

# Totally laparoscopic pancreaticoduodenectomy with tangential portal vein resection

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## ABSTRACT

Totally laparoscopic pancreaticoduodenectomy (TLP) is an oncologically safe and feasible technique. It is performed in centers experienced in laparoscopic hepatobiliary surgery. Locally advanced pancreatic cancer with portal venous invasion seems to be a relative contraindication for laparoscopic surgery. There is no definitive data supporting such an approach. Case of a 47-year-old male patient with locally advanced pancreatic cancer determined to have portal confluence invasion in the preoperative period is reported in this study. Tumor was successfully resected with laparoscopic tangential portal vein resection (TPVR). In a selected patient with locally advanced pancreatic cancer, TLP with TPVR appears to be a safe and viable procedure when performed in high-volume centers with experience in laparoscopic hepatobiliary surgery.

**Keywords:** Pancreatic cancer; tangential portal vein resection; totally laparoscopic pancreatoco-duodenectomy.

## Introduction

Pancreatic cancer is one of the challenging problems of surgical oncology carrying a poor prognosis with a low 5-year survival rate.<sup>[1]</sup> About 80% of the patients are unresectable at the time of diagnosis due to locally advanced or metastatic stage of the disease.<sup>[2]</sup> Surgical resection is the only chance for patients to have curative therapy. The aim of the surgical treatment is to achieve R0-resection by total removal of the tumor mass.<sup>[3]</sup> However, involvement of major vessels is not rare and occurs in 21–64% of the patients.<sup>[4]</sup> While major arterial involvement is a contraindication for resection, major venous resection during pancreatico-duodenectomy signifies a feasible and safe procedure in traditional open surgery now.<sup>[5–9]</sup>

The first results of total laparoscopic pancreatico-duodenectomy (TLPD) have revealed its feasibility and safety.<sup>[10–12]</sup> Major vessel involvement is supposed to be a contraindication for laparoscopic approach. Only one study has shown its feasibility in selected patients revealing lack of data.<sup>[13]</sup>

## Case Report

A 47-year-old male patient was admitted to the surgical department of Moscow Clinical Scientific Center with abdominal pain in epigastrium and right hypochondrium, weight loss, sclera, and a skin turned yellow. Six months before the admission, he had felt pain in the upper ab-



Received: 02.05.2014 Accepted: 30.05.2014

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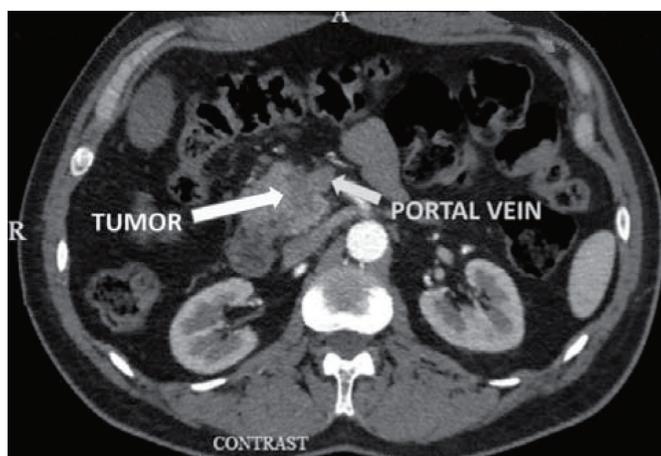
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domen, fatigue, meteorism, and weight loss. One week before the admission, he noted jaundice, steatorrhea and darkening of urine. Transabdominal ultrasound in the out patient revealed dilatation of biliary tree with the stenosis of terminal part of common bile duct. The serum bilirubin was 98  $\mu\text{mol/L}$  and CA 19-9 was 121 U/L. The patient didn't smoke and didn't consume alcohol. He was admitted for a detailed examination.

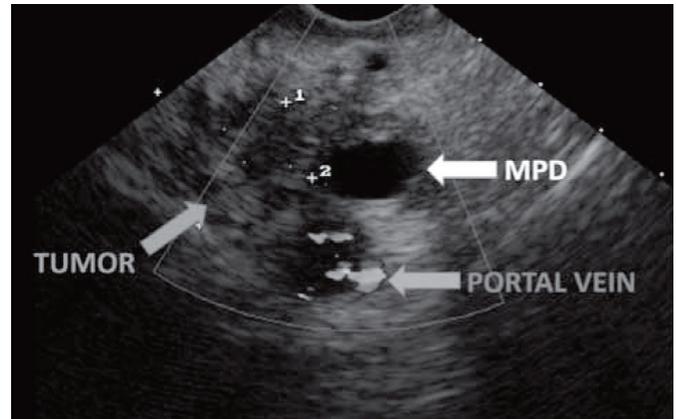
The biochemical analysis of blood indicated: total bilirubin 93.6  $\mu\text{mol/L}$ , conjugated bilirubin 44.5  $\mu\text{mol/L}$ , alkaline phosphatase 672.4 U/L, gamma-glutamyl transferase 1875 U/L, alanine aminotransferase 405.2 U/L, and aspartate aminotransferase 320.6 U/L. There were no deviations in clinical analyses of blood, urine and coagulogram.

Transabdominal ultrasound revealed that the pancreas was not enlarged (pancreatic head 32 mm, body 16 mm and tail wasn't seen). There was a tumor 26x27x25 mm in the head of the pancreas with irregular contour compressing common bile duct and main pancreatic duct not extending to the pancreas. There was no infiltration of the main vessels; the diameter of portal vein was 10 mm without signs of thrombosis and the blood flow was normal. The main pancreatic duct was twisted and dilated on whole length with diameter 8 mm with homogeneous content. The regional lymphatic nodes were not visualized. The liver was not enlarged; it had a smooth contour, medium echogenicity and no focal lesions. The biliary tree was dilated; the segmental ducts were of 1-2 mm, lobular ducts 9-10 mm and common bile duct was of 14-16 mm in diameter with biliary sludge.

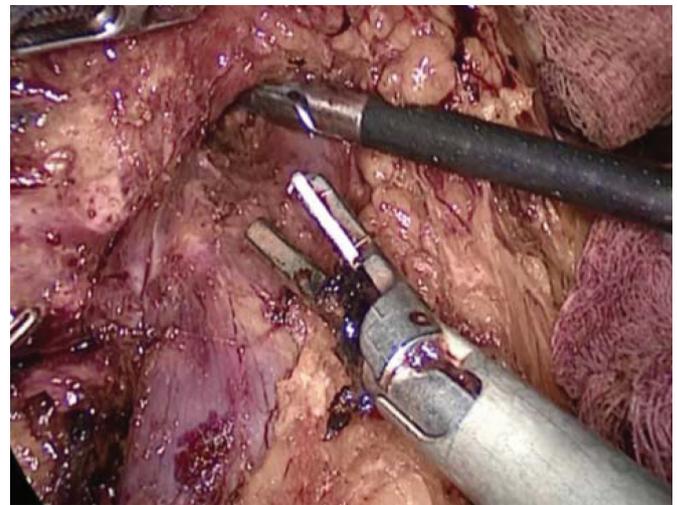
Contrast-enhanced MDCT of abdominal cavity showed the pancreas was not enlarged: the diameter of the head



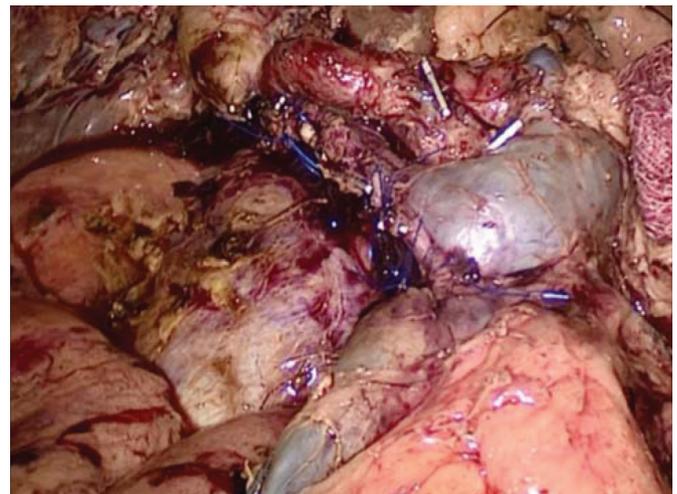
**Figure 1.** Contrast-enhanced MDCT of peritoneal cavity. Arterial phase.



**Figure 2.** Endoscopic ultrasonography demonstrating an infiltration of the superior mesenteric-portal vein wall by the tumor mass. The dilated main pancreatic duct is seen.



**Figure 3.** Intraoperative photo demonstrating invasion of the lateral wall of the superior mesenteric-portal vein confluence.



**Figure 4.** Intraoperative photo demonstrating operative field after tangential venous resection and removal of the specimen.

was 35 mm, the body 12 mm and the tail 15 mm. There was a hypodense tumor 16x15 mm in the head of the pancreas. The main pancreatic duct was 10 mm dilated before the tumor. The common bile duct was dilated to 19 mm and ended abruptly at the level of the upper edge of the pancreatic head. The portal vein was adjacent to the tumor for the length of 15 mm and was not narrowed. The arteries were intact and had typical anatomy (Figure 1).

The endoscopic ultrasonography revealed hypoechoic mass 20x25 mm with irregular contour and inhomogeneous structure without pancreatic texture. The main pancreatic duct ended abruptly in the tumor mass and its diameter was 8 mm. There were enlarged lymphatic nodes of 6–8 mm throughout the length of the hepato-duodenal ligament. The common bile duct was dilated to 15 mm with some biliary sludge in its lumen. The superior mesenteric vein had a 15 mm-length contact with tumor mass and the intima of the vessel was not visualized; however, the lumen of the vein was clear by Doppler US (Figure 2). EUS-guided fine needle aspiration was conducted. The diagnosis of pancreatic cancer was confirmed by cytology; there were cells with expressed nuclear and cellular polymorphism and several complexes of cells with anaplastic component.

The roentgenoscopy of the upper gastrointestinal tract indicated an infiltration of the duodenal wall from the head of the pancreas, a hyperkinesia of the duodenum, and failure of the cardiac sphincter.

On gastroscopy, duodenoscopy, colonoscopy, and chest X-ray, there were no pathologic findings. The patient was also examined by a therapist and there were no contra indications to perform a radical surgical treatment. Total laparoscopic pancreatico-duodenectomy with extended lymphadenectomy was planned.

Diagnostic laparoscopy was performed on 10 April, 2013. There were no distant metastases in the abdominal cavity. The surgical team decided to perform radical operation by laparoscopic approach.

### Operative Technique

Dissection was carried out by an ultrasonic scalpel. The gastrocolic ligament was transected and the Kocher maneuver was performed. Lymph nodes at the aortocaval space were dissected. The cholecystectomy was performed next followed by the dissection of the hepatoduodenal ligament. The gastroduodenal artery was mobilized, clipped

and transected. The common bile duct was transected above the cystic duct. Stomach was mobilized and transected by an endoscopic suturing device. Jejunum was transected 15 cm distal to Treitz ligament. The superior mesenteric vein was identified and isolated at the inferior border of pancreatic neck. Subsequently, a tunnel was made under the pancreatic neck and an infiltration of SMV/PV-confluence was found (Figure 3). Pancreas was transected at the level of its neck.

The SMV/PV-confluence was isolated by clamping of the portal vein, the superior mesenteric vein, and the splenic vein. The part of the lateral venous wall was cut off and sutured by an encircling stitch (Prolene 5–0) (Figure 4). The total time of clamping of the SMV/PV confluence was 15 minutes. Later, the uncinate process was mobilized. The superior mesenteric artery was mobilized and its right semicircle was dissected. The specimen was put in the container. Jejunum was placed in the upper abdominal cavity under the mesenteric vessels. Then dunking termino-lateral pancrea to jejunostomy (interrupted anastomosis, Ethibond 3–0), 15 cm distally -hepatico jejunostomy (run anastomosis, PDS 4–0) and gastro enterostomy in antecolic position (by using of Endo-GIA were all performed respectively). The peritoneal cavity was drained by two silicone tubes: one in the area of the pancreatico-jejunal anastomosis and the other in the area of pancreatico jejunostomy. The container with the specimen was removed via umbilical minilaparotomy (4 cm). The total volume of blood loss was 200 mL.

### Histological Investigation and The Postoperative Course

Moderately differentiated pancreatic ductal adenocarcinoma, grade 2, with intra- and extrapancreatic perineural invasion. The tumor was infiltrating duodenum and the parapancreatic tissues at the posterior surface of the pancreas. There were no tumor cells in the border of resection in the pancreas, the main pancreatic duct and the common bile duct. Metastases in three peripancreatic lymph nodes were found.

Postoperative period was uneventful. A fast-track protocol in the treatment of this patient was used. On the 1<sup>st</sup> postoperative day, first bowel movement was confirmed and the nasogastric tube was removed. On the 2<sup>nd</sup> postoperative day, the patient spent one hour out of bed and had frequent cases of diarrhea (6 times a day) successfully treated by loperamide. ICU stay was 4 days. The enteral

nutrition began on the 5<sup>th</sup> postoperative day. The drain at the hepatico jejunostomy area was also removed on that day, and the drain from pancreaticojejunostomy was removed on the 7<sup>th</sup> postoperative day (due to abundant serous discharge). The length of postoperative hospital stay was 14 days without any complications. There was no readmission.

## Conclusion

Tangential venous resection during TLPD is feasible and safe. It may be performed in centers with experience in minimally invasive hepato pancreatobiliary surgery in selected patients.

## Disclosures

**Peer-review:** Externally peer-reviewed.

**Conflict of Interest:** None declared.

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