CASE REPORT

Ligation of the Left Hepatic Duct and Proper Hepatic Artery Following a Traffic Accident Injury

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Abstract A 32-year-old man was admitted to our hospital due to a traffic accident. Intraoperative observations revealed hemoperitoneum, splenic transection, pancreatic tail contusion, comminuted injury in the porta hepatis, rupture in the left hepatic duct, an irregular crevasse in the ductus hepaticus communis, the caudate lobe was transversely broken on the left, and under the gap, there was a fracture in retrohepatic inferior vena cava with huge retroperitoneal hematoma. We carried out a ligation of the left hepatic duct and the proper hepatic artery. Postoperation, the man recovered smoothly. At 5 years and 5 months postoperation, MRI showed that the left liver had atrophied partly. So, we consider that the ligation of the left hepatic duct is a safe procedure for patients without cirrhosis under the conditions of ligation of the proper hepatic artery.

Keywords Laparotomy · Hepatic duct · Ligation · Emergency operation · Proper hepatic artery

Introduction

Traumatic injuries of extrahepatic bile duct are rare [1, 2], especially associated with coagulopathy resulted from massive blood

loss. Although there are some different opinions, ligation of segmental or lobe bile ducts is still a significant alternative method to manage extrahepatic bile duct injury [3]. But it is very rarely reported that left hepatic duct and proper hepatic artery were ligated in order to manage simultaneously left hepatic duct transection trauma and hepatorrhesis.

Case Report

A 32-year-old man was admitted to our hospital due to a traffic accident in December 2008. In the emergency department, we found his blood pressure to be 70/40 mmHg, heart rate 140 beats/min, and massive hemorrhage in abdominal cavity. An emergency exploratory laparotomy was carried out. Intraoperative observations revealed hemoperitoneum (about 3500 mL), splenic rupture, pancreatic tail contusion, comminuted injury in the porta hepatis (with a size of 4 × 3 cm), and transection in the junction of left hepatic duct with hepatic duct (1.5 mm in diameter an irregular crevasse in the hepatic duct). The left of the caudate lobe was transversely broken, and under the caudate lobe, there was avulsion in retrohepatic inferior vena cava (approximately 2 cm in diameter) with huge retroperitoneal hematoma (upper, under the liver; lower, bifurcation of the abdominal aorta). Intraoperative splenectomy was carried out following operative suture of the postcava, porta hepatis, and pancreatic tail. We found the diameter of the left hepatic duct to be only 1 mm. Straight anastomosis after pruning and shaping would have resulted in biliary stenosis due to a high tension, whereas biliointer-anastomosis would have lead to unsatisfactory recovery and multiple complications due to a long operation time. Therefore, a ligation of the left hepatic duct was carried out, the common bile duct crevasse was repaired and a T-tube placed in the common bile duct for drainage. Although the wound in the liver had been repaired, there was still active bleeding. Thus, the

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proper hepatic artery was ligated. At 8 days postoperation, the total bilirubin levels reached $39.6 \mu\text{mol}$ (direct bilirubin: $21.5 \mu\text{mol}$), which returned to normal 16 days postoperation. Gamma-glutamyltransferase reached 285 IU/L and returned to normal levels 27 days postoperation. Meanwhile, a computed tomography scan 24 days postoperation revealed a cystic expansion area in the left liver (Fig. 1). At 5 years and 5 months postoperation, magnetic resonance imaging showed that the left liver had atrophied partly (Fig. 2).

Discussion

There are different ways to deal with total transection of extrahepatic biliary tract including end-to-end anastomosis [4], hepaticojejunostomy [3], hepatectomy [5], and the ligation of the bile duct [6]. According to intraoperative observation in the case, the left hepatic duct was transected from its junction with the hepatic duct. If end-to-end anastomosis was performed, there would be tension at the anastomosis leading to stenosis or fistulae [3]. The diameter of the left hepatic duct was so small (about 1 mm) that it was difficult to do hepaticojejunostomy. Meanwhile, hepaticojejunostomy might result in some serious complications including stenosis, fistulae, and retrograde infection, related to excessive hemorrhage, long operation time, coagulopathy, and severe trauma in the patient. Based on the same reasons as above, longer operation time and more hemorrhage, we did not manage the transaction of the left hepatic duct through hepatectomy, which would lead to the higher operative mortality and morbidity rate under this emergency condition than elective [7]. Although some authors did not advocate the ligation of the left hepatic ducts mainly due to a possible atrophy [8], it is

Fig. 1 At 24 days postoperation, a computed tomography (CT) scan revealed a cystic expansion area in the left liver

Fig. 2 At 5 years and 5 months (May 2014) postoperation, magnetic resonance imaging (MRI) shows that the left liver had atrophied partly

adequate to restore normal liver function, and the incidence rate of cholangitis is rare [6], if drainage of 30–50% of the liver was normal. Ligation of the segmental bile ducts of the liver does not cause hypohepatia [2]. The concept is also supported by the case, in which the left hepatic duct was ligated and liver function of the patient was not altered. At early postoperation, a cystic expansion area showed up in the left lateral liver (Fig. 1), and it has atrophied 5 years and 5 months postoperation (Fig. 2). Nearly an 8-year period postoperation, the patient has not suffered from fever, jaundice, or pruritis.

Nonoperative management in modern times is the primary choice to treat bleeding of liver trauma when patient is hemodynamically stable. But the failure rate of conservative management is up to 11%. The ligation of proper hepatic artery is used to deal with hepatorrhesis. In order to treat active bleeding intraoperation in this case, we blocked the left hepatic artery and still found active bleeding, then we ligated the proper hepatic artery, and subsequently, the bleeding stopped. Postoperation, the patient recovered smoothly.

Conclusion

So far, we do not find the proper hepatic artery, and the left hepatic duct was ligated at the same time in literature. Though intraoperative ligation of the left hepatic duct and left hepatic artery were forced, unilateral ligation of the bile duct (the left hepatic duct at least) is a safe procedure for patients without cirrhosis under the conditions of ligation of the proper hepatic artery.

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Authors' Contributions Jiang O and Liu Yu contributed the same work to this study. Cheng NS was the guarantor and designed the research. Jiang O and Liu Yu performed the research.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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