Laparoscopic Intestinal Derotation

Original Technique

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Abstract: The intestinal derotation technique, introduced by Cattel and Valdoni 40 years ago, is carried out using a laparoscopic procedure, which is described here for the first time. The method is effective in the treatment of malign lesions of the III and IV duodenal and during laparoscopic subtotal colectomy with anastomosis between the ascending colon and the rectum. Ultimately, the procedure allows for the verticalization of the duodenal C and the anterior positioning of the mesenteric vessels, facilitating biopsy and resection of the III and IV duodenal portions and allowing anastomosis of the ascending rectum, avoiding both subtotal colectomy and the risk of torsion of the right colic loop. Although the procedure calls for extensive experience with advanced video-laparoscopic surgery, it is both feasible and repeatable. In our experience we have observed no mortality or morbidity.

Key Words: laparoscopic intestinal derotation, laparoscopic colectomy, duodenal adenocarcinoma

METHODS

Patient Selection

The decision to perform laparoscopic intestinal derotation should be based on disease-related factors. Medical conditions that would compromise the safety of the anesthetic—defined as Physical Status Classification IV or greater by the American Society of Anesthesiologists—are the only factors that would preclude the procedure.

Patient Preparation and Positioning

The operation is performed under general anesthesia. Thromboprophylactic measures were adopted routinely and in all cases bowel preparation was performed and prophylactic antibiotic therapy was administered intravenously 1 hour before the scheduled surgery. The stomach is decompressed with a nasogastric tube, which is removed at the conclusion of the procedure. The patient is placed in a supine position, in reverse Trendelburg (45 degrees), with arms tucked at the sides and legs spread apart in a left lithotomy position. The surgical monitor is placed by the patient’s right shoulder. The operating surgeon stands between the patient’s legs, the assistant stands by the patient’s left flank and a second assistant is positioned by the patient’s right flank, near the equipment table.

Trocar Placement

Three to four trocars are typically used in this procedure. The first trocar is placed 1 cm above the umbilicus with periumbilical access and is used as the optical port for the 10 mm 30-degree laparoscope (Fig. 1). Using Hasson trocar technique, and after establishing CO2 pneumoperitoneum, abdominal pressure is initially maintained between 8 and 12 mm Hg. The second and third 10 mm ports are placed bilaterally, 10 mm from the external lateral margins of the rectus abdominal muscle and 6 cm below the transverse umbilical line. Either of the first 2 ports may be used for the laparoscopic ultrasound probe or for the passage of the vascular staplers. To complete the procedure it may be necessary to position a fourth trocar of 5 mm to introduce a palpator in cases where the left liver is exceptionally large and obstructs the vision of the laparoscopic field, or to mobilize the stomach. If the derotation is carried out for a subtotal colectomy, the trocar position will be that used in colectomy (Fig. 2). Two antitrauma Babcock...
graspers and one harmonic scalpel are needed for this procedure, the latter being essential for avoiding accidental lesions during dissection, performed using simple monopolar or bipolar scalpels.

Technique
For tumors, a complete staging laparoscopy is performed to rule out the presence of secondary malignancy or unresectable duodenal disease, because of the local invasion of the retroperitoneum or visceral vascular involvement. Adhesions from earlier surgeries are lysed and the peritoneal surfaces are inspected.

Once the abdominal cavity has been carefully explored, the first jejunal loop is identified and retracted to the right until the Treitz ligament can be seen and incised (Fig. 3). An incision is made along the peritoneal reflection and the cecum and right colon are mobilized by cutting away the Told lamina from the Gerotas lamina, close to the lateral wall of the bowel from the tip of the cecum upward to the region of the hepatic flexure to expose the right duodenal margin (Fig. 4). The mobilization continues into the splenic flexure along the pre-duodenopancreatic submesocolic fascia or Fredet’s right transverse mesocolon fascia and the omental prepancreatic supermesocolic fascia.

Kocher maneuver and duodenal-pancreatic mobilization are subsequently performed. With the lateral peritoneal

FIGURE 1. Trocars position during intestinal derotation for stenosis of third and fourth duodenum portion.

FIGURE 2. Trocars position for intestinal derotation during subtotal colectomy.

attachment divided, the large bowel may be lifted medially. Dissection of the mesenteric root up to the previously dissected Treitz ligament permits the mobilization of the entire intestinal package, positioned to the left during this maneuver (Fig. 5).

Once the entire intestinal package is freed from its ligaments, by applying traction on the second portion of the duodenum the first loop runs from left to right. The maneuver is completed when all the loops rotate on the mesenteric axes and are arranged in complete derotation in the right paracolic gutter (Fig. 6).

Once derotation is completed, the “C” duodenal becomes vertical, continuing with the first jejunal loop. The cecum will stand in the left abdomen and the mesenteric vessels will be lifted forward (Fig. 7).

After a completed derotation it is possible to carry out the resection of the III and IV parts of the verticalized duodenum and biopsies of posterior parietal lesions of the distal duodenum. In cases of mesenteric clamp syndrome, the derotation is the treatment of the disease itself. With laparoscopic subtotal colectomy, intestinal derotation facilitates reconstruction, permitting ascending rectum anastomosis and avoiding both total colectomy and the risk of colic right loop torsion.

This procedure lasts, on average, 120 minutes.

**RESULTS**

With 20 years of intestinal derotation open surgery experience, in July 2006 we performed—for the first time in literature—a total video-laparoscopic intestinal derotation for neoplastic stenosis of the IV duodenum, and evaluated its feasibility. The patient involved suffered severe stenosis of the duodenum, not evidenced as a mass in imaging tests (computed tomography, magnetic resonance imaging, ultrasound). During the operation we observed, only after derotation, a neoplasia of the III and IV duodenum with...
for the first 24/36 hours). The second day after surgery was well controlled with Ketorolac (30 mg every 12 hours). Postoperative pain and recovery of the peristalsis took place between the third and fourth postoperative day. Postoperative ileus was treated by applying the same technique, except that the duodenum was treated by applying the same technique. After this first positive experience in a patient without a duodenal suture, enteral feeding may be introduced on the second or third postoperative day.

We have found video-laparoscopic intestinal derotation allows for the positioning of the duodenum and subtotal colectomies according to Cattel and Valdoni’s indications; it is important to evaluate the risk of lesions to the duodenum after intestinal derotation.

### DISCUSSION

The objectives of performing laparoscopic intestinal derotation can be summarized as follows:

- Feasibility of the derotation procedure using video-laparoscopic technique;
- Repeatability of method;
- Determining the indications;
- Verification of time frames and technical difficulties in the video-laparoscopic procedure;
- Application of the method for lesions of the III and IV duodenum and subtotal colectomies according to Cattel and Valdoni’s indications;
- Evaluation of advantages and disadvantages of the laparoscopic procedure of itself.

The procedure is surely feasible and repeatable in a reasonable time frame (120 to 180 min), as demonstrated by our experience. Given the particular technical difficulty of the procedure, the surgeon who attempts this method should have extensive experience in laparoscopic surgery of the colon, stomach, and pancreas, and also experience in open derotation surgery.

The fields of application and advantages of the procedure are as follows:

- Diagnosis of nonextra-mucosal (nonextra-sieroso) stenosis of the III and IV duodenum.
- Treatment of pathologies of malrotation as found in mesenteric clamp syndrome.
- Avoidance of far more radical procedures—such as duodenocefalocrancresectomy—in the treatment of D3 and D4 tumors.
- Advantage of video-laparoscopic gastroenteroanastomosis over open surgery in the treatment of D3 and D4 tumors inasmuch as the procedure allows for optimal stadiation of the disease, histopathologic diagnosis, and good surgical palliation.

In our experience, we did not observe tangible advantages to the application of the method in subtotal colectomies with ileus-rectal and ascending-rectal anastomosis, as the diminished risk of an anastomotic twist (more hypothetical than real) does not justify the added surgical time and technical difficulties of subtotal video-laparoscopic colectomies. Morbidity and morbidity were incidentally not observed in our experience, but it is not possible to sufficiently evaluate such parameters in a feasibility and repeatability study such as ours.

From July 2006 to December 2007, we have performed 5 video-laparoscopic intestinal derotations, 3 of which were in subtotal video-laparoscopic colectomy owing to neoplasia and 2 because of adenocarcinoma of the III and IV duodenum.

We have not observed any mortality or morbidity owing to the derotation process. All patients were discharged between the sixth and ninth postoperative day, and recovery of the peristalsis took place between the second and fourth postoperative day. Postoperative pain was well controlled with Ketorolac (30 mg every 12 hours for the first 24/36 hours).

### CONCLUSIONS

We have found video-laparoscopic intestinal derotation to be both feasible and repeatable, and from our experience, believe that the procedure leads to a number of advantages.

Video-laparoscopic intestinal derotation allows for peristalsis restoration on the second postoperative day. In patients without a duodenal suture, enteral feeding may be introduced on the second or third postoperative day. The procedure also seems to result in a reduction of postoperative pain when compared with open surgery.

Video-laparoscopic intestinal derotation prevents the risk of colic right loop torsion in cases of anastomosis ascending rectum and leads to resolution of stenosis from benign causes.

It may be important to note that the possibility of laparotomic or laparoscopic reintervention after histologic neoplasia diagnosis does exist.\(^5\)
We have found that video-laparoscopic intestinal derotation is a feasible technique and is a repeatable procedure, which, however, requires considerable experience in both laparoscopic surgery and open intestinal derotation.

REFERENCES


