39 Pylorus-Preserving Pancreaticoduodenectomy

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Abstract

Pancreaticoduodenectomy (PD) is the standard surgical treatment for tumors of the pancreatic head, proximal bile duct, duodenum, and ampulla. Since its initial description by Whipple et al. in the 1930s, it has evolved and undergone several modifications. The development of specialist units has contributed to a marked reduction in postoperative mortality from approximately 30% to 5–6% or less.

Keywords

Pancreatic resection · Pancreatoduodenectomy

Since its introduction in 1978 by Traverso and Long-mire, pylorus-preserving pancreaticoduodenectomy (PPPD) has become the standard of treatment in periampullary disease [1]. Current mortality rates are 3% or less at high-volume centers because of advances in intraoperative and postoperative care, as well as technical refinements [2].

39.1 Surgical Techniques

39.1.1 Patient Position and Skin Incision

Adequate exposure is mandatory for safe PPPD. The patient is positioned supine and a midline incision is performed (Fig. 39.1). An abdominal retractor is used for secure retraction. A thorough abdominal exploration is used to investigate peritoneal or hepatic metastases, focused on the pelvis for unexpected metastases.

39.1.2 Kocher Maneuver

Occasionally, the hepatic flexure of the colon is released inferiorly, and a Kocher maneuver is performed to elevate the duodenum and the head of pancreas. Kocher maneuver should be performed to the left of the abdominal aorta. The dissection is conducted cephalad above the retrocholedochal lymph node, inferior to the transverse duodenum, and medially to the aorta (Fig. 39.2).

Supplementary Information The online version contains supplementary material available at https://doi.org/10.1007/978-981-16-1996-0_39.

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H. C. Yu (ed.), *Hepato-Biliary-Pancreatic Surgery and Liver Transplantation*,
https://doi.org/10.1007/978-981-16-1996-0_39

Fig. 39.1 Midline incision

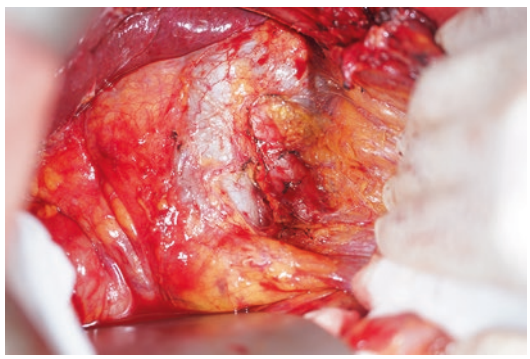

Fig. 39.2 Kocher Maneuver

39.1.3 Pancreatic Approach

The omentum is freed from the transverse colon in an avascular manner. The omental dissection is carried out from the right to the left, to complete separate the omentum from the right transverse mesocolon. The lesser sac is entered, and the entire anterior aspect of the pancreas is explored (Fig. 39.3a, b).

39.1.4 Duodenal Surgery

The right half of the omentum is mobilized and the proximal pancreas exposed, followed by the identification of middle colic vein down to its junction with the SMV. Exposing the lateral aspect of the SMV, the right lateral SMV is followed in a cephalad direction to the gastrocolic venous trunk. The gastrocolic trunk is ligated with fine sutures and divided (Fig. 39.4a, b). The right gastroepiploic artery and vein are divided and the stomach is retraced directly anteriorly, followed by duodenal traction. (Fig. 39.5) The duodenum can be severed at this time with GIA 2–3 cm distal to the pylorus (Fig. 39.6a, b).

39.1.5 Dissection of Lesser Sac

The gastrohepatic omentum beneath the left lobe of liver incised in an avascular manner carefully protects the nerves of Latarjet. Tissues anterior to the hepatoduodenal ligament are carefully incised and the right gastric artery divided. The common hepatic artery is identified and retraced (Fig. 39.7). The plane between the superior border of the pancreas and the common hepatic artery is dissected superiorly, and PV is identified. GB is mobilized from GB bed above downward. The cystic artery is ligated and divided. The common bile duct is palpated posteriorly to determine the presence of the accessory or the right hepatic artery arising from the SMA is replaced. The bile duct is then mobilized along the plane between the PV and the common hepatic duct, and clamped and severed (Fig. 39.8).

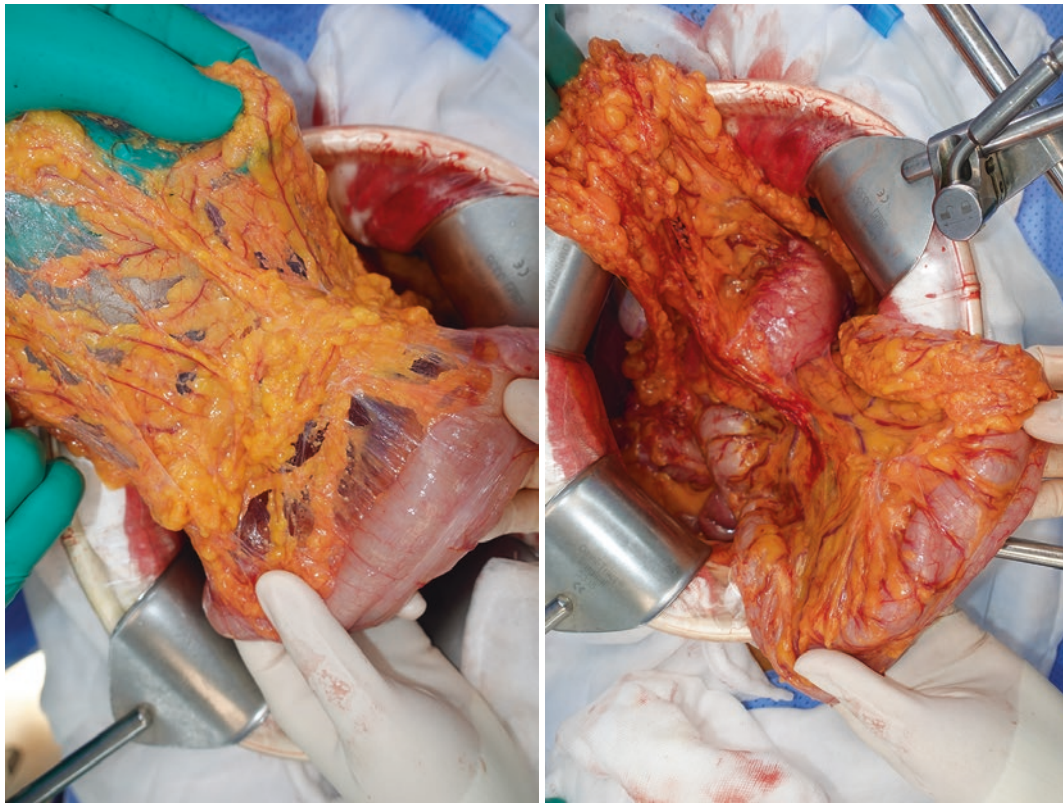

Fig. 39.3 Omentectomy

39.1.6 Division of the Pancreas

The space under the pancreatic neck anterior to superior mesenteric vein is suitable for dissection. Using a blunt clamp alternately advancing and spreading, a plane is then developed between the pancreatic neck anteriorly and the SMV-PV confluence posteriorly. A blunt clamp is then placed behind the pancreatic neck and slightly elevated. The pancreatic neck is divided carefully. The consistency of the pancreas and the size of the pancreatic duct is noted, and a specimen from the neck of the pancreas is removed and submitted as margin. Bleeding from the transected pancreas is controlled with sutures and ligated as needed.

Hemostasis is completed. The superior and inferior longitudinal pancreatic arteries are secured by suture ligatures. The end of the pancreas must be freed up for about 2 cm before the anastomosis is attempted, and any bleeding must be controlled via electrocoagulation or interrupted sutures (Fig. 39.9a, b).

Intraoperative assessment of the flow through the hepatic artery is performed before GDA ligation.

If median arcuate ligament syndrome is diagnosed during procedure, the median arcuate ligament must be divided before GDA ligation. GDA is identified and double-ligated after confirming the flow in the hepatic artery (Fig. 39.10a, b).

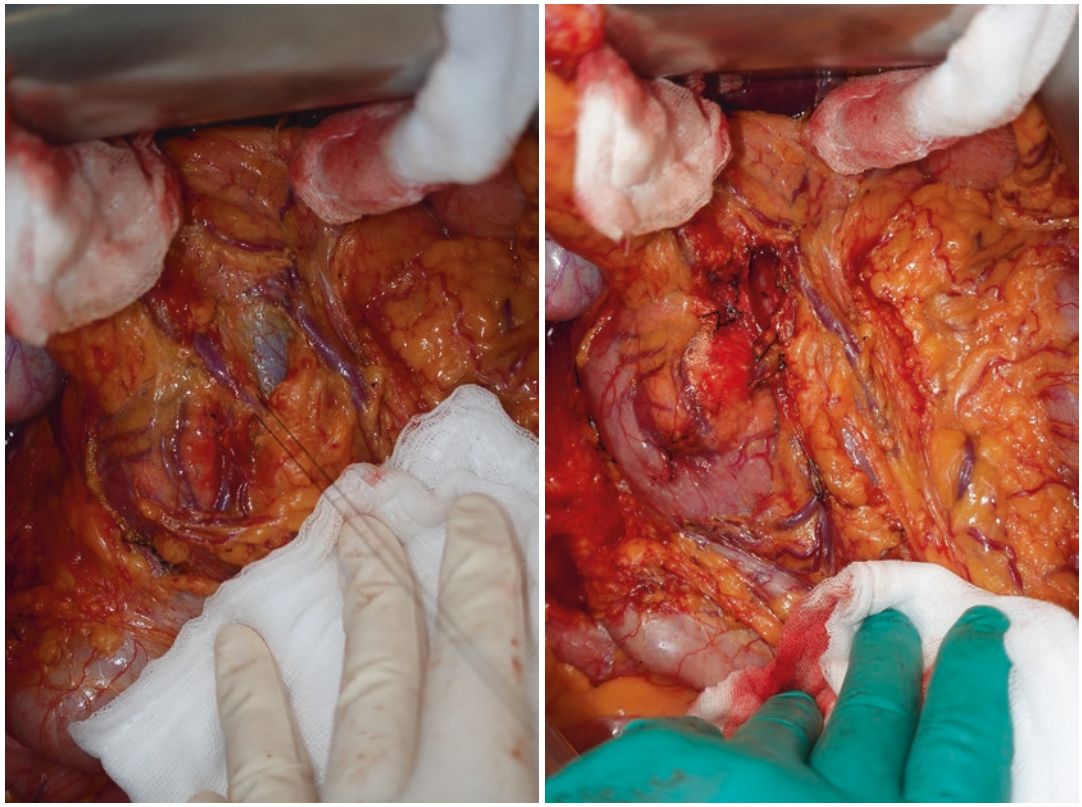

Fig. 39.4 Gatrocolic Trunk Approach

39.1.7 Mobilization of the Ligament of Treitz and SMA Dissection

The ligament of Treiz is mobilized, and the tissues to the right of the IMV are incised. The bowel is then transilluminated approximately 20 cm beyond the ligament of Treitz, and a mesenteric window is fashioned. The bowel is stapled and transected. With anterior and lateral traction on duodenum, the dissection is carried to a point at which the uncinate process is visible. Vein retractors are then applied to the SMV-PV confluence, and the PV is retracted to the patient's left, which allows retraction of the SMV-PV confluence to the left and anteriorly and provides access to the anterior aspect of the SMA. The adventitia of the SMA is incised carefully, exposing the SMA, followed by dissection posteriorly along the right side of the pancreas. It should be noted that the arterial branches originating from the posterolateral aspect of the SMA are very friable, easily avulsed, and may trigger annoying hemorrhage (Fig. 39.11a, b).

39.1.8 Reconstruction and Pancreaticojejunostomy

An opening is made in the mesocolon to the right of the middle colic vessels, through which

Fig. 39.5 Rt. gastroepiploic artery/Vein ligation

the jejunum passes. Preparations are made for the end-to-side pancreaticojejunostomy. The anastomosis is facilitated by mobilizing the pancreatic stump to elevate the stump anteriorly. With interrupted 4-0 vicryl sutures, the pancreatic parenchyma is sutured transversely to the seromuscular layer of the jejunum. A small opening is made with an insulated point cautery in a full-thickness stitch in the jejunum adjacent to the pancreatic duct. A silastic catheter with a diameter somewhat smaller than the pancreatic duct is inserted into the jejunal opening. The duct-to-mucosa anastomosis is created with interrupted 5-0 non-absorbable sutures with the posterior row completed tied. The silastic catheter is then advanced into the pancreatic duct to facilitate the anterior row of sutures and to prevent inadvertent suturing of anterior and posterior walls of the anastomosis. The sutures are placed inside-out on the jejunum and outside-in on the pancreatic duct, and tied. The anterior row of the anastomosis is completed with interrupted 4-0 vicryl sutures (Fig. 39.12a, b, c, d).

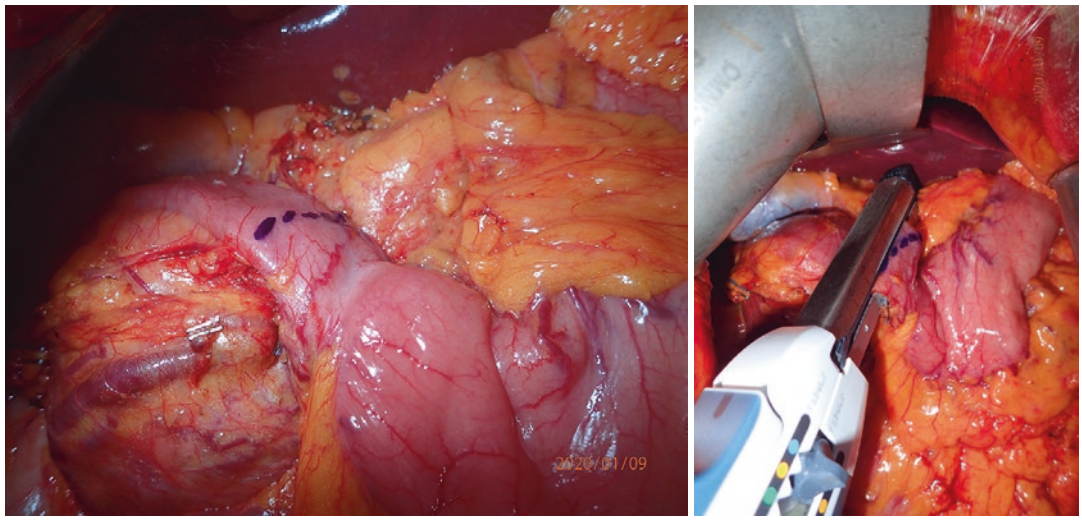

Fig. 39.6 Duodenal divided with GIA

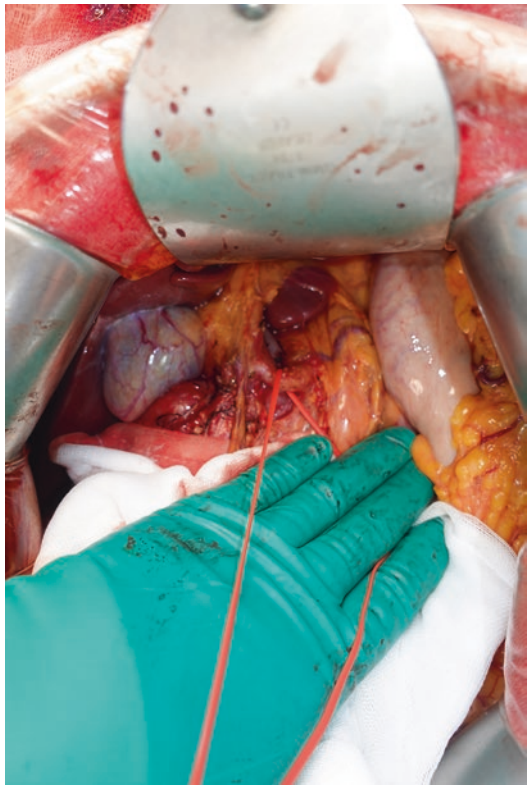

Fig. 39.7 Dissection of Lesser SAC

Fig. 39.8 Identify of CBD

39.1.9 Hepaticojejunostomy and Duodenostomy

Approximately 8–10 cm distal to the pancreaticojejunostomy, an end-to-side biliary enteric anastomosis is performed. A single layer of nonabsorbable interrupted suture is used through all layers (Fig. 39.13). Approximately 25–30 cm distally, an end-to-side duodenojejunal anastomosis is created in two layers: an inner layer with a running suture of vicryl and an outer layer with permanent interrupted sutures (Fig. 39.14). Two JP drains are placed posterior to the biliary and pancreatic anastomoses.

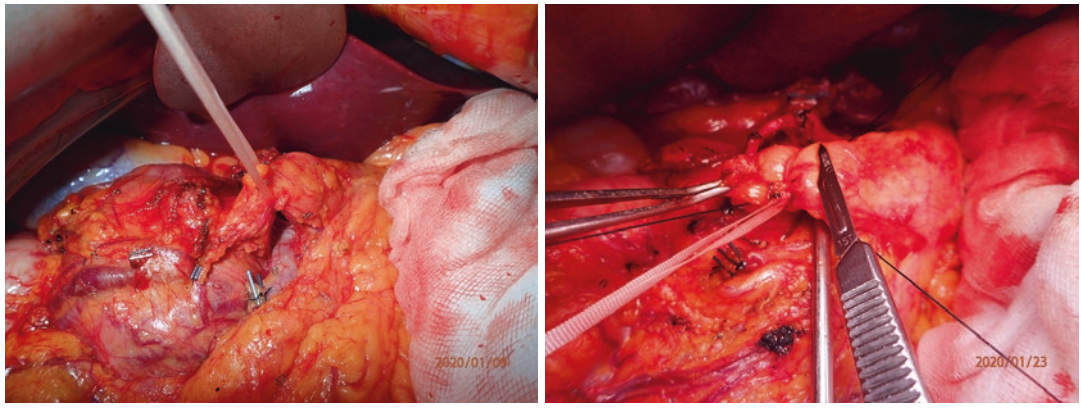

Fig. 39.9 Division of Pancreas

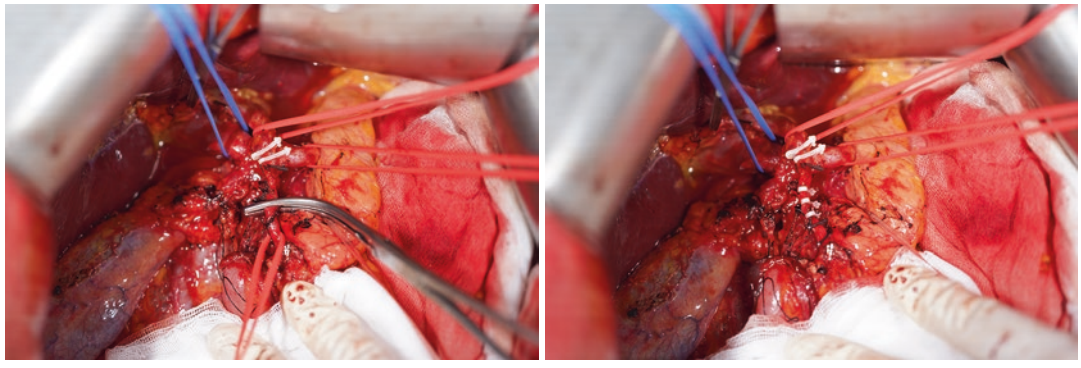

Fig. 39.10 GDA ligation

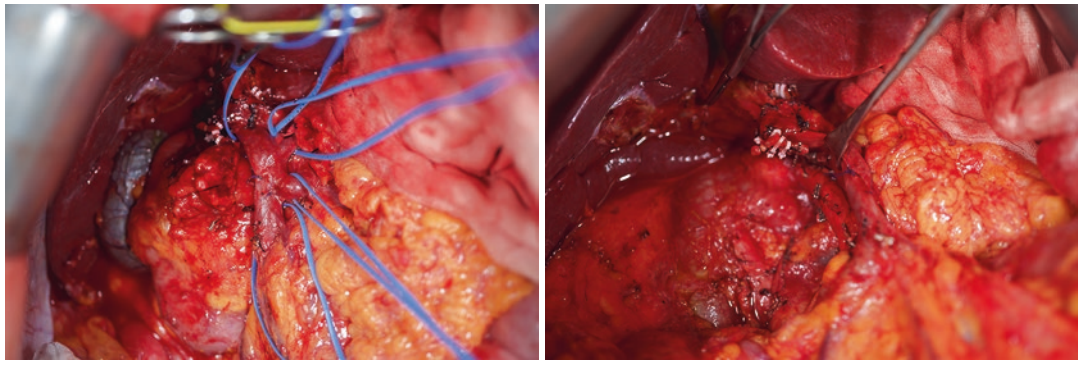

Fig. 39.11 SMV and SMA dissection

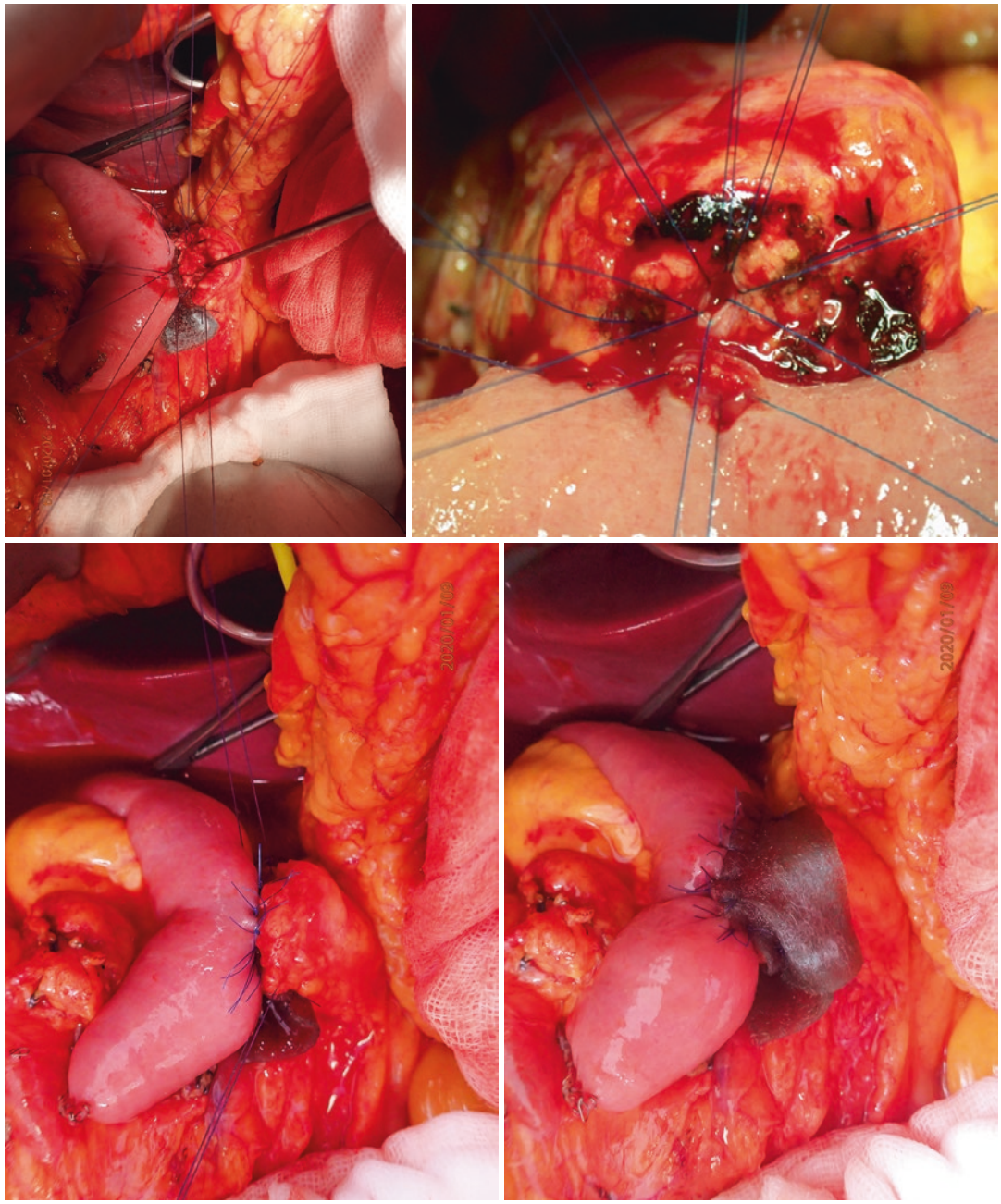

Fig. 39.12 Pancreatojejunostomy

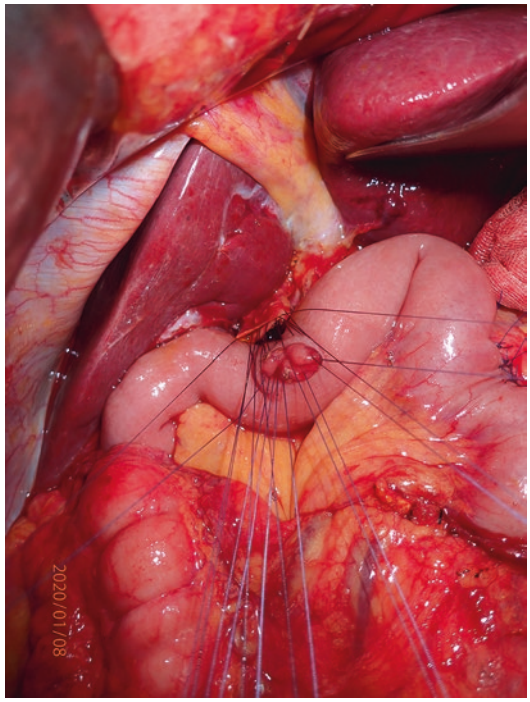

Fig. 39.13 Hepaticojejunostomy

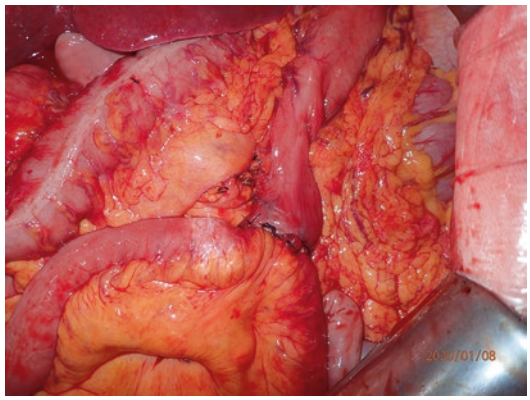

Fig. 39.14 Duodenojejunostomy

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