Full Laparoscopie Pancreaticoduodenumectomy: Technic's Description

Bijan Ghavami[1,*]

[1]Departement of Surgery, Clinique La Source, Lausanne, Switzerland

[*]*Corresponding author*: Bijan Ghavami, Departement of Surgery, Clinique La Source, Lausanne, Switzerland. Tel: +41-216483285, E-mail: bijan.ghavami@gmail.com

Abstract

Background: The feasibility of safe full laparoscopic Cephalic duodenopancreatectomy (CDP) has been demonstrated by several authors.

Objectives: For its realization, we propose a 5 trocars approach.

Methods: Kocher maneuver is performed to reach the inferior vena cava, the infrarenal aorta, the rear plate of the uncinate process, and the superior mesenteric artery. Lymphadenectomy in the region can be done in a comprehensive way; interaortico cave, around the hepatico-duodenal ligament, and the celiac trunk and its branches. After dissection of the portal vein (PV), the pancreas can be cut away from the tumor, and its right part is separated from the PV. The duodenal bulb and the first jejunal loop are cut using a linear stapler. After cholecystectomy, the bile duct is cut upstream of the cystic.

Results: The reconstruction will include three anastomoses: termino-lateral posterior pancreatogastric by telescoping, end-to-side duodeno-jejunal and end-to-side hepatico-jejunal anastomoses.

Conclusions: The Cephalic duodenopancreatectomy (CDP) is entirely feasible laparoscopically. In obese patients, the CPD is more simple by laparoscopy. Of course, performing this complex procedure requires a careful selection of patients and an experienced surgical team.

Keywords: Laparoscopic, Pancreaticoduodenectomy, Technic's Description

1. Background

Since its first description by Gagner and Pomp in 1994 (1), minimally invasive pancreatic surgery has not been used very commonly because of its technical challenges (2). However, it is now considered feasible and safe (2-4). This purely laparoscopic approach is complicated by the difficulty of dissecting the structures involved, and especially the difficulty to perform the three anastomoses involved. This is why some physicians prefer the laparoscopy-assisted technique where reconstruction is performed after mini-laparotomy (5, 6). Careful patient selection is important: those with a history of abdominal surgery and or with a contraindication for laparoscopy, are not eligible. Large tumors and those that include vessels (portal vein, celiac trunk, the superior mesenteric artery), will be more difficult to dissect. High BMI, however, does not seem to be an obstacle but rather than an advantage over open surgery, facilitating access to the surgical site, reducing pain and improving postoperative period (7). For its realization, we propose a 5 trocars approach.

2. Technique

Under general anesthesia, the patient is lying on the back, both arms and legs spread. The surgeon stands between the legs (French position), with the assistant on the right and the nurse on the left.

Antibiotic prophylaxis.

Nasogastric tube

2.1. Five Needed Trocars

12 mm umbilical receiving optical.

12 mm para-umbilical right 10 cm from the navel.

12 mm on the left upper quadrant midclavicular line.

5 mm below costal left para-median.

5 mm subxiphoid for liver retractor.

2.2. Optics

10 mm angled at 30°

2.3. Instruments

non-traumatic intestinal clamps.

Forceps needle holder.

ultrasonic scissors.

Suction irrigation device.

mono and bipolar electrocoagulation.
Endoscopic staplers Linear 1.2 and 3.5 mm.
Slow absorbable thread 3.0, and 4.0.

3. Description

3.1. Dissection

After exploring the abdominal cavity, the intervention begins with the Kocher manoeuver releasing the duodenum up to and including the lower duodenal flexure. This gesture brings out the inferior vena cava and aorta (Figure 1), and allows the dissection of the posterior surface of the uncinate process of the pancreas and of the superior mesenteric artery. The inter-aorto-caval and sub-aortic renal vein lymph nodes can be removed for rapid histology. Lymphadenectomy proceeds along the superior mesenteric artery, the hepatoduodenal ligament, below the portal vein and the common bile duct. The posterior surface of the portal vein is dissected and the uncinate process of the pancreas is released as far as possible.
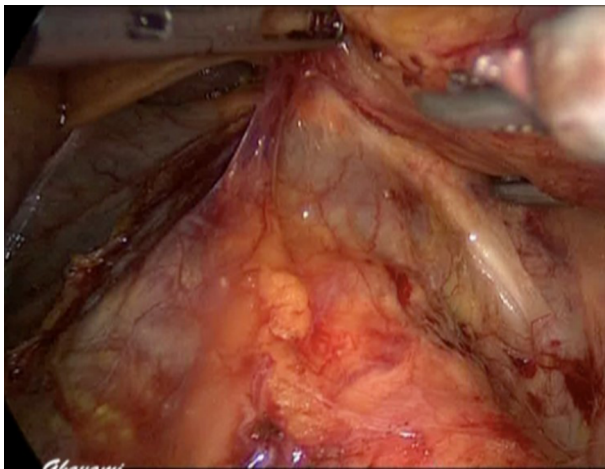

Figure 1. Figure 1

The lesser omentum is resected. At the upper edge of the head of the pancreas, the common hepatic artery (CHA) is approached. Dissection of CHA and its branches allows the excision of lymph nodes groups 8 and 12 (Figure 2), as well as the section of the gastroduodenal artery at its branching. Continuing towards the celiac trunk and the first part of the splenic artery along the head and body of the pancreas, the group 11 (splenic artery) and if necessary the group 9 (the celiac trunk), may be taken.

Lymphadenectomy of hepatoduodenal ligament exposes its different elements the common hepatic duct can then be individualized and loaded after cholecystectomy.
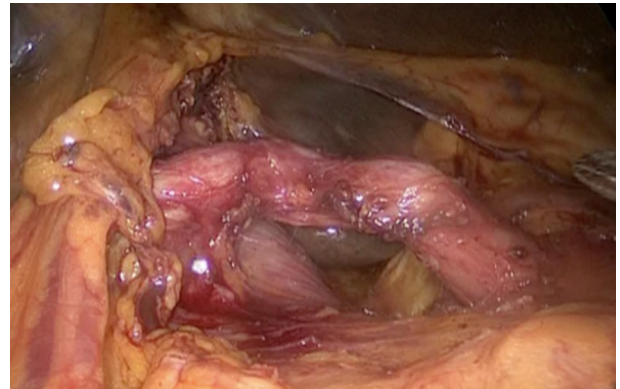

Figure 2. Figure 2

The colo-omental detachment allows reaching the posterior cavity of the lesser sac. By dissecting the lower rim of the pancreas, on the left of the ligament of Treitz, the termination of the inferior mesenteric vein is located. Moving on, to reach its junction with the superior mesenteric vein and splenic vein that form the portal vein. Dissecting it from the posterior surface of the pancreas, at the limit between the head and the body that is very easy laparoscopically, because it has a complete visual control of the region (Figure 3), which would be very difficult in laparotomy. Once this act is completed, the pancreas can be loaded and be prepared at a few centimeters distally.
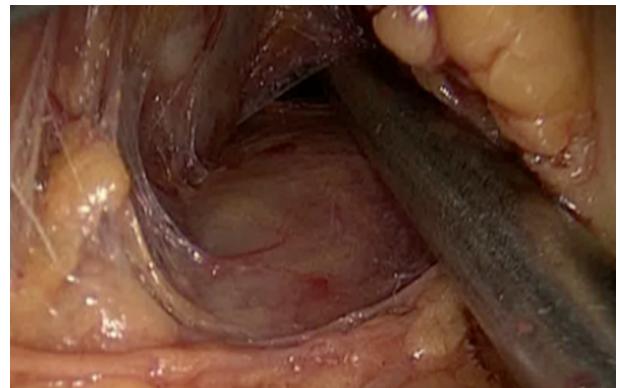

Figure 3. Figure 3

The section of the pancreatic parenchyma (Figure 4), is then performed on the left side of the portal vein. Ultrasonic scissors seem to be best for their fairly satisfactory hemostasis of the section. A recut of this section should be examined as a frozen section to ensure of tumor invasion absence. As the posterior surface of the portal vein has already been prepared, the only remaining part con-

sists of cutting its ties. It will only remain to get away its ties from the later (posterior) blade and to split draining veins of pancreas' head, and cut this vein to complete its separation from duodeno-pancreatic block (Figure 5).
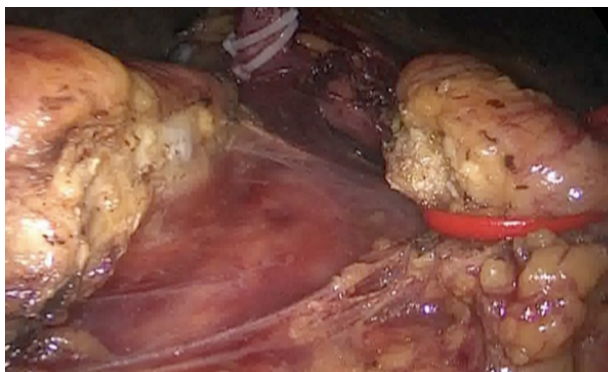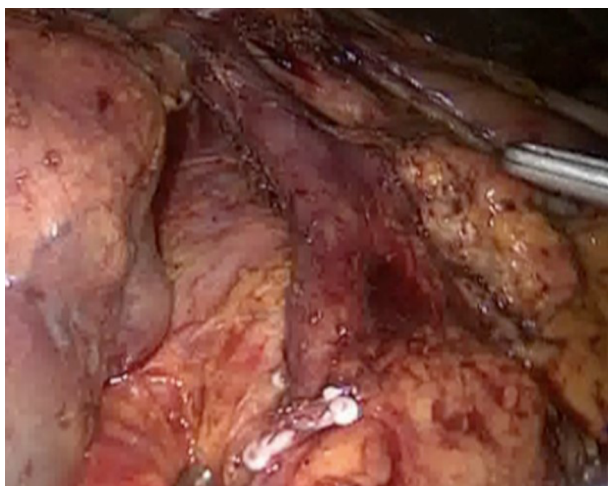

Figure 4. Figure 4

Figure 5. Figure 5

The ligament of Treitz then needs to be opened, and the first jejunal loop needs to be prepared and cut using the charger 1.2 mm linear stapler.

The duodenal bulb is then prepared at two centimeters and will be cut with the charger 3.5 mm linear stapler. The preservation of the pylorus allows the pancreatico-splenic gastrostomy without tension.

Finally, the section of the common hepatic duct upstream of the cystic duct releases the specimen.

3.2. Reconstruction

Jejunal stump is pulled to the operative site, either ante- or retro-colic under the ligament of Treitz (8).

The first anastomosis to perform, is the pancreaticosplenic gastrostomy. The pancreatic remnant is released at 2 to 3 cm. A continuous suture slow absorbable thread of 3.0 between the anterior surface of pancreas 2 cm from its border and the posterior surface of the stomach will put them back to back without tension. A gastrostomy along this suture enables the introduction (telescoping) of the pancreatic stump into the gastric cavity at 2 cm. The anastomosis is completed by a second running suture of the same thread between the free portion of the gastrostomy and the posterior surface of the pancreas (Figure 6).
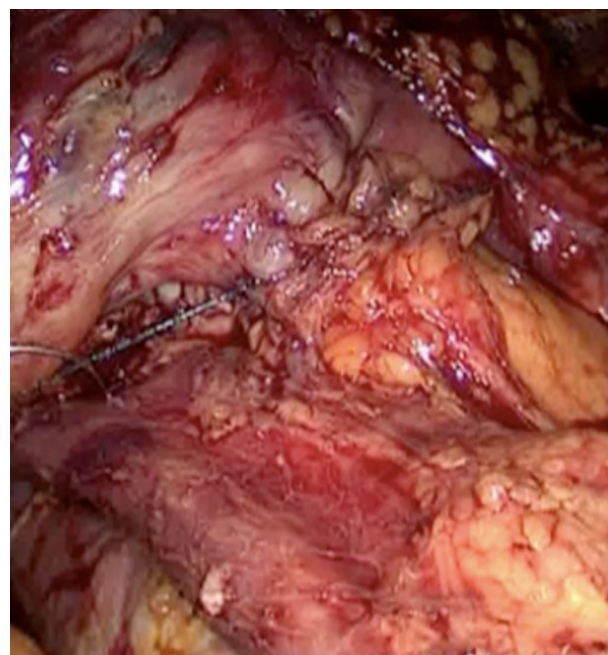

Figure 6. Figure 6

3.2.1. Duodeno-Jejunostomy

The jejunal stump is placed on the back of the duodenal section. The duodenum is opened over its entire width along the staple line, and the jejunum is opened longitudinally on its ante-mesenteric border opposite to duodenal opening (Figure 7). The anastomosis is achieved with an end-to-side in a plane, with two running sutures with 3.0 slow absorbable threads. The posterior side is done before the anterior side (Figure 8). It is easier to start running sutures on the right and head toward the left end.
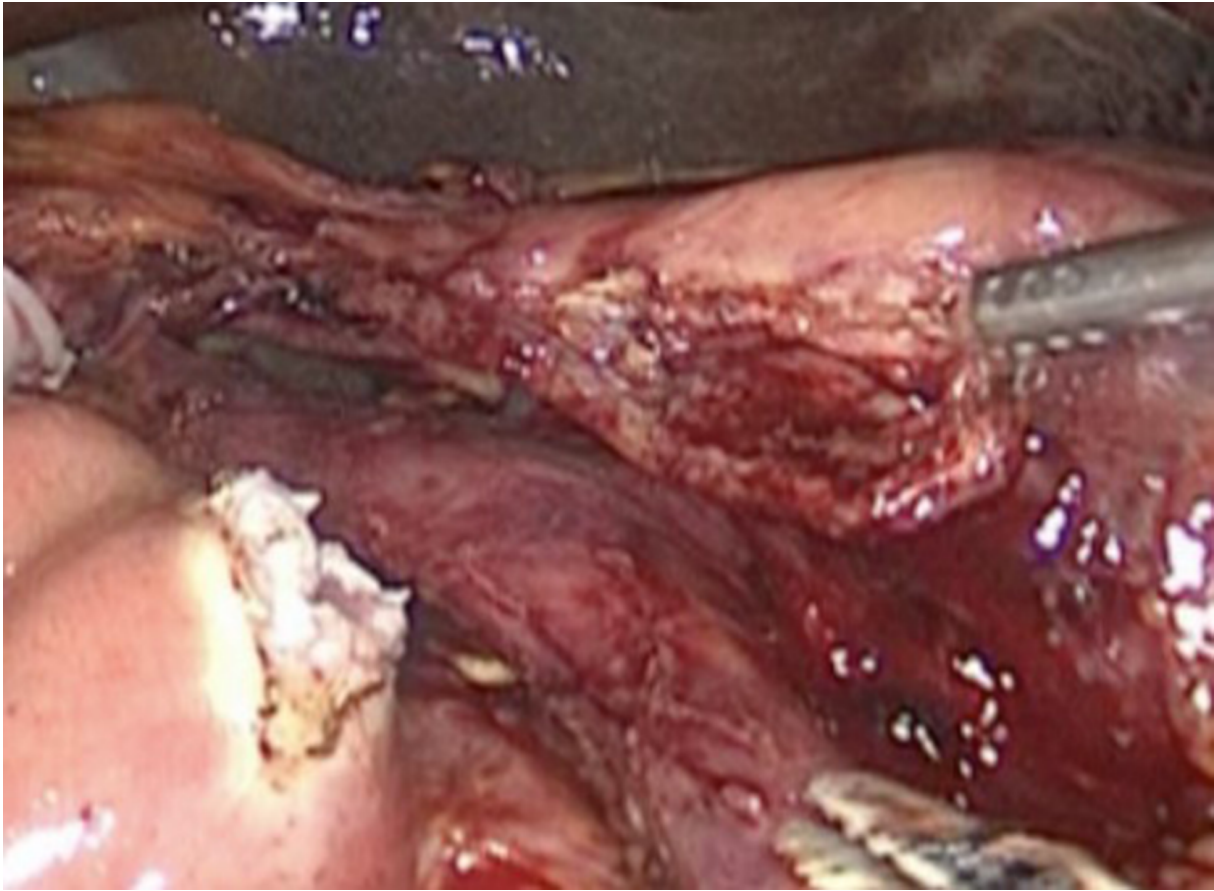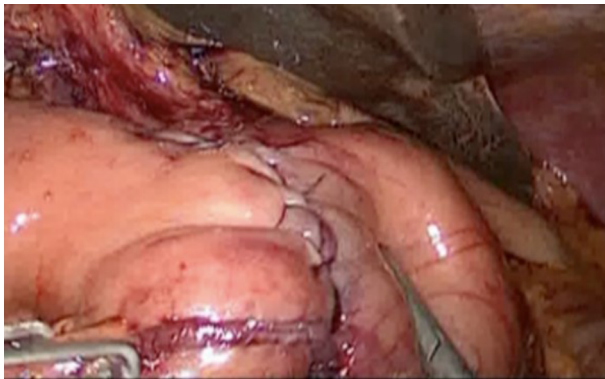
Figure 7. Figure 7

Figure 8. Figure 8

3.2.2. Hepatico-Jejunostomy

If the diameter of the common bile duct is less than one centimeter, it needs to be expanded by opening in with an inverted T longitudinally on its anterior surface. A small enterotomy adapted to the dimensions of the hepatic duct will be made on the lateral wall of the jejunum, where it will naturally get without tension near the bile duct. The hepatico-jejunostomy will be conducted on one plan by two running sutures of 4.0 slow absorbable thread (Figure 9). To prevent any tension on the sutures, the jejunum should be suspended from the gallbladder bed by one or two points of 3.0 thread.

3.2.3. Drainage

Two passive drains are brought out from right and left hypochondrium for draining the anastomoses.

A nasogastric tube will drain gastric contents during the gastric atonia period.

4. Discussion

The operating time depends on the surgeon's experience. The literature review published in 2015 by Merkow et
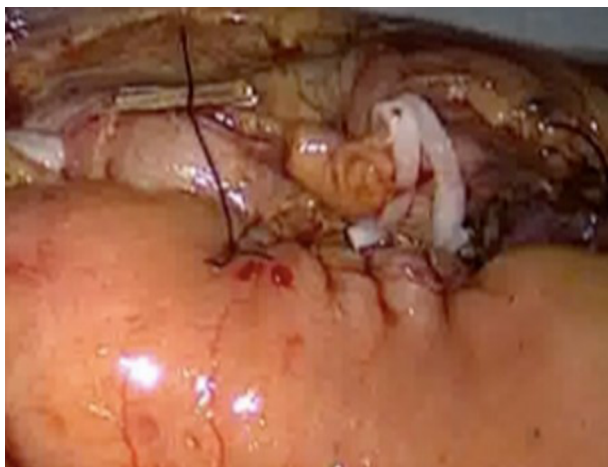
Figure 9. Figure 9

al. (2), reporting the results of 8 publications, includes 492 patients; they noted that the average operating time was 452 minutes (range 337 - 551 mn). Blair and Shahreez (4) reported the results of published duodeno-pancreatectomy as follows:

- Operating time: 337-628 minutes.
- Number of nodes removed: 7 and 45.
- R0 resection margin 63 to 100% (100% in half of publications).
- blood loss: 100 and 486 mL.
- Average length of stay: 7 to 23 days.
- Pancreatic Fistula: 0 to 35%.
- Morbidity: 0 to 50%
- Mortality: 0 to 14%.

Pancreatic fistulas are described less frequently in pancreatico-gastric anastomoses (9). Their approach is easier by laparoscopy. The preservation of the pylorus seems to be necessary for this purpose. Moreover, this technique is preferred by many authors (10-12) both in total laparoscopy and in assisted laparoscopy.

4.1. Conclusions

The Cephalic Duodeno-Pancreatectomy (CDP) is entirely feasible laparoscopically. Many studies have demonstrated its feasibility and its advantages for both benign and malignant lesions. Among its advantages, we can name less blood loss, the shortened length of hospital stay and most importantly, an improved post-operative comfort for the patient. In obese patients, the CPD is more simple by laparoscopy. Of course, performing this complex procedure requires a careful selection of patients and an experienced surgical team.

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