Combined resection of aberrant right hepatic artery without anastomosis in panceaticoduodenectomy for pancreatic head cancer: A case report

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A B S T R A C T

INTRODUCTION: This case report is intended to inform pancreas surgeons of our experience in operative management of aberrant pancreatic artery.

PRESENTATION OF CASE: A 63-year-old woman was admitted to our institute’s Department of Surgery with obstructive jaundice, and the pancreas head tumor was found. To improve liver dysfunction, an endoscopic retrograde nasogastric biliary drainage tube was placed in the bile duct. Endoscopic fine-needle aspiration showed a pancreas head carcinoma invading the common bile duct, the aberrant right hepatic artery arising from the superior mesenteric artery, and the portal vein. Enhanced computed tomography showed the communicating artery between the right and left hepatic artery via the hepatic hilar plate. By way of imaging preoperative examination, a pancreaticoduodenectomy combined resection of the aberrant right hepatic artery and portal vein was conducted without arterial anastomosis. Hepatic arterial flow was confirmed by intraoperative Doppler ultrasonography, and R0 resection without tumor exposure at the dissected plane was achieved. The patient’s postoperative course was uneventful.

DISCUSSION: In this case report, perioperative detail examination by imaging diagnosis with respect to hepatic arterial communication to achieve curative resection in a pancreas head cancer was necessary. Non-anastomosis of hepatic artery was achieved, and the necessity of R0 resection was stressed by such management.

CONCLUSION: By the preoperative and intraoperative imaging managements conducted, combined resection of the aberrant right hepatic artery without anastomosis was achieved by pancreaticoduodenectomy for pancreas head cancer. However, improvements in imaging diagnosis and careful management of R0 resection are important.

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1. Introduction

R0 resection is only a curative treatment option for pancreatic carcinoma [1], and combined vascular resections of portal vein or arteries were necessary so as to not expose the tumor surface at the dissected plane as well as the pancreatic resected stump [2]. In the case of combined vascular resection, appropriate anastomosis should be necessary to maintain hepatic inflow and to avoid intestinal congestion. Particularly in case of hepatic arterial anastomosis, precise anastomosis by microsurgical technique is important to avoid thrombosis [3] and to maintain the communication artery between the right and left hemi-liver via hepatic hilar plate [4]. In such a case, anastomosis is not necessary when total hepatic arterial flow is maintained. A variety of anatomical anomalies of hepatic arteries have been found by arteriography using the latest helical computed tomography with high resonance imaging, which is usually applied in preoperative simulations [4].

The aberrant right hepatic artery (aRHA) alone arising from the superior mesenteric artery or celiac artery is typically observed [5] and is sometimes problematic in pancreatic or hepatic surgeries. In the case of peripancreatic head malignancies, that aberrant artery runs adjacent to the posterior plane of the pancreas head and the exposed tumor. To achieve R0 resection in pancreatectomy for malignancies, that adjacent artery should be resected combined with pancreas head resection [6]. This case report showed the successful treatment of the combined resection of an aRHA without anastomosis in pancreaticoduodenectomy (PD) for pancreatic head carcinoma (PC) by way of preoperative and intraoperative imaging diagnosis.

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2. Presentation of case

A 63-year-old woman was admitted to a different hospital with obstructive jaundice and epigastralgia. By means of ultrasonographic diagnosis at that former hospital, a pancreas head tumor was found and referred to the Division of Hepato-biliary-pancreas Surgery in the Department of Surgery at our institute.

Physical examination showed jaundice, and laboratory data showed an increased level of total bilirubin as 12 mg/dl; associated hepatobiliary enzymes were also increased. Abdominal computed tomography (CT) showed a dilated intrahepatic bile duct and common bile duct, and therefore, an endoscopic retrograde nasogastric biliary drainage tube was placed in the bile duct to improve liver dysfunction. After biliary drainage, the patient’s general condition improved. By Endoscopic fine-needle aspiration showed pancreas head carcinoma, which had invaded the lower common bile duct. Enhanced CT showed the pancreas head carcinoma severely invading the superior mesenteric vein (SMV), and regional node swelling was observed (Fig. 1a and b). This was diagnosed as a borderline resectable for portal vein, and chemotherapy by gemcitabine 1 g/m² weekly plus S-1 80 mg daily for 8 weeks was performed to aim down staging of pancreatic cancer. As a result, tumor size was partially reduced; however, invasion of the SMV remained unchanged (Fig. 2a and b). Chemotherapy stabilized the disease.

A second CT showed that the aRHA was arising from the superior mesenteric artery (SMA), which ran along the tumor posterior surface toward the right liver. Obstruction of the common bile duct and the main pancreatic duct by the tumor invasion was unchanged as well (Fig. 3). On one hand, the aRHA was considered to have been invaded by the pancreas head cancer, and on the other hand, the very small communicating artery via hepatic hilar plate was seen in the CT’s coronary and axial views (Fig. 2a and Fig. 4).

Although the preoperatively coi embolization of the aRHA was considered, it seemed to be difficult to embolize this artery because of small size and the acute angle at the root. Thus, under these imaging preoperative examinations, a pancreaticoduodenectomy combined resection of the aRHA and SMV was scheduled without arterial anastomosis. During the operation, the common hepatic duct was first transected, and each hepatic artery was encircled by a tape (Fig. 5). The aRHA was remarkably invaded, and a test clamping of the aRHA was performed. Intraoperative Doppler
ultrasonography showed that the obtuse angle of arterial flow in the entire right liver remained. We judged that the communicating arterial flow from the left-side artery remained, and the aRHA was transected at the hepatic hilum. Eventually, PD with combined resection of aRHA and SMV (3 cm in length) was achieved, and anastomosis of portal vein and SMV was conducted (Fig. 6a and b). R0 resection without tumor exposure at the dissected plane could be achieved macroscopically by the resected specimen (Fig. 7). Operating time was 588 min, and blood loss was 1750 mL.

The patient’s postoperative course was uneventful, and infarction of the liver was not observed. The patient had a tumor relapse in the mesentery of the colon at 6 months after surgery and received second-stage chemotherapy at 12 months.

### 3. Discussion

At this stage, the borderline resectability of portal vein or artery in pancreatic cancer has been discussed [7] as well as clinical practice guidelines by the National Comprehensive Cancer Network–defined criterion [8]. In Japan, pancreatic cancer invasion to the semicircle of the portal vein or SMV has been considered a resectable state [9].

With respect to the arterial invasion of pancreatic cancer, a few institutes aggressively performed combined resections and anastomosis with pancreatectomy [6,10]. However, neither the safety nor the feasibility of the operation or oncological benefit has been remarkable. In the recent era of chemotherapy based on gemcitabine, the clinical significance of surgery alone was not discussed by previously poor results in pancreatic cancer [11].
Adjuvant chemotherapy as gemcitabine, S-1, or a combination of these drugs showed improvement in patient survival, but in many cases, total scheduled doses could not be administered because of the side effects of these drugs after the aggressive surgery [12]. To improve that problematic situation or to control the pancreatic cancer locally, neoadjuvant chemotherapy has been attempted at this stage [13]. In the present case, we decided on neoadjuvant chemotherapy to aim down staging of the advanced pancreatic head cancer. Eventually, a stable response resulted, and additional distant metastasis or cancer progression might be avoided.

In case of a partial arterial resection or resection of the aberrant artery accompanied by pancreatic cancer, feasibility of resection is supposed to be achieved; and we reported successful cases in a Japanese article whose English title is “Two cases of pancreaticoduodenectomy with combined resection of hepatic artery,” by Atsushi Nanashima et al., 2011, “Tan to Sui”. In my experience, 8 of 695 hepatectomy (1.2%) and 5 of 235 pancreatectomy (2.1%) received combined arterial resections at the former institute from 1994 to March 2015. Among these cases, three and two cases, respectively, showed aberrant replacement of the hepatic artery, as does the present case report. In those six cases, the aRHA from the celiac or SMA was observed in four cases, and the proper hepatic artery from SMA was observed in one. Three cases underwent arterial anastomosis; others did not because collateral arterial flow could be confirmed, as in the present case. In those cases, threedimensional arteriography by the latest CT was very useful, and the liver transplant surgeon supported the arterial anastomosis [14]. These issues are important so as to be able to perform the scheduled operation safely. In the present case, the communication artery was relatively tiny and intraoperative hepatic flow in the right liver was relatively unremarkable. Preoperative coil embolization of the aRHA was considered [15], but that procedure depends on the radiologist’s skill. Coil embolization sometimes results in complications in the form of deviation of coil to the periphery or induction of surrounding inflammation. In addition, the selection criteria for arterial embolization might be difficult in each case. A previous report showed the importance of the communicating artery at the hepatic hilar plate [15]. To maintain that communication on the PD, a careful operative procedure around the hilar plate is necessary by confirming the location of the communication and the cut line of the bile duct by using CT images. In the present case, the cut line of the common hepatic duct was decided above the confluent of the cystic duct because of pancreatic cancer.

4. Conclusion

We reported a successful case of non-anastomosis of the combined resection of aRHA during a PD for pancreas head cancer. Before selecting this procedure, detailed information regarding tumor extension and surrounding main vasculatures should be obtained preoperatively, and appropriate operative simulation is important case by case. Such efforts may contribute to an increase in operative indications for pancreatic cancer to achieve R0 resection, which lead to improved patient survival.

Conflict of interest

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Ethical approval

At our institute, ethical permission for case report is not necessary.

Consent

None.

Submission declaration

The authors declare that the work described has not been published previously, that it is not under consideration for publication elsewhere, that its publication has been approved by all authors and either tacitly or explicitly by the responsible authorities where the work was carried out, and that, if accepted, it will not be published elsewhere—including electronically in the same form in English or any other language—without the written consent of the copyright holder.

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All authors contributed to the perioperative management and writing this paper. Atsushi Nanashima is a main operator and wrote this mainly.

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