

## CASE REPORT

# Right Hepatectomy for Hepatic Abscess after Pancreaticoduodenectomy: A Case Report

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### ABSTRACT

Early hepatic abscess after pancreaticoduodenectomy is related to i) undetected celiac axis stenosis; ii) intra-operative injury to the hepatic artery or one of its branches; iii) postoperative embolization of the hepatic or gastro duodenal artery, after treating bleeding or pseudo-aneurysm of these vessels. It is associated with severe morbidity and mortality reaching 15%. We report here an unusual early hepatic abscess secondary to a right branch hepatic artery lesion and biliary injury after pancreaticoduodenectomy for a pancreatic neuroendocrine tumor. In this patient the collateral hilar plexus vascularization did not develop. Our choice of treatment was to perform a right hepatectomy and biliary reconstruction by left hepatic bile duct-jejunum anastomosis.

### INTRODUCTION

Early hepatic abscess following pancreaticoduodenectomy (PD) is a rare event, which could lead to a lethal outcome. The incidence and the physiopathology are not well described in the literature. It is possible to differentiate an early or a late hepatic abscess, the latter as a consequence of a stricture of the choledochojejunostomy or more rarely of a biliary reflux secondary to a short Roux-y limb [1]. The early hepatic abscess following PD is principally caused by a lack of inflow in the hepatic artery (decreased or interrupted inflow) and can occur in three circumstances : i) undetected celiac axis stenosis, that is appreciated after intra-operative section of gastro duodenal artery with subsequent increase of postoperative cytotoxicity; ii) intra-operative injury of the hepatic artery or one of its branches due to an unrecognized anatomic variation (50% of patients); iii) consequences of postoperative embolization of the hepatic artery to treat bleeding or pseudo-aneurysm. Early onset of these conditions could be related to the patency of the hepatic artery associated with severe morbidity and mortality, around 15%. The right branch of hepatic artery

lesions does not usually need treatment because of the physiological bypass revascularization of the right liver by the hilar plexus; the presence of a collateral circulation does not allow the appearance of ischemic lesions of the intrahepatic bile ducts. Indeed, it is also accepted that in the case of a lesion of the right branch of the hepatic artery during a cholecystectomy (associated or not with biliary injuries) vascular reconstruction is not required due to the presence of collateral circulation. We report here an unusual iatrogenic lesion of the right branch of the hepatic artery associated with a biliary injury after PD for pancreatic neuroendocrine tumor. In this patient, the section of the hilar plate associated with the ligation of the right branch of hepatic artery prevented revascularization of the right liver by the left collateral arteries. Our choice of treatment was to perform a right hepatectomy and biliary reconstruction by left hepatic bile duct-jejunum anastomosis.

### CASE REPORT

A Forty-three-year-old woman underwent PD for a pancreatic neuroendocrine tumor (classified as pT1N0, Ki67: 5%). During the procedure the surgeon recognized biliary injury due to anomalous arrangement of a right posterior sectorial biliary duct mistaken for the cystic duct. Two drainage tubes were inserted into the right posterior sectorial and the right anterior sectorial biliary ducts, and a single anastomosis with the jejunum was carried out. On postoperative day 1, an unusual increase of transaminases (aspartate aminotransferase AST=702 UI/L; alanine aminotransferase ALT=1389 UI/L) motivated an abdominal computed tomography angiography (**Figure 1a**). It showed surgical clips at the proximal part of the right branch of the hepatic artery and a hypo density in

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the V and VI segments. On postoperative day 7, the patient developed fever, with increasing of inflammation markers (white blood cells counts 20 G/L, reactive-c-protein 350 mg/L) and a biliary fistula; thus, a second abdominal computed tomography was carried out showing an abscess at the junction of segments IV and V (**Figure 1b**). A US-guided percutaneous needle aspiration for bacteriological sampling was performed and the microbiological culture highlighted a multi-species infection with *Morganella morganii*, *Escherichia coli*, and *Enterococcus faecium*. The infection was managed with a non-operative approach including antibiotic therapy (aminoglycoside 80 mg/Kg and quinolone 1 g/day). Afterwards, the patient developed five episodes of acute recurrent cholangitis treated medically with antibiotic therapy. A abdominal computed tomography angiography was performed and multifocal collections at segments IV, V and VI were described. No evidence of revascularization from the hilar plexus between the left and right liver was particularly found. The right part of the liver was partially vascularized from the periphery to the center by diaphragmatic vessels (**Figure 1c**). Therefore, a magnetic resonance cholangiography was performed. It displayed dilatation of the biliary tract with saccular aspect leading to the diagnosis of ischemic cholangitis, which was confirmed by the pre-operative-cholangiography (**Figure 1d**). As a consequence of this clinical evidence a second operation for right hepatectomy and left hepatico-jejunostomy was decided upon in a multidisciplinary meeting. Nine months after pancreatic surgery, the patient underwent right hepatectomy with biliodigestive anastomosis on the left hepatic biliary duct. During the postoperative period a collection related to the hepatic section was discovered (diameter 7.5 cm × 12 cm) and treated by radiological percutaneous drainage. The patient was discharged from hospital on postoperative day 20. Pathological examination of the resected liver showed the presence of multiple abscesses, recent hepatic multifocal, centrolobular ischemia and ischemic necrosis. The drain was removed 30 days after the operation. At the 30<sup>th</sup> months follow-up consultation the patient was healthy, blood tests (white blood cells count, reactive-c-protein, hepatic cytolysis and cholestasis) remained within normal limits and physical examination was negative.

## DISCUSSION

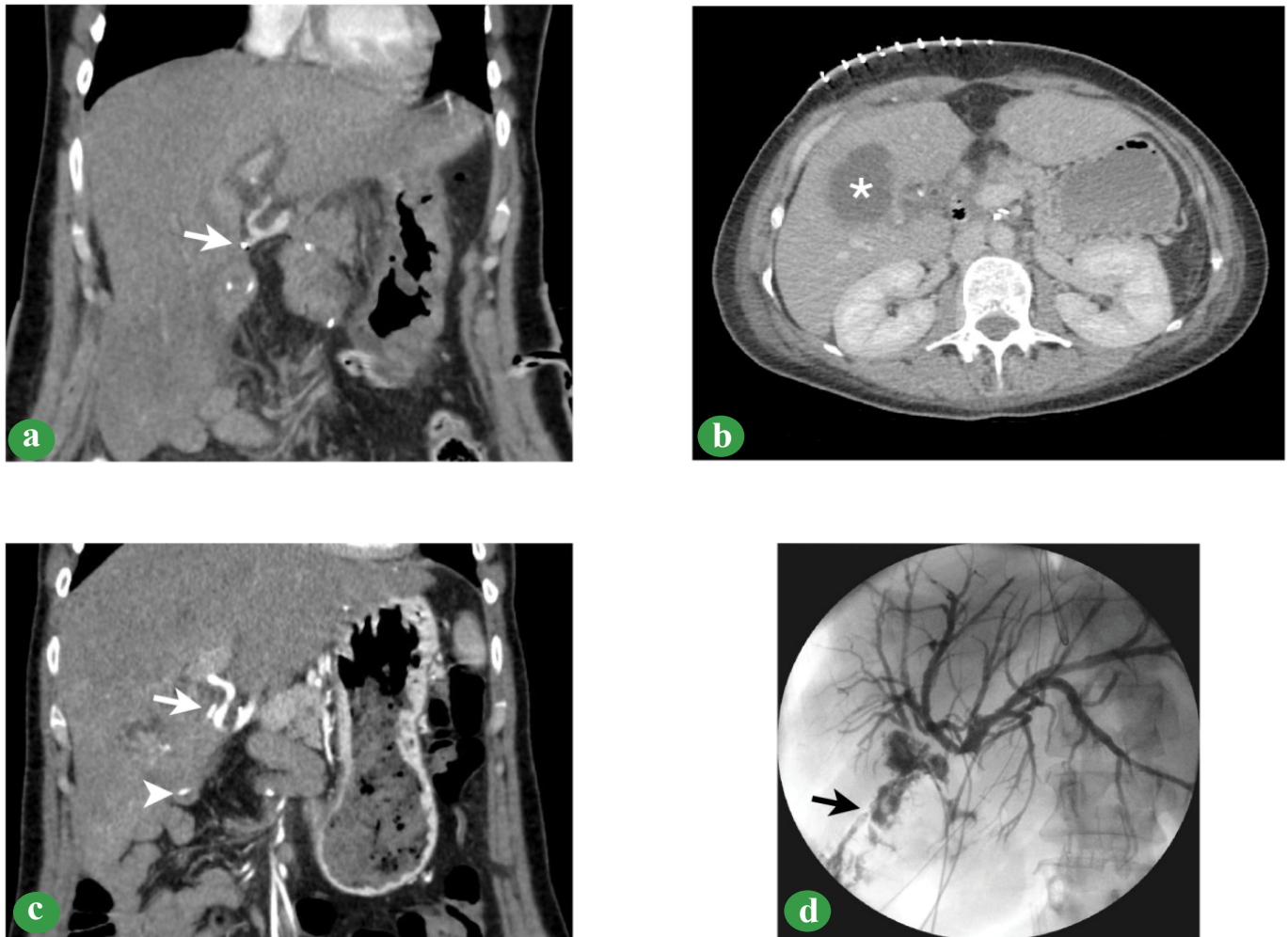
Treatment of liver abscess after PD is generally medical with an antibiotic therapy and percutaneous drainage when necessary. However, as shown in this report, a surgical option may be considered in selected patients.

Hepatic abscess after pancreaticoduodenectomy is a rare complication. Recently, authors have reported 35 cases in literature [2]. Njoku *et al.* [3] have published a series of 22 pyogenic liver abscess in a group of 1.189 patients, defining the diagnostic workout, treatment and identifying risk factors related to this complication. In Njoku's experience the incidence of pyogenic liver abscess after PD was 2.6%, complete resolution was observed in 86% of patients and no one of them required

surgical drainage; mortality was 14%. Regarding risk factors, biliary fistula and reoperation were statistically significant associated to liver abscess. Kubo *et al.* [4] have shown a clinical case with inferior vena cava thrombosis, complicated with a pyogenic liver abscess 3 years after PD. In this context Njoku's [3] experience was, at the time, the main reference for pyogenic liver abscess complication after PD.

Our reported management of this patient shows some peculiarities related both to biliary fistula and to the lesion of the right hepatic artery branch. As shown in literature a biliary duct injury added to a vessel occlusion is a worse condition than a bile duct injury alone [5, 6, 7]. However, when a lesion of the right branch of the hepatic artery occurs, a collateral revascularization of the right liver is preserved by the physiological arterial bypass from the left branch of the hepatic artery, via the hilar plexus collateral vascularization. Mays *et al.* show a reconstituted flow by intrahepatic arteries shunts, from left to right, 15 hours later, after ligation of the right branch of the hepatic artery [6].

Our patient developed multiple early hepatic abscesses and recurrent cholangitis during the postoperative period due to injuries of the hilar plexus. Two particular conditions could explain this unusual outcome: 1) the absence of collateral vessels of the common bile duct, because of the section of the gastroduodenal artery with the common bile duct during PD; 2) during lymphadenectomy, a haemorrhage occurred, treated with surgical clip placed at the hepatic hilum, this caused accidental interruption of the arterial plexus of the hilary plate. The lesion of the right hepatic artery was not recognised during the operation, but in the next 24 hours. At this point, there were two therapeutic options. The first one was to give an early second look, not to remove the clip, in fact the damage to the vessels was not recoverable, but trying a revascularization of the right liver, considering the early onset of the ischemic lesions. In this patient, since the lesion of the right branch is was at the same level as that of the hilar plexus, the artery reconstruction needed a hepatotomy to reach the bifurcation of the hepatic artery, with the risk to proceed with the ligation of the vessels due to an unsuccessful reconstruction. The second therapeutic option is non-operative treatment with antibiotics. In fact, this treatment option is usually favoured and described in literature. Njoku *et al.* [3] have reported a conservative treatment with antibiotics alone in 31.8% of cases and antibiotics plus percutaneous drainage in 68.2%. Therefore, in our patient we decided for a non-surgical management with antibiotics therapy, in order to control the abscess lesions and the initial recurrent cholangitis due to vascular ischemia. After the biliary fistula expanding to a stenosis, consequently to a dilatation of the intra-hepatic bile ducts, and when the general condition of the patient was good a multidisciplinary decision was made: we opted for the surgical treatment. The main arguments raised by the multidisciplinary team for the realization of hepatectomy were: i) the young age of the patient whom was in excellent condition; ii) the pancreatic neuroendocrine tumor was a



**Figure 1.** Coronal cross-section of a contrast enhanced CT-scan (arterial time) at D-1 post-pancreaticoduodenectomy showing a brutal interruption of the right branch of hepatic artery blood flow by a surgical clip (white arrow). **(a).** Note the hypodensity of liver parenchyma supplied by the right branch of hepatic artery especially seen on segment VI. **(b).** Axial cross-section of a contrast enhanced CT-scan (portal time) at D-7 post-pancreaticoduodenectomy. Note the presence of a liver abscess (white star) interesting segments IV and V. Coronal cross-section of a contrast enhanced CT-scan (arterial time) at M-4 post-pancreaticoduodenectomy still showing a brutal interruption of the right branch of hepatic artery blood flow by a surgical clip (white arrow). **(a).** Note the revascularisation of the right liver by diaphragmatic artery (white arrowhead) and the atrophy of segments V and VI compared to; **(c).** the heterogeneity of the liver parenchyma highly suggestive of multiple liver abscesses. **(d).** Peroperative-cholangiography at M-9 post-pancreaticoduodenectomy showing radiological signs of cholangitis within the right posterior sectoral biliary duct: dysmorphism and dilatation-stenosis alternations (black arrow).

well differentiated tumor with good survival rate; iii) the reduced time interval between episodes of cholangitis; iv) the absence of collateral arterial bypass revascularization. Finally, we thought that this patient was not appropriate for non-operative treatment.

### Conflict of Interest

All authors declare having no conflict of interests or financial disclosures.

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