

Pancreaticoduodenectomy in portal annular pancreas: report of a case

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Abstract Portal annular pancreas (PAP) is a rare anatomical anomaly in which the pancreatic parenchyma surrounds the superior mesenteric vein and portal vein (PV) annularly. This anomaly requires careful consideration in pancreatic resection. A case is presented and the technical issues are discussed. A 61-year-old female was referred to the hospital for suspected papilla Vater adenocarcinoma. Preoperative computed tomography showed that the PV was annularly surrounded by pancreatic parenchyma. Surgery revealed the uncinate process extended extensively behind the PV and fused with the pancreatic body. The pancreas was first divided above the PV, and it was divided again in the body after liberating the PV from pancreatic annulation. The postoperative course was uneventful without pancreatic fistula. It is safer to divide the pancreatic body on the left of the fusion between the uncinate process and the pancreatic body to reduce the risk of pancreatic fistula in pancreaticoduodenectomy for PAP.

Keywords Pancreas · Portal annular pancreas · Pancreaticoduodenectomy · Portal vein

Introduction

Portal annular pancreas (PAP) is an anatomical anomaly in which the uncinate process of the pancreas extends

extensively behind the superior mesenteric vein (SMV) and/or portal vein (PV), and then fuses with the dorsal surface of the pancreatic body [1]. Pancreatic tissue annularly surrounds the SMV–PV and requires careful consideration during surgical planning for pancreatic resection. A case of PAP is herein presented and the technical issues are discussed.

Case report

A 61-year-old female with PAP was referred to the hospital for pylorus-preserving pancreaticoduodenectomy for papilla Vater adenocarcinoma. Preoperative computed tomography (CT) showed that the PV was annularly surrounded by pancreatic parenchyma and PAP was diagnosed (Fig. 1a). Endoscopic retrograde pancreatography (ERP) demonstrated the inferior head branch of the pancreatic duct (IHBPD) in the uncinate process (Fig. 1b). The connection between IHBPD and the main pancreatic duct (MPD) could not be identified in the pancreatic body. Magnetic resonance cholangiopancreatography (MRCP) revealed the same findings (Fig. 1c). The intraoperative findings were compatible with CT. The uncinate process extended extensively behind the PV, and then fused with the dorsal surface of the pancreatic body (Fig. 2). The pancreas was divided above the PV in order to liberate the PV from pancreatic annulation, and then the body of the pancreas was divided again (Fig. 3). Reconstruction was performed by a modification of the method described by Child with pancreatojejunal anastomosis performed by duct-to-jejunum, end-to-side pancreatojejunostomy. [2] Pancreatic duct-to-jejunal anastomosis was performed with 9 interrupted sutures using monofilament slowly absorbable material (5-0 Maxon, Covidien Co.). The pancreatic

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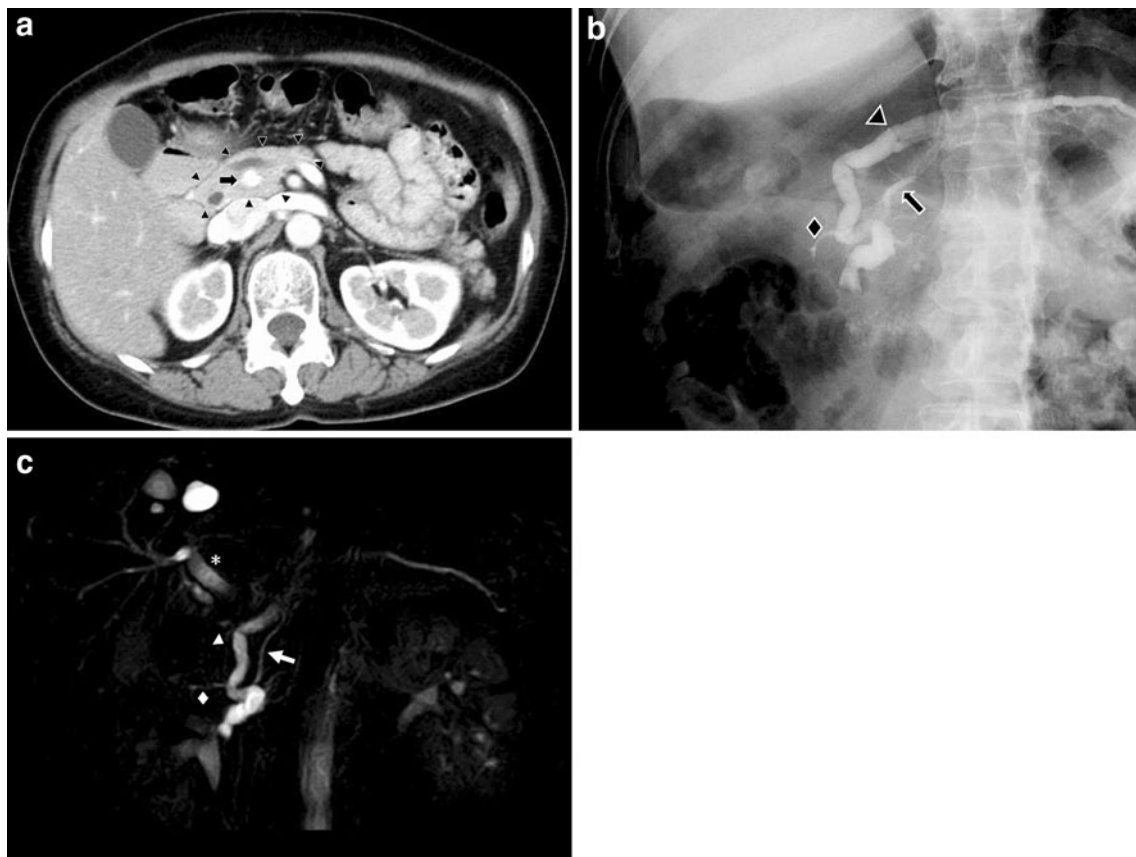


Fig. 1 Preoperative findings of a portal annular pancreas by computed tomography and endoscopic retrograde pancreatography. CT shows the portal vein (*arrow*) is surrounded annularly by pancreatic parenchyma (*arrow heads*; Fig. 1a). Endoscopic retrograde

pancreatography and MRCP shows that the inferior head branched pancreatic duct (*arrow*) was visualized as well as the main pancreatic duct (*arrow head*; Fig. 1b, c). The common hepatic duct (*asterisk*) and duct of Santorini (*filled diamond*) were also visualized

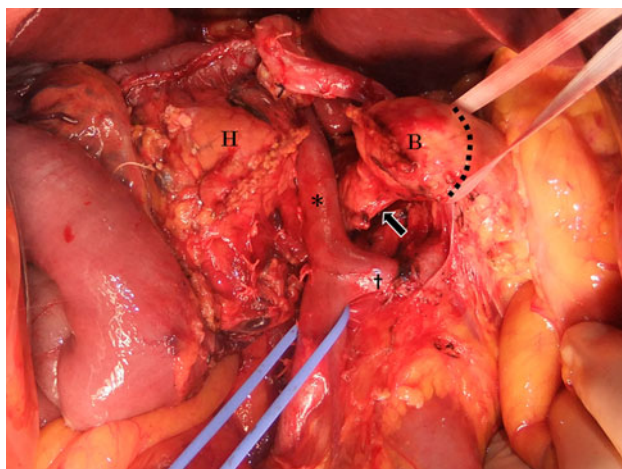


Fig. 2 Intraoperative findings of the portal annular pancreas. The pancreatic head (*H*) was divided from the pancreatic body (*B*) with a stapling device above the portal vein (*asterisk*). The uncinate process (*arrow*) extended behind the PV and fused with the dorsal surface of the pancreatic body. The fusion was superior to the splenic vein (*dagger symbol*) The pancreatic body was divided again along the dotted line

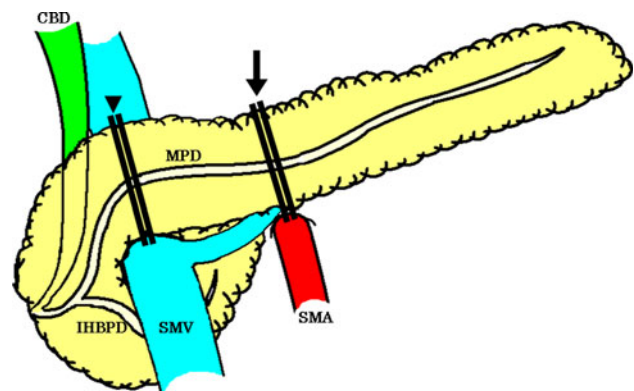


Fig. 3 Schematic illustration of the planes of pancreatic division. The pancreas was first divided above the portal vein (*arrow head*) and then subsequently divided again to the left of the fused area between the uncinate process and pancreatic body (*arrow*)

stump and jejunal seromuscular layer were closely approximated with 5 interrupted sutures using monofilament non-absorbable material (4-0 Nespylene, Alfresa Pharma Co.) as described by Kakita et al. [3]. A 7 French (Fr) polyethylene tube was placed in the MPD as a lost

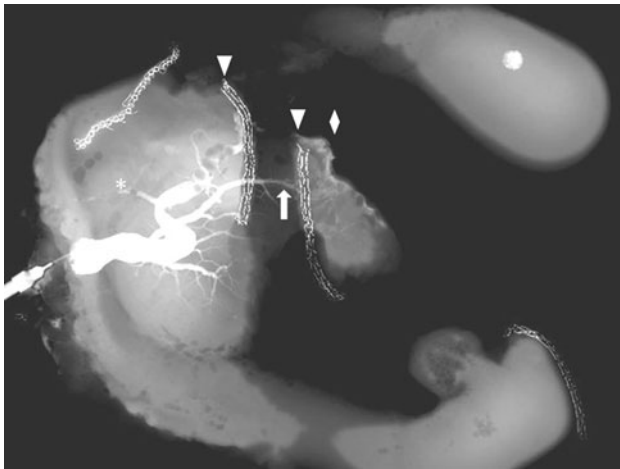


Fig. 4 Postoperative pancreatography of the specimen. The pancreas was first divided above the SMV–PV with a stapling device (*inverted triangles*). The pancreas was divided again in the body (*diamond*). The inferior head branched pancreatic duct (*arrow*) extended in the uncinata process stretching to the dorsal surface of the pancreatic body. The duct of Santorini (*asterisk*) was also visualized

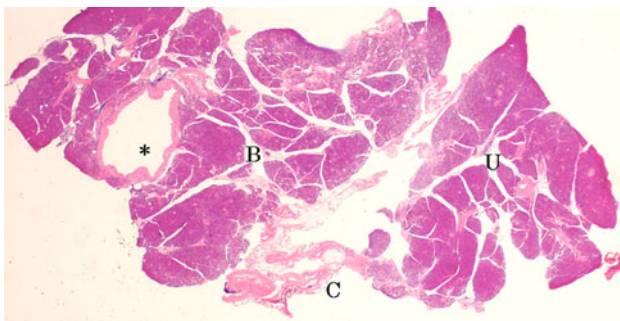


Fig. 5 Histological examination of the fusion between the uncinata process and the dorsal surface of the pancreatic body (magnified with a loupe). There were connective tissues (*C*) between the uncinata process (*U*) and the pancreatic body (*B*). No ductal continuity was identified between the main pancreatic duct in the body (*asterisk*) and the branched duct in the uncinata process

stent. Postoperative pancreatography of the specimen demonstrated extension of IHBPD in the uncinata process without connection to the MPD in the pancreatic body (Fig. 4). The fusion between the uncinata process and the dorsal surface of the pancreatic body was histologically examined. There was connective tissue between the extended uncinata process and pancreatic body, and no ductal continuity was identified between the IHBPD in the uncinata process and the MPD in the pancreatic body (Fig. 5). The postoperative course was uneventful.

Discussion

PAP is a rare anatomical anomaly with a reported incidence of only 1.14 % [1]. PAP is classified as suprasplenic,

intrasplenic and the mixed type depending upon where the uncinata process fuses in relation to the splenic vein [4]. PAP requires division of the pancreatic parenchyma at least twice to liberate the SMV–PV. The present case was the suprasplenic type and required pancreatic division twice (Fig. 4), whereas it is necessary to divide the pancreas three times in patients with the mixed type. The uncinata process is derived from the ventral pancreatic bud and contains its own pancreatic duct [5]. Therefore, a retroportal pancreatic duct is invariably present in PAP to drain the uncinata process with or without ductal continuity between its branch and the MPD in the pancreatic body. A retroportal MPD develops if the IHBPD connects to MPD in the body [4, 6, 7]. The current case clearly demonstrated the presence of IHBPD in the extended uncinata process on both preoperative ERP and postoperative pancreatography, but there was no ductal continuity with the MPD in the pancreatic body either radiologically or histologically. Dividing the pancreas anywhere in the uncinata process would have produced two independent pancreatic dissecting planes, one with the MPD and the other with an isolated IHBPD, and such a procedure would have increased the risk of pancreatic fistula. In fact, previous reports of pancreaticoduodenectomy for PAP described a prolonged postoperative course due to the development of a pancreatic fistula [1, 6, 8–10]. One solution to prevent pancreatic fistula might have been to ligate the retroportal pancreatic duct [4, 7], but two independent pancreatic dissecting planes would have still remained. Therefore, it was safer to dissect the whole uncinata process to produce only one dissecting plane with the MPD in the pancreatic body. This procedure produces only one dissecting plane with the MPD even in the case of a retroportal MPD. The current case did not histologically demonstrate the fusion and ductal continuity between the uncinata process and the dorsal surface of pancreatic body. It might have been possible that there were only physiological adhesions between the uncinata process and pancreatic body. Only one pancreatic division above the SMV–PV might have been sufficient in that case, with separation of the physiological adhesions in order to produce only one dissecting plane with the MPD in the pancreatic body. However, lysis of tight adhesions between the pancreatic body and uncinata process carries some risk of pancreatic fistula from the raw pancreatic surface once it is injured during separation. Therefore, the pancreas was first divided above PV in the present case, and the final division was performed to the left of the fusion between the uncinata process and pancreatic body (Fig. 3). In conclusion, PAP should be treated by dividing the pancreatic body after liberation of the SMV–PV on the left of the fusion between the uncinata process and pancreatic body to reduce the risk of a pancreatic fistula after pancreaticoduodenectomy.

Conflict of interest Shin Kobayashi and other co-authors have no conflict of interest to declare.

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