Partial Resection of the Pancreatic Head and Duodenum for Management of Carcinoma of the Ampulla of Vater: A Case Report

XIAO-FANG LIU, KUN TANG, FU-BO SUN, LU-LU SUI1 and GANG XU

Department of Hepatobiliary Surgery, Affiliated Yantai Yuhuangding Hospital, Qingdao University Medical College, Yantai, P.R. China

Abstract. *A 57-year-old woman presented with spontaneous pain in the upper right quadrant of the abdominal region of one year's duration. Contrast-enhanced computed tomography (CT), magnetic resonance imaging, and magnetic resonance cholangiopancreaticography revealed the presence of a tumour in the periampullary region, gallstones, cholecystitis, and biliary obstruction, as well as atrophy of the pancreas and dense adhesions involving the pancreas, portal vein, and superior mesenteric vein. Duodenoscopy revealed a papillary neoplasm, measuring 2.5×3 cm, in the descending duodenum. Pathological analysis of the duodenoscopic biopsy suggested carcinoma of the ampulla of Vater. Partial resection of the pancreatic head and duodenum, together with lymph node dissection and digestive tract reconstruction, was performed. Postoperatively, the patient recovered well. CT at 14 months postoperatively showed no recurrence or metastasis. This surgical procedure avoids the potential risk of pancreaticoduodenectomy and retains the function of the pancreas as much as possible, while achieving radical tumour resection.*

Carcinoma of the ampulla of Vater is a rare malignant gastrointestinal tumour, with an incidence of approximately six in one million cases (1). Due to its unique anatomical position, carcinoma of the ampulla of Vater tends to manifest itself early with symptoms, such as obstructive jaundice, cholangitis, and pancreatitis (2). As a result, carcinoma of the ampulla of Vater has a higher likelihood of resectability and a more favourable prognosis in comparison to other periampullary malignancies (2). At present, pancreatoduodenectomy with or without pyloric preservation, is the standard therapy for this type of carcinoma but is associated with a high rate of complications (3). Although local resection is considered an alternative in selected patients, this procedure is associated with a high rate of early recurrence (4). Some patients might be inappropriate candidates for pancreaticoduodenectomy and local resection. Therefore, efforts should be made to develop alternative procedures that can reduce morbidity and mortality while still achieving radical resection.

We encountered a case of carcinoma of the ampulla of Vater with recurrent acute pancreatitis as the initial manifestation. Due to the presence of pancreatic atrophy and dense adhesions involving mesenteric blood vessels, the portal vein, and the pancreas, pancreatoduodenectomy with or without pyloric preservation was very difficult to perform and risky. We, therefore, performed a partial resection of the pancreatic head and duodenum, in this case, and the patient recovered well. To the best of our knowledge, there has been no previous report on such a procedure in patients with carcinoma of the ampulla of Vater.

Case Report

A 57-year-old woman presented with spontaneous pain in the right upper quadrant of the abdominal region of one year's duration, which was aggravated after meals. She had repeated chills and fever but did not report nausea, vomiting or jaundice. She had been hospitalized three times before because of acute pancreatitis, gallbladder stones, and cholecystitis.

On physical examination, the patient's body temperature (rectal) was 36.5 to 37.3˚C, heart rate was 78 beats/min, and blood pressure 120/90 mmHg. The skin and *tunica dura* of the patient were not stained yellow. There were no swollen superficial lymphoid nodes. The abdomen was flat and soft without a gastrointestinal pattern, peristaltic waves or

Correspondence to: Dr. Xiao-Fang Liu, Department of Hepatobiliary Surgery, Affiliated Yantai Yuhuangding Hospital, Qingdao University Medical College, Yantai 264000, China. Tel: +86 5356691999, Fax: +86 5356240341, e-mail: Liu634@263.net

Key Words: Carcinoma of the ampulla of Vater, pancreatoduodenectomy, local resection.

Figure 1. *Contrast-enhanced computed tomography image showing a periampullary tumour, expansion of the bile and pancreatic ducts, gallbladder stones and cholecystitis.*

varicose vein. The patient felt a slight tenderness in the upper right quadrant without rebound tenderness or muscle tonus. The liver and spleen were not touched below the costal margin. Bowel sound was 2 to 3 min.

Laboratory examination revealed that blood cell counts, blood and urine amylase, as well as the tumor markers carbohydrate antigen (CA) 19-9, carcinoembryonic antigen (CEA) and α-fetoprotein (AFP) were all normal. The patient had abnormal liver function tests: total protein=69.79 g/l (65-85 g/l), total bilirubin=24.9 μmol/l (3.2-23.5 μmol/l), direct bilirubin=5.8 μmol/l (0-8μmol/l), γ-glutamyl transpeptidase= 1076 IU/l (10-60 IU/l), alkaline phosphatase=637 IU/l (45-125 IU/l), glutamic oxaloacetic transaminase=45 IU/l (15-40 IU/l), glutamic-pyruvic transaminase=46 IU/l (9-50 IU/l), and glutamic acid=5.46 mmol/l (0-14 mmol/l). Serum lipase increased to 566 IU/l (50-120 IU/l).

Contrast-enhanced computed tomography (CT) showed the presence of a tumour in the periampullary region and the expansion of pancreatic bile duct, gallbladder stones and cholecystitis (Figure 1). Magnetic resonance imaging (MRI) and magnetic resonance cholangiopancreaticography (MRCP) showed gallstones, cholecystitis and biliary obstruction. The obstruction plane was located in the ampulla, and there was abnormal signal at the end of the common bile duct (Figure 2). Moreover, common bile duct stones inside the pancreas, bile duct expansion, and atrophy of the pancreas (especially the tail of the pancreas) were noted. Chronic inflammation was initially suspected, although a tumor could not be excluded. A duodenoscopy was then performed, which revealed a papillary neoplasm, measuring 2.5×3 cm, in the descending duodenum. Pathological analysis of the duodenoscopic biopsy suggested with carcinoma of the ampulla of Vater.

After this diagnosis was established by imaging and duodenoscopy, a surgery was planned. The tumour was not at an early stage, and local excision may result in inadequate removal of the tumour. Given that the patient had significantly atrophied pancreatic tail, the resection of the whole head of the pancreas might have seriously impaired pancreatic exocrine and endocrine secretion. Dense adhesions involving mesenteric blood vessels, the portal vein, and the pancreas would also have made resection of the whole pancreatic head and duodenum difficult. For these reasons, partial resection of the pancreatic head and duodenum was performed.

An incision was made through the upper right *rectus abdominis* muscle to open the abdominal cavity. About 100 ml of pale yellow ascites was noted. Adhesions involving the greater omentum, hepatic flexure of the colon transverse colon and liver were visible. The adhesions were separated to expose the liver, hepatoduodenal ligament, and duodenum. No metastatic nodules were found in the liver, pelvis, small intestine or colon. A Kocher's incision was made. After mobilizing the head of the pancreas and the duodenum, a mass measuring about 3.0×2.5 cm was noted in the descending duodenum; the tumour did not invade the duodenal seromuscular layer. Due to repeated pancreatitis, there were severe adhesions involving the superior mesenteric vein, portal vein, and hepatoduodenal ligament. The hepatoduodenal ligament, proper hepatic artery, and common hepatic artery were mobilized to expose the gastroduodenal artery, which was then ligated and cut. The

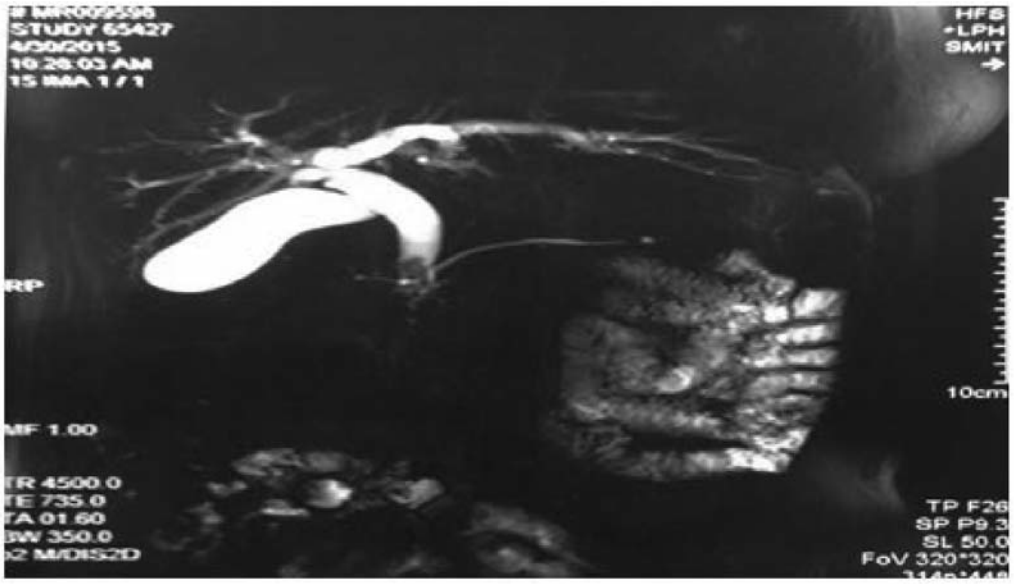

Figure 2. *Magnetic resonance cholangiopancreaticography image showing gallstones, cholecystitis, and biliary obstruction. The obstruction plane is located in the ampulla, and there is abnormal signal at the end of the common bile duct.*

common hepatic artery, celiac trunk and hepatoduodenal ligament lymph nodes were excised, and the distal duodenum was transected and closed. Subsequently, a 60% distal gastrectomy was performed. At 2.0 cm right to the superior mesenteric vein, the head of the pancreas was partly resected. The superior pancreaticoduodenal artery from the gastroduodenal artery and the inferior pancreaticoduodenal artery branch from the superior mesenteric artery were sutured and ligatured without dissection of the superior mesenteric vein and portal vein in the rear of the neck of the pancreas, while preserving the integrity of the uncinated process of the pancreas. The gallbladder, extrahepatic biliary tract transected at the common hepatic duct, distal stomach, and duodenum were excised together with the subtotal resection of the pancreatic head. Reconstruction of the digestive tract was then performed. The jejunum was transected 30 cm below the Treitz ligament. The distal jejunum was lifted to carry out a duct-to-mucosa pancreaticojejunostomy. A 4-mm silicone tube was placed in the main pancreatic duct, and an end-to-side choledochojejunostomy was performed at 10 cm from the pancreaticojejunostomy. A side-to-end gastrojejunostomy was then performed 10 cm below the Treitz ligament, followed by a side-to-side jejunojejunostomy performed 40 cm under the choledochojejunostomy. Finally, the mesangial hiatus was closed (Figure 3).

Postoperative pathology revealed well-to-highly differentiated adenocarcinoma. The tumor invaded the duodenum muscle layer and involved the common bile duct mucosa (Figure 4). Gastric, pancreatic and duodenal resection margins were all free of tumour cells. No metastases was found in number 4, 6, 8, 9, 12, or 13 group of lymph nodes.

Postoperative recovery of the patient was smooth. After 16 days of hospitalization, she was discharged and received regular outpatient follow-up. Fourteen months postoperatively, CT examination showed no recurrence or metastasis (Figure 5), and routine blood tests, tumor markers CA19-9, AFP, and CEA, liver function tests, blood glucose, and blood and urine amylase were all within normal ranges.

Discussion

Carcinoma of the ampulla of Vater is a malignancy arising very near the distal end of the common bile duct and tends to cause obstruction of biliary outflow (2). For this reason, obstructive jaundice is the initial clinical manifestation in most patients with carcinoma of the ampulla of Vater (2). Obstruction of the pancreatic duct is also often caused by carcinoma of the ampulla of Vater. Therefore, acute pancreatitis is also a common clinical presentation in patients with unresected lesions (2). This report presents a case of carcinoma of the ampulla of Vater with recurrent acute pancreatitis as the initial manifestation.

Due to the improvement detection with the extensive use of screening endoscopy and imaging techniques and the relatively early manifestation of the tumour, carcinoma of the ampulla of Vater is associated with a higher likelihood of

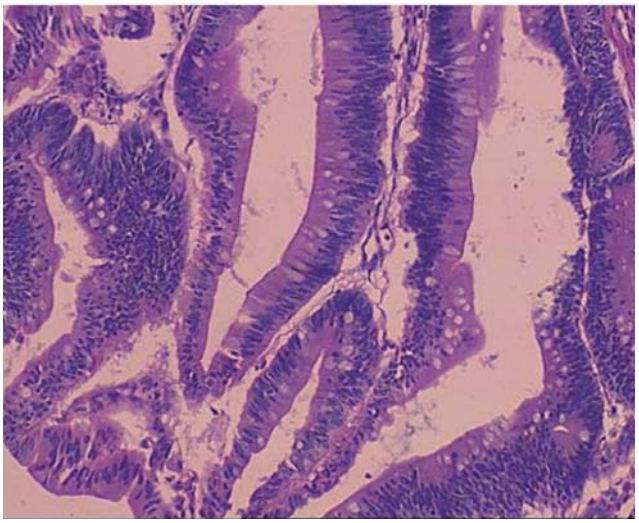

Figure 3. *Haematoxylin and eosin-stained image showing differentiated adenocarcinoma. The tumour invaded the muscle layer and involved the common bile duct mucosa.*

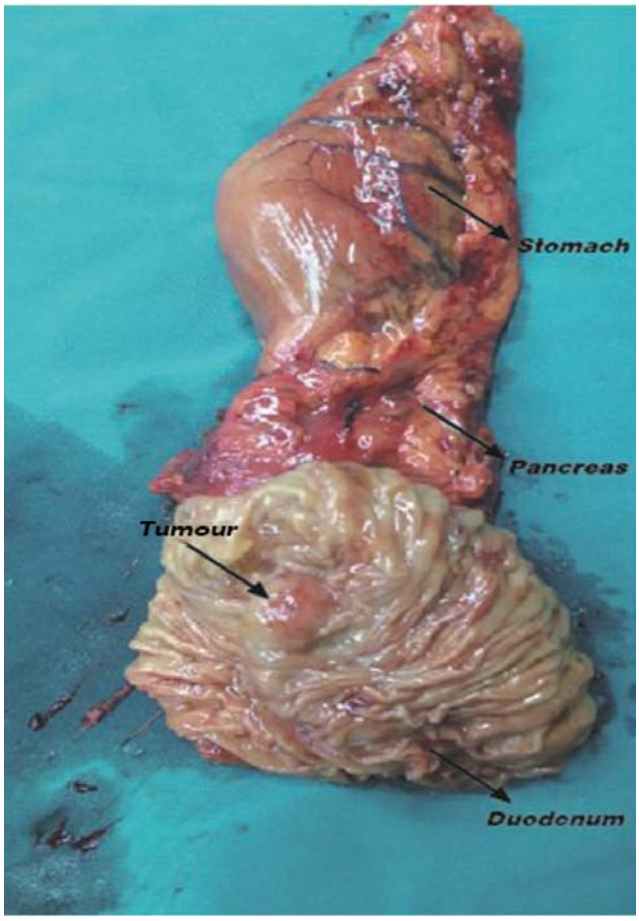

Figure 4. *Gross pathology.*

resectability and a more favourable prognosis compared to other periampullary malignancies (1). Therefore, surgical resection with curative intent is the primary modality of treatment, because it represents the only hope for long-term survival. Currently, pancreaticoduodenectomy, with or without pylorus preservation, is the standard treatment for carcinoma of the ampulla of Vater and can significantly improve the survival rates (5, 6). However, the broad scope of surgery, long operative time, great trauma, relatively high surgical mortality, and complications are the drawbacks of this radical procedure (7, 8). The crucial point of pancreaticoduodenectomy is the mobilization of the pancreas from the superior mesenteric vein and portal vein. In our patient, due to the ongoing and recurrent inflammation of the pancreas, there were dense adhesions involving the pancreas, superior mesenteric vein, and portal vein. Forced mobilization of the dense adhesions can cause vascular penetration, tear, and even uncontrollable intraoperative bleeding. Therefore, our patients was not an appropriate candidate for pancreaticoduodenectomy.

Apart from pancreaticoduodenectomy, local resection of the ampulla has also been proposed as an alternative approach to treating tumours of the ampulla of Vater. Compared to pancreaticoduodenectomy, the rates of surgical mortality and postoperative complications associated with local resection are lower (9). However, local resection is associated with a higher rate of early recurrence after resection of carcinoma of the ampulla of Vater (10). Therefore, this procedure is only applicable to low-risk patients who have well-differentiated, tumors of low malignant potential of 2.5 cm or less, without invasion or lymph node metastasis, and those who are inappropriate candidates for pancreaticoduodenectomy (4).

Several prominent features of our patient prevented us from choosing pancreaticoduodenectomy and local resection. Firstly, because of recurrent pancreatitis, preoperative CT and MRI showed pancreatic atrophy, which was more significant in the pancreatic tail. Thus, resection of the whole pancreatic head would have seriously impaired pancreatic exocrine and endocrine secretion in this patient. In this regard, our patient was inappropriate for pancreaticoduodenectomy. Secondly, the dense adhesions involving the pancreas, portal vein, and superior mesenteric vein made pancreaticoduodenectomy difficult to perform. Thirdly, the patient had a tumour larger than 2.5 cm with local invasion, and local excision might have been inadequate and would not have conformed with the principle of a radical cure. Thus, the rationales for partial resection of the pancreatic head include (i) achieving radical tumour resection, (ii) retaining the function of the pancreas as much

Figure 5. *Computed tomographic image at 4 months postoperatively shows no recurrence or metastasis.*

as possible and avoiding exocrine or endocrine pancreatic insufficiency, and (iii) not damaging the portal vein and the superior mesenteric vein and preventing possible uncontrollable intraoperative bleeding.

The role of adjuvant therapy in treatment of carcinoma of the ampulla of Vater remains controversial. Several lines of evidence reveal that early-stage tumours (T2) benefit from adjuvant radiotherapy and patients with node-positive disease with resected ampullary adenocarcinoma may benefit from adjuvant chemoradiation (1, 11, 12). Due to inconsistent findings in studies regarding adjuvant chemoradiation, adjuvant therapy was not administered to our patient.

In conclusion, we herein documented a case of partial resection of the pancreatic head and duodenum for the management of carcinoma of the ampulla of Vater in a patient with pancreatic atrophy, as well as dense adhesions involving the pancreas, portal vein, and superior mesenteric vein. This procedure avoids the potential risk of pancreaticoduodenectomy and retains the function of the pancreas, while achieving radical tumour resection.

Competing Interests

The Authors declare that they have no competing interests.

Acknowledgements

The work was supported by grants from Natural Science Foundation of Shandong Province,China (No.ER2014HM052).

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Received January 18, 2016
Revised February 19, 2016
Accepted February 22, 2016