

Common Hepatic Artery Approach in Complicated Laparoscopic Distal Pancreatectomy

Ivelin Takorov, Stefan Simeonovski*, Tsonka Lukanova

First Clinic of Abdominal Surgery, Military Medical Academy, Sofia, Bulgaria

ABSTRACT

Laparoscopic distal pancreatectomy is the gold standard procedure nowadays for the treatment of symptomatic benign, premalignant and malignant pancreatic body and tail lesions. Tumor infiltration of the splenic artery (SA) near its origin, as well as the engagement of the splenic vein (SV) near its confluence with the superior mesenteric vein (SMV), or even localization on the body in front of the celiac trunk, could be a reason for technical difficulties. In such cases the most easily accessible major landmark is the common hepatic artery (CHA). The aim of the current article is to demonstrate our approach and to describe steps to facilitate the access of the SA. Laparoscopic distal pancreatectomy in cases with centrally located tumors can be technically difficult and should be performed only by surgeons with sufficient experience in open pancreatic surgery and advanced laparoscopic gastro-intestinal surgery. Identification of common hepatic artery can guide surgeons for safety performance.

Key words: Laparoscopic distal pancreatectomy; technical difficulty; common hepatic artery

*Corresponding author:

Stefan Simeonovski, M.D.

Mladost 1, bl. 85, ent. 9, app. 143

Sofia, Bulgaria, Postal code: 1797

Phone number: +359 883307103

E-mail: simeonovskistefan@gmail.com

ORCID numbers:

I. Takorov – 0000-0002-0648-3053;

S. Simeonovski – 0000-0003-1244-7021;

Ts. Lukanova – 0000-0001-5392-4897

Abbreviations:

SA: splenic artery;

SV: splenic vein;

SMV: superior mesenteric vein;

CHA: common hepatic artery;

LDP: laparoscopic distal pancreatectomy;

PDAC: pancreatic ductal adenocarcinoma;

CT: computed tomography;

ICU – intensive care unit.

INTRODUCTION

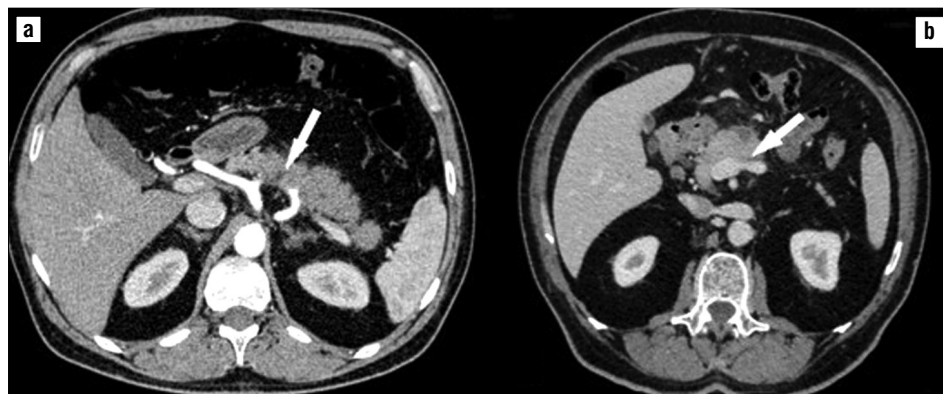
Laparoscopic distal pancreatectomy (LDP) has become the gold standard procedure for the management of symptomatic benign, premalignant and malignant lesions located in the pancreatic body and tail (1), since the technique was first described by Gagner and Cuschieri (2, 3). The laparoscopic approach is considered to reduce intraoperative blood loss, length of stay, overall morbidity (4, 5) and patients after LDP recover faster and are with better cosmetic results. Surgeons should attempt to preserve the spleen in cases of symptomatic benign or premalignant lesions, using the Kimura (6) or Warshaw (7) techniques, as splenectomy can be very incapacitating and can lead to severe post splenectomy sepsis. In patients with pancreatic ductal adenocarcinoma (PDAC) of the body or tail, LDP is safe and oncologically adequate procedure (8) in experienced hands. Being beneficial for patients, the laparoscopic approach can be very demanding technically for surgeons. It can have multiple complexities related to patient's habitus, tumor localization and relationship of the lesion with nearby vessels and organs. One of the most disturbing steps during the procedure can

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Figure 1 - (a): Axial CT image revealing splenic artery encasement (arrow); (b): Axial CT image revealing splenic vein infiltrated by pancreatic body lesion (arrow)



be the identification and dissection of the splenic vessels. We propose a technique, which we use successfully in technically challenging cases of LDP (*fig. 1 a, b*) and we called it the “Common hepatic artery approach”.

OPERATIVE PROCEDURE

General considerations

All patients undergoing LDP are being fully medically evaluated with routine hematologic tests including tumor markers and preoperative computed tomography (CT) of the abdomen with contrast enhancement. If splenectomy is planned based on the lesion location and size, vaccinations against *Streptococcus pneumoniae*, *Haemophilus influenzae* and *Neisseria meningitidis* are being administered pre- or postoperatively.

Patient positioning and port placement

The patient is placed in a supine position on the operative table and is well secured with circumferential straps. A foley catheter is placed and the operative field is cleaned. Patients can be tilted right side down and reversed Trendelenburg in order to facilitate gravity exposure of the left upper quadrant. The operating surgeon is between patient's legs and the first assistant is on the right. A 12 mm supraumbilical camera port is inserted using an open Hasson's technique. After pneumoperitoneum is established up to 12 mmHg, another two 12 mm and one 5 mm working ports are inserted under direct visualization (*fig. 2*).

Step 1: Gastrocolic and gastropancreatic ligament transection

We initiate the procedure with wide transection of

the two ligaments (*fig. 3*), as we preserve the gastro-epiploic arcade. We do not divide the short gastric vessels in standard LDP until the splenic vessels are identified and controlled, because a hemorrhage in the splenic hilum in the beginning of the procedure will compromise it.

Step 2: Common hepatic artery approach

In the abovementioned difficult LDP situations, we recommend the identification of the common hepatic artery as it is the most easily accessible major landmark (*fig. 4*). It is dissected along the superior border of the pancreatic gland until we identify the portal vein in depth and until we reach the celiac trunk laterally.

Step 3: Pancreatic control and transection

After we conclude with the dissection along the

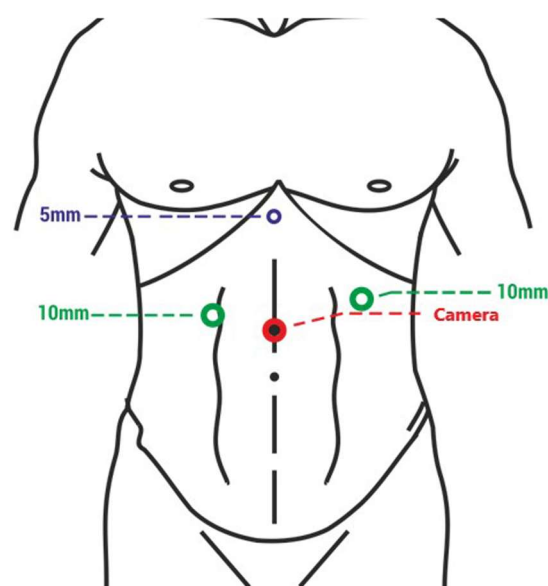


Figure 2 - Port placement

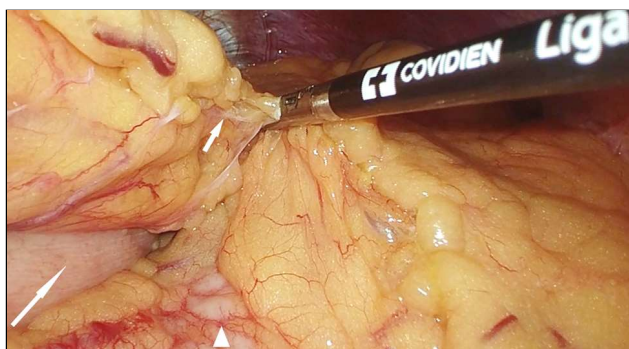


Figure 3 - Gastrocolic ligament transection (long arrow – stomach; short arrow – gastrocolic ligament; arrowhead – pancreas)

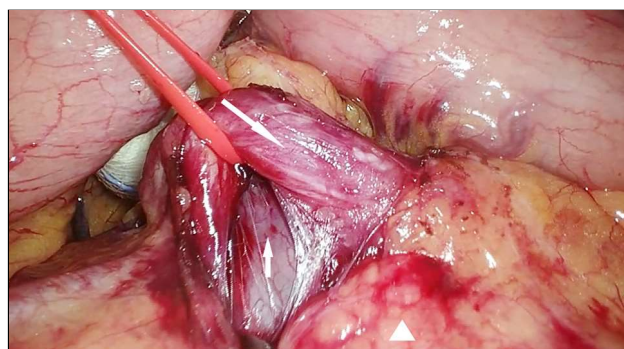


Figure 4 - Identification and taping of common hepatic artery (long arrow – CHA; short arrow – portal vein; arrowhead – pancreas)

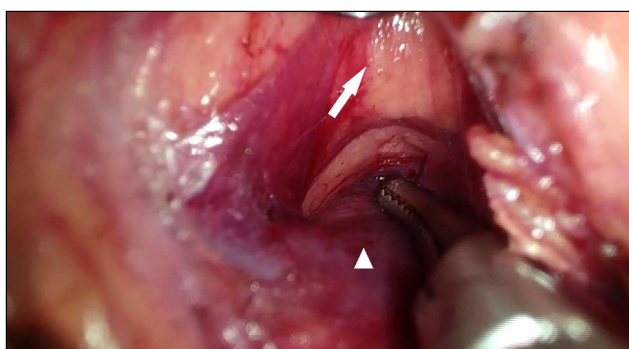


Figure 5 - Tunnelisation of the space between SMV and pancreatic neck (arrow – pancreatic parenchyma; arrowhead – SMV)

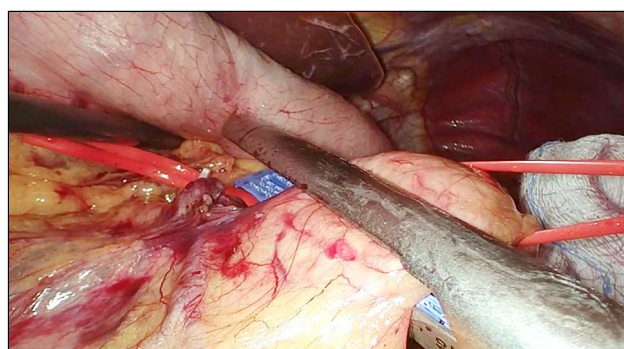


Figure 6 - Elevated pancreatic parenchyma being transected

superior pancreatic border, we transfer the dissection caudally along the inferior pancreatic border, where we identify the superior mesenteric vein and perform a retropancreatic tunnel between the gland and the mesenteric-portal venous axis (*fig. 5*).

After the pancreatic neck is dissected, the pancreas is taped and elevated ventrally. Pancreatic neck transection is performed in a very slow fashion, with a stepwise compression using a mechanical stapler (*fig. 6*).

After the gland is transected, the splenic vein is easily visible and accessible, in contrast to the splenic artery which is barely seen.

Step 4: Dissection and transection of splenic vein and artery

In standard laparoscopic distal pancreatectomy and in Warshaw procedure, transection of the splenic vein can be either performed with vascular stapler or with Hem-o-lok clips (*fig. 7*).

This step is mandatory for the clear exposure of the origin of the splenic artery (*fig. 8*), lengthening it, increasing its mobility, and likewise facilitating its control. The artery can also be stapled or clipped.

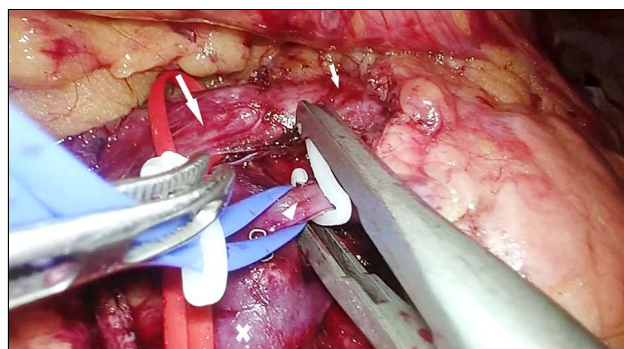


Figure 7 - Elevating and clipping the splenic vein (long arrow – CHA; short arrow – celiac trunk; arrowhead – SV; cross – SMV)

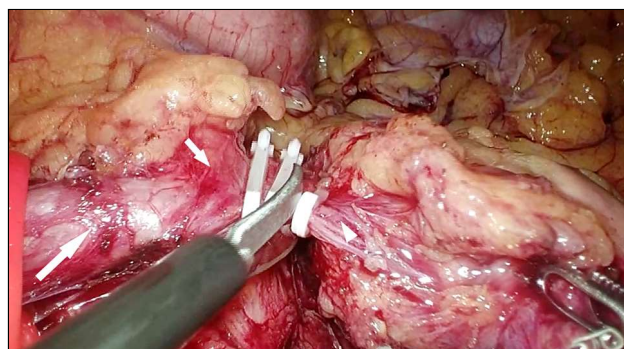


Figure 8. Transection of splenic artery (long arrow – CHA; short arrow – celiac trunk; arrowhead - SA)

Step 5: Specimen mobilization, removal and closure

Depending on the procedure, small gastric vessel can be either resected (standard distal spleno-pancreatectomy) or spared (Kimura/Warshaw procedure). In a Kimura procedure, we ligate the small vessels alongside the pancreatic parenchyma and spare the splenic vasculature. The specimen is placed in an Endo bag and removed from the abdominal cavity through a small suprapubic or median incision. The procedure ends with hemostasis verification. Drainage is placed in the lesser sac, near the transected pancreatic parenchyma.

Postoperative period

Patients rarely require stay in the intensive care unit (ICU) after the procedure. They are monitored closely for signs of hemorrhage. We place nasogastric tube, which we remove after gas passing. Drain output is monitored closely. If the patient has a pancreatic fistula, the management in our department is conservative. Patients with intraabdominal collections are managed with placement of percutaneous drainage.

DISCUSSION

Many different approaches facilitating the performance and enhancing the learning curve of LDP were described in the literature. Asbun et al. (9) described the “clockwise approach”, where the rate of conversion to hand-assisted approach is low (5%). We used the CHA approach (CHAA) in 10 technically demanding LDPs during the period: 01.10.2018 - 01.10.2023 and none was converted. Morikawa et al. (10) and Ome et al. (11) described the “artery first approaches”, where the superior approach provides shorter operation time and less blood loss. Our experience showed that in the “common hepatic artery approach” the blood loss was insignificant and the mean operative time was 183 minutes, which is comparable to the operative times of the abovementioned techniques, albeit our approach is used and performed only in complicated cases. Each of our patients was discharged uneventfully on the 7th postoperative day, which is the hospital stay as in our standard LDP procedures. Overall morbidity and mortality rate in the CHAA group was 0%. The number of patients described in our series is still very low and further investigations are needed, but we most sincerely hope that this technique will be of use in the everyday surgical practice.

CONCLUSION

The common hepatic artery approach in laparoscopic distal pancreatectomy is a feasible technique which provides patient safety, predictability of the procedure and gives the surgeon the possibility of performing a mini-invasive procedure in complicated cases.

Disclosure of interest

The authors declare that they have no competing interest.

Ethical statement

The study was conducted in accordance with the Declaration of Helsinki and approved by the Institutional Ethics Committee of hospital.

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