Hepatectomy with simultaneous resection of portal vein for Bismuth IV perihilar cholangiocarcinoma: a case report

Shuo Wang  
Zhejiang University

Zhe Yang  
Zhejiang Shuren University

Kai-Wun Chang  
Zhejiang University

Shusen Zheng  
shusenzheng@zju.edu.cn  
Zhejiang University

Case report

Keywords: Perihilar Cholangiocarcinoma, Percutaneous Transhepatic Cholangial Drainage, Right hemihepatectomy, Portal Vein Thrombosis, Portal Vein Stent

DOI: https://doi.org/10.21203/rs.3.rs-375100/v1

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Abstract

**Background:** Surgical resection is the only potential treatment choice for patients with cholangiocarcinoma. Portal vein invasion used to be a primary cause of irresectable tumor. Nowadays, portal vein resection and reconstruction has become a routine surgical procedure.

**Case presentation:** A 65-year-old male patient, suffering from jaundice and abnormal liver function was referred to our hospital for intensive examination. Before admission to our center, the patient had been undergoing percutaneous transhepatic cholangial drainage (PTCD) for six days for the palliation of jaundice and liver function. A series of check-ups and examinations resulted in the diagnosis of Bismuth type IV perihilar cholangiocarcinoma. The patient later received right hemihepatectomy and Roux-en-Y choledochojejunostomy. As the portal vein was affected by tumor, it was partially removed and reconstructed. In addition, the portal vein thrombus (PVT) was removed, and a portal vein stent was placed.

After surgery, the patient received six courses of chemotherapy. A gemcitabine-based regimen in combination with S-1 were used. Nineteen months after the surgery, the patient is still healthy.

**Conclusions:** This report demonstrates that hepatectomy with simultaneous resection of portal vein for Bismuth type IV perihilar cholangiocarcinoma may contribute to a satisfactory result. Consequently, combined resection and reconstruction is often required when negative pathological resection (R0 resection) is performed.

Background

Perihilar cholangiocarcinoma presents a great challenge to hepatobiliary surgeons. Surgical resection is the only potentially curative choice for patients with cholangiocarcinoma [1]. Negative surgical margins often result in failure of the surgical treatment, as the bile duct bifurcation is very close to the vascular inflow of the liver. Portal vein invasion used to be a primary cause of irresectable tumor. The advancement in surgical techniques in the era of liver transplantation has facilitated the reconstruction of hepatic artery and portal vein. Today, portal vein resection and reconstruction has become a routine surgical procedure in leading centers around the world [2].

The reported 3- and 5-year survival rates after resection for pCCA are around 45% (35 to 60%) and 30% (15 to 40%) [1]. Here, we report a case with locally advanced perihilar cholangiocarcinoma in which the patient underwent right hemihepatectomy with simultaneous resection and reconstruction of the portal vein.

Case Presentation

A 65-year-old male patient, complaining of abdominal pain and with signs of jaundice for one month, was admitted to our hospital. Percutaneous transhepatic cholangial drainage (PTCD) was performed on
the patient at the local hospital six days before admission to our center. He was diagnosed with perihilar cholangiocarcinoma and referred to our hospital later for further treatment. Laboratory data showed elevated levels of carbohydrate antigen 19-9 (CA19-9). Other laboratory tests performed on admission revealed mild elevation in the levels of carcinoembryonic antigen (CEA). His serum total bilirubin (TB), carbohydrate antigen 19-9 (CA19-9), and carcinoembryonic antigen (CEA) were 119 umol/L, 1118 U/L, and 6.1 ng/ml, respectively. The serum bilirubin level decreased after PTCD (Fig. 1). The preoperative serum total bilirubin (TB) level was 69 umol/L.

MRCP showed that the tumor was located in the hilum of the liver (Fig. 2a). Multidetector-row computed tomography (MDCT) scan demonstrated that the tumor had invaded the right hepatic artery (Fig. 2b). Based on radiological imaging, the patient was diagnosed with Bismuth Type IV perihilar cholangiocarcinoma.

Patient’s height was 165 cm, and weight was 69 kg. His remnant liver volume was 777.3 cm$^3$. He had undergone right hemihepatectomy, Roux-en-Y choledochojejunostomy, and portal vein reconstruction. The portal vein was resected and reconstructed with end-to-end anastomosis by using surgical microscope. The postoperative pathology demonstrated a moderately differentiated adenocarcinoma in the hilar biliary tract without microvascular invasion; no signs of metastases were found in the harvested lymph nodes. The patient was discharged 55 days after the operation.

The patient came back for follow-up two weeks after discharge. He showed symptoms related to gastrointestinal bleeding. The laboratory results included decreased hemoglobin level (55 g/L) and positive fecal occult blood test (Fig. 3). The portal vein thrombosis appears as a filling defect in the portal vein lumen on computed tomography (CT) (Fig. 4a).

The patient underwent percutaneous transhepatic portal venography 72 days after the operation, and the intra-operative angiography showed stenosis of the portal vein anastomosis (Fig. 4c). After the placement of a bare-metal stent (BMS) with a diameter of 40 mm and length of 14 cm, angiography was performed following a complete balloon dilation angioplasty (Fig. 4b). It demonstrated that stenotic condition had improved. After the surgery, gemcitabine-based regimen in combination with S-1 were used as adjuvant chemotherapy. The latest CA19-9 was 36.5 u/ml (Fig. 5), and the CT scan showed no signs of metastases. It also showed that the stent had remained in the appropriate position (Fig. 2d). Seventeen months after the surgery, the patient is still healthy.

**Discussion And Conclusion**

Perihilar cholangiocarcinoma always involves the portal vein or the hepatic artery [3]. Therefore, complete surgical resection of perihilar cholangiocarcinoma remains one of the most challenging procedures, mainly because the invasion of the portal vein by hilar cholangiocarcinoma is a contraindication in surgical resection. The anatomy of the hepatic hilus is complicated, with many anatomic variations of the portal vein, hepatic artery, and bile duct wherein the hilar bile duct is in close contact with the hepatic
artery and portal vein [4, 5]. Treatment options for Bismuth Type IV cholangiocarcinoma are limited [6]. A radical surgical resection with negative pathological resection margins (R0 resection) is the only way to improve long-term survival or provide a cure to patients [7]. Consequently, combined resection and reconstruction are often required when R0 resection is performed [8, 9].

Perihilar cholangiocarcinoma is often associated with severe jaundice due to biliary duct obstruction [10]. Preoperative endoscopic retrograde cholangiopancreatoigraphy (ERCP) or PTCD, used to palliate jaundice, can greatly raise a patient’s tolerance toward the surgery and increase its safety [11]. For our patient diagnosed with obstructive jaundice, we used PTCD preoperatively to achieve a better reduction of the jaundice. A recent study reported that the diagnostic power of MDCT in assessing macroscopic right hepatic artery invasion was acceptable with an accuracy of 85.4% and a sensitivity of 100% [12]; however, microscopic right hepatic artery invasion was not observed in more than half of the patients who underwent hepatectomy with hepatic artery resection [12]. Finally, we applied the liver transplantation technique for portal vein reconstruction [13].

Considering that the probability of postoperative thrombosis with vascular invasion is 4.1% [14], patients should be monitored closely for any changes in the level of hemoglobin and the presence of any fecal occult blood after the operation. Postoperative portal vein anastomosis thrombosis should be treated in time [15]. Accurate preoperative evaluation and R0 resection contribute to a satisfactory result. The 5-year survival rates for patients who undergo R0 resection with and without lymph node metastases are 21% and over 60%, respectively [16].

Once postoperative gastrointestinal bleeding caused by portal vein stenosis is found, stenosis should be treated and portal vein stents should be placed, if necessary [17]. As a result of the multiple risk factors associated with cholangiocarcinoma, postoperative chemotherapy for cholangiocarcinoma has become a routine treatment.

**Declarations**

**Abbreviations**

PC, Perihilar cholangiocarcinoma; PVT, portal vein thrombosis; LT, liver transplantation; PTCD, percutaneous transhepatic cholangiodrainage; ALT, alanine aminotransferase; AST, aspartate aminotransfetase; TB, serum total bilirubin; BMS, bare-metal stent

**Acknowledgements**

Not applicable

**Funding**

There’s no funding provided for the research or publication of manuscript
Availability of data and materials

The data set supporting the conclusions of this article is included within this article.

Authors' contributions

Z.Y. and S.W. were the doctors in charge of the patient and revised the manuscript, S.W. and K.W.C wrote the manuscript and analyzed the data, Z.Y. was responsible for resources, S.W. proposed the study. S.-S.Z. is the guarantor. All authors read and approved the final manuscript.

Competing interest

The author declare that they have no competing interest.

Consent for publication

Written informed consent was obtained from the patient for publication of the case report and any accompanying image. A copy of the written consent is available for review by the editor-in-chief of this journal.

Ethics approval and consent to participate

This study was approved by the ethic committee of our institution Shulan (Hangzhou) Hospital.

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Figures
Figure 1

Preoperative PTCD achieved a good result; serum bilirubin level was decreased.

Figure 2
a MRCP scan shows an obstruction of the common bile duct and marked stenosis of the common bile duct (arrow). b The computed tomography scan (CT) demonstrates encasement of the right hepatic artery (arrow). c The tumor involved in portal vein. d The tumor invades the right portal vein.

Figure 3

Patient presents with symptoms related to gastrointestinal bleeding post-operation. The laboratory result was a remarkable decline in hemoglobin count.
**Figure 4**

a Portography shows filling defects in the main portal vein. b Portography after PV stent placement shows the resolution of the PV stenosis. c CT scan shows severe stenosis at the main portal vein. d The CT scan after the procedure shows normal portal blood flow with the stent previously positioned.
Figure 5

After surgery and adjuvant chemotherapy, CA19-9 was decreased.