscopic gastrojejunostomy is feasible using conventional and clinically available instrumentation by advanced laparoscopic surgeons. The current technique seems safe and efficient because it merely reproduces the standard technique of the multiport laparoscopic approach. Future material development, especially multichannel port and bended instrumentation, will improve the feasibility of this technique. However, it has to be determined whether this approach offers any benefit except for cosmesis compared with the standard laparoscopic surgical technique of gastrojejunostomy for these patients who benefit highly from rapid recovery.

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