Journal of Visceral Surgery (2019) 156, 433—439

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SURGICAL TECHNIQUE

Direct laparoscopic feeding jejunostomy

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Available online 4 October 2019

Introduction

Malnutrition is common in oncological digestive surgery [1] and represents a risk factor for early post-operative morbidity and mortality [2—4] and for poor long-term oncological prognosis [5—7]. The choice of approach to ensure pre- or post-operative nutritional support is fundamental. The parenteral intravenous route is simple to implement, but prolonged total parenteral nutrition exposes the patient to the risk of infection [8] and is often insufficient to cover the post-operative energy needs of a patient undergoing carcinologic surgery. When prolonged and intensive nutritional support is necessary, the enteral route (*i.e.* jejunostomy feeding tube) is preferred [9]. In digestive surgery, two situations justify the placement of a feeding jejunostomy:

- in the presence of a stenosing gastroesophageal tumor that prevents sufficient oral feeding, enteral feeding support is fundamental to allow a possible neo-adjuvant treatment, a palliative chemotherapy or a curative oncological surgery. Currently, esophagogastric cancer surgery is more and more often performed laparoscopically [10,11] with a significant decrease in morbidity including pulmonary complications after a Lewis-Santy resection [12]. Pre-operative laparoscopic feeding jejunostomy limits the formation of adhesions and lessens the risk of compromising the laparoscopic approach for appropriate oncological surgery at a second procedure;
- when a patient at-risk for malnutrition undergoes laparoscopic carcinologic resection and requires insertion of a feeding jejunostomy [13], it is a pity to lose the benefit of laparoscopy by converting to an open approach simply to perform the jejunostomy.

This surgical procedure should not be trivialized because it has a significant morbidity and is far from being harmless [14]. Here we describe a laparoscopic direct feeding jejunostomy technique.

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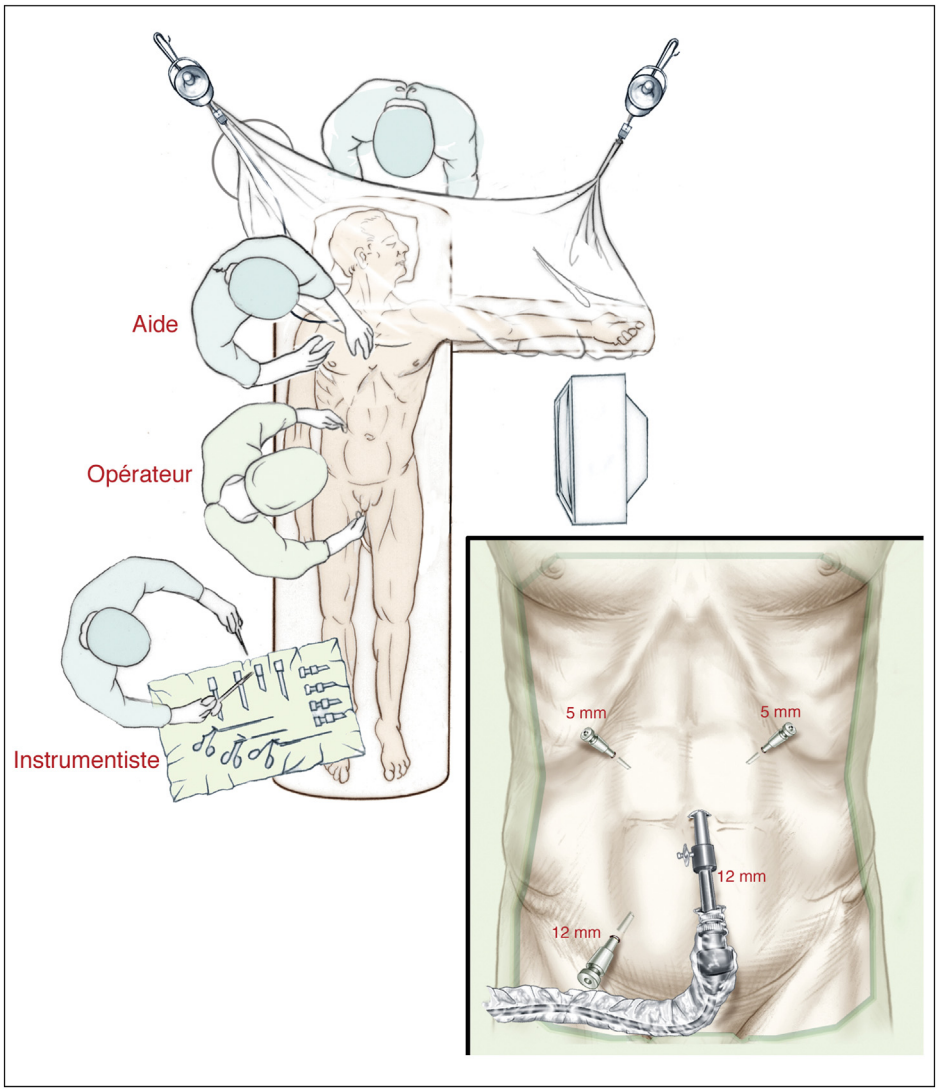
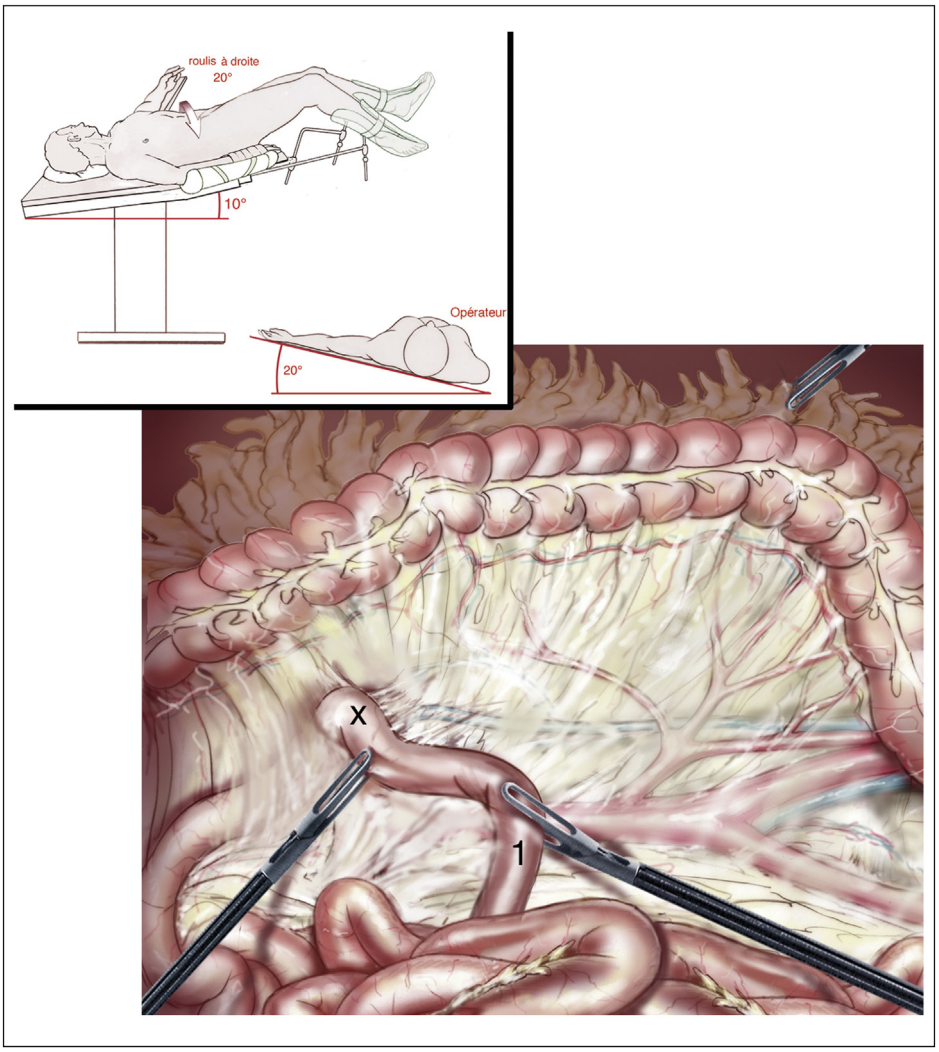
https://doi.org/10.1016/j.jviscsurg.2019.07.005



1 Patient installation and trocar layout

The patient is supine, with the right arm alongside the body, and the legs together. The operating surgeon stands to the patient's right with his assistant to his left. The scrub nurse stands to the operator's right. Only one video screen is needed and should be placed in front of the operator on the patient's left side.

A 12-mm optical trocar is inserted at the umbilicus by open technique. After insufflation of the peritoneal cavity to a target pressure of 12 mmHg, a 12-mm trocar is placed in the right iliac fossa. A third 5-mm trocar is positioned in right subcostal region, thus respecting the principle of triangulation. Finally, a fourth 5-mm trocar is inserted in the left upper quadrant about three fingertips beneath the costal margin along the mid-clavicular line at the site of the future jejunostomy.

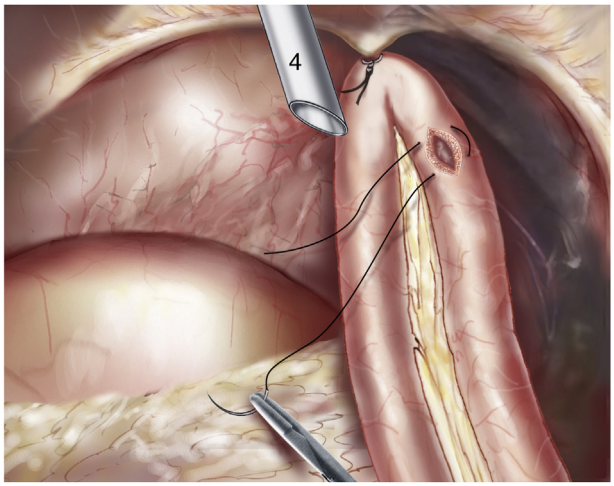


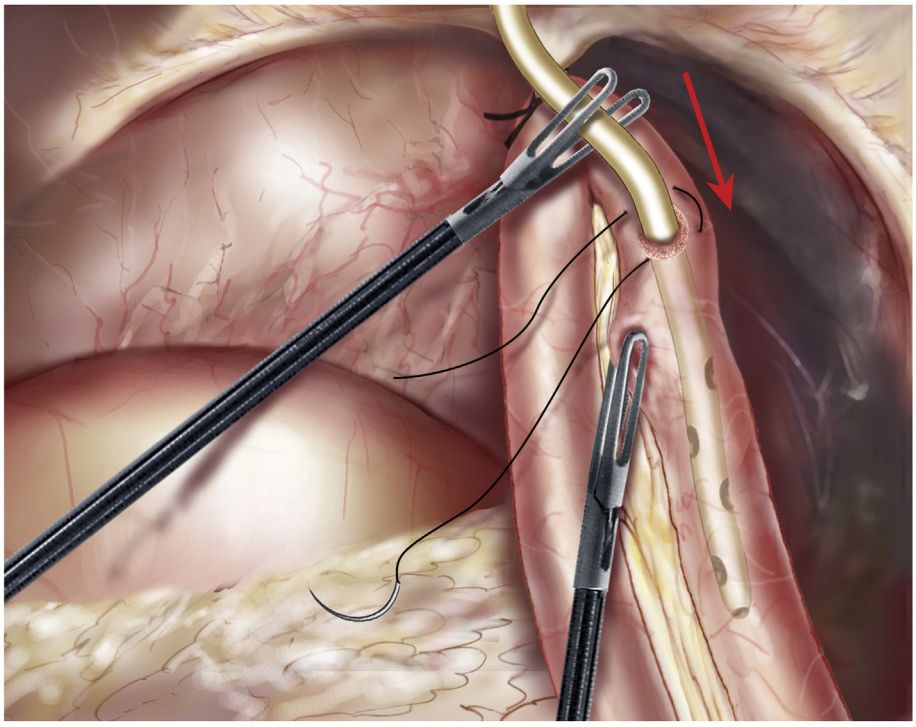
2 Identification of the duodeno-jejunal angle

After elevating the head of the operating table 10° and rolling it 20° to the right, the greater omentum is displaced above the transverse colon with two atraumatic grasping forceps. The small intestine is displaced to the right and inferiorly allowing identification of the duodeno-jejunal angle (x). The relative fixation of the first jejunal loop (1) and the presence on it left border of the inferior mesenteric vein confirm the identification of the duodeno-jejunal angle suspended by the ligament of Treitz.

3 Fixation of the jejunum to the abdominal wall and preparation of the intestine

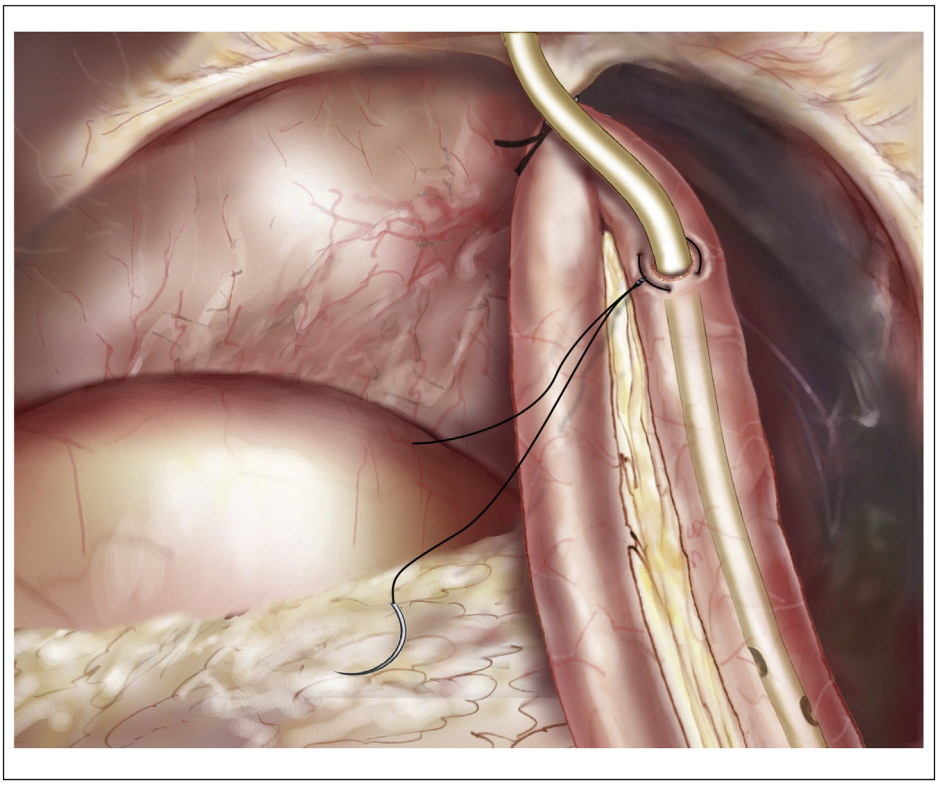
The small intestine is unrolled from the duodeno-jejunal angle for a distance of about 60 cm. After verifying that the small intestine can be brought up to the wall without tension, the loop is affixed by a single stitch lateral to the left upper quadrant trocar site (4) to facilitate the introduction of the feeding tube. A short jejunal incision is made on the anti-mesenteric border with the monopolar hook. A U-shaped mattress stitch is placed around the jejunotomy without being knotted as a purse string. It is easier to place this stitch before insertion of the feeding tube. It will ensure the attachment of the tube to the jejunum and limit its movement, thus limiting the risk of leakage of intestinal chyme around the orifice.





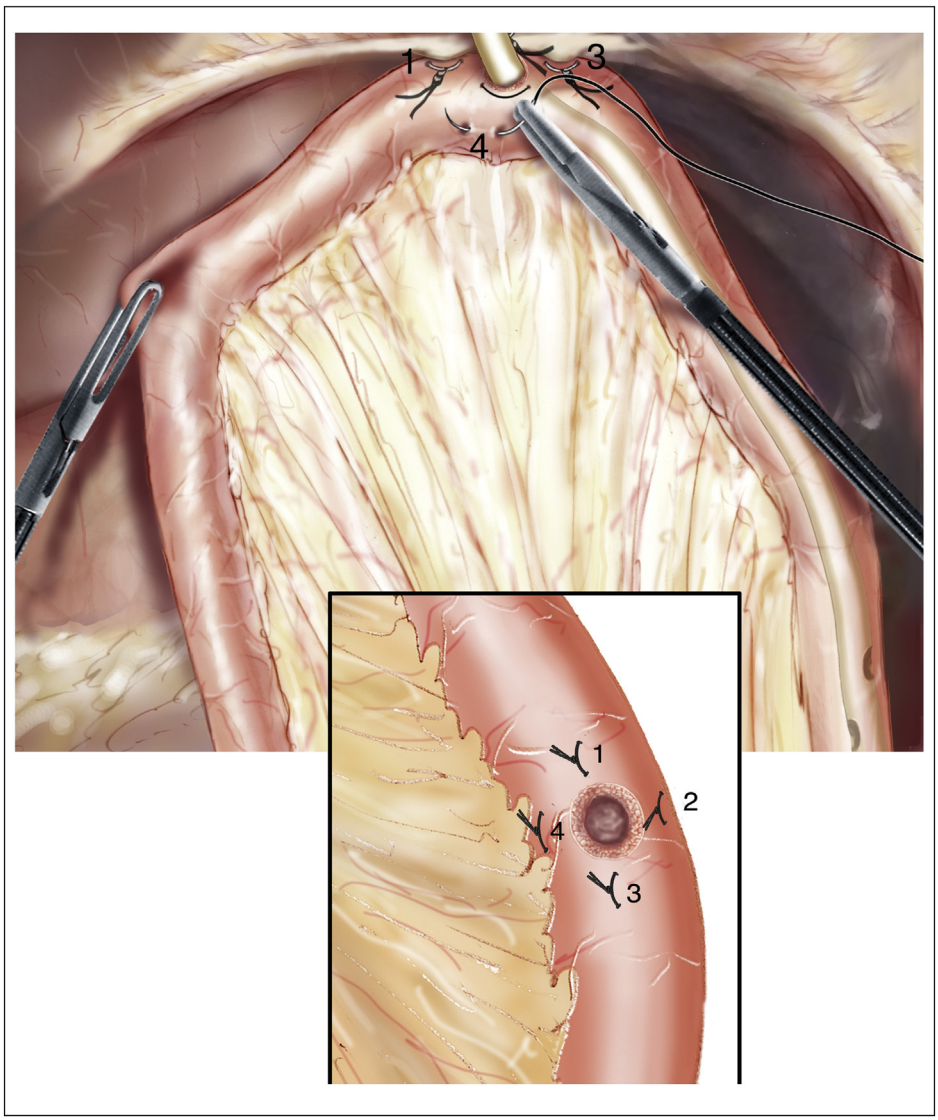
4 Placement of the jejunostomy tube

Several types of tube can be used for the feeding jejunostomy (*i.e.*, Pezzer tube, Foley catheter), however the use of dedicated multiperforated silicone tubes is preferable. If the caliber of the intestine allows, the use of a 12 Fr tube or larger facilitates its introduction and positioning in the jejunum and is less likely to clog. An atraumatic forceps, passed through the right subcostal trocar and into the internal orifice of the left upper quadrant trocar is used to pull the tube into the abdominal cavity after removal of the left upper quadrant trocar. The tube is then inserted into the small intestine through a jejunotomy and maneuvered distally for a length of 30 to 40 cm using forceps placed in the subcostal trocar. It is necessary to assure that the tube takes the downstream direction in the jejunum (arrow) and that it does not form a loop in the small intestine as it is advanced.



5 Fixation of the jejunostomy tube to the intestine

Once the feeding tube is correctly positioned, the previously placed mattress or purse-string is tied down to fix the tube to the jejunum and seal the enterotomy. Saline solution is injected through the proximal end of the tube to be sure that it is not kinked and flows easily and without leakage.

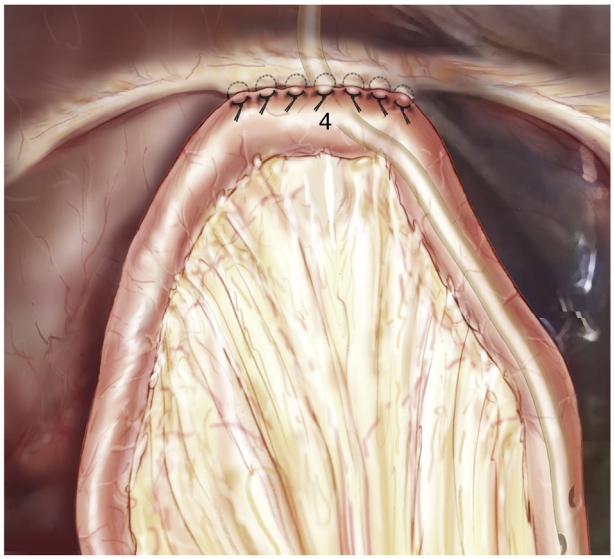


6 Fixation of the tube to the abdominal wall

Seromuscular sutures are placed at the four cardinal points (*i.e.* behind, in front of and lateral to the tube) to fix the jejunum to the anterior abdominal wall. The first left lateral cardinal point was already made beforehand during the suspension of the intestine (1). We place these sutures in a clockwise direction, placing the posterior stitch (2), the right lateral stitch (3) and finally the anterior stitch (4). Flow through the tube is tested again by injecting saline to verify free flow without leakage.

7 Prevention of jejunal twist

One or more stitches fix the upstream and downstream segments of the jejunal wall to the parietal wall to prevent jejunal twist around the axis of the jejunostomy. The greater omentum is then brought down over the small intestine. The tube is attached to the skin by several non-resorbable braided stitches and it is connected to a collection bag until feeding is started.



Conclusion

The knowledge of this simple, reproducible and minimally-invasive technique allows undernourished or at-risk patients to benefit from optimal nutritional support at the cost of limited morbidity.

Disclosure of interest

The authors declare that they have no competing interest.

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