



Case report

Laparoscopic repositioning of an aberrant right hepatic artery and hepaticojejunostomy for pediatric choledochal cyst: A case report

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ABSTRACT

Introduction: The right hepatic artery crossing the ventral side of the common hepatic duct is a relatively frequent abnormality. This aberrant right hepatic artery not only interferes with dissection of the common bile duct and hepaticojejunostomy for choledochal cyst but can also cause postoperative anastomotic stenosis.

Case presentation: A 14-year-old patient presented with upper abdominal pain and was diagnosed with a choledochal cyst (Type IVA in Todani Classification) and pancreaticobiliary maljunction. Abdominal enhanced computed tomography showed aberrant right hepatic artery located at the ventral side of the common hepatic duct. Laparoscopic choledochal cyst resection and hepaticojejunostomy were planned. Intraoperative findings also showed the aberrant right hepatic artery crossing the common hepatic duct ventrally as detected on preoperative computed tomography. Laparoscopic dorsal side repositioning of the aberrant right hepatic artery was performed because it appeared to compress the common hepatic duct and risked causing postoperative anastomotic stenosis. We performed laparoscopic hepaticojejunostomy by replacing the aberrant right hepatic artery dorsally to facilitate suturing and prevent postoperative anastomotic stenosis. The postoperative course was uneventful, with no findings suggestive of anastomotic stenosis.

Discussion: The abnormality of the right hepatic artery is reported to be a primary cause of anastomotic stenosis after hepaticojejunostomy. Once anastomotic stenosis or stricture develops, it is often difficult to treat. The prevention of the stenosis is important.

Conclusions: In choledochal cyst with aberrant right hepatic artery, dorsal repositioning is effective for preventing postoperative anastomotic stenosis and cholestasis.

1. Introduction

The right hepatic artery crossing the anterior aspect of the common hepatic duct (CHD) is a relatively frequent abnormality [1]. Aberrant right hepatic artery (ARHA) not only interferes with dissection of the CHD and suturing for hepaticojejunostomy in choledochal cyst but can also cause postoperative anastomotic stenosis [2].

We describe our surgical technique for replacing the ARHA dorsally in hepaticojejunostomy to prevent anastomotic stenosis during laparoscopic resection and hepaticojejunostomy of a choledochal cyst in a pediatric patient.

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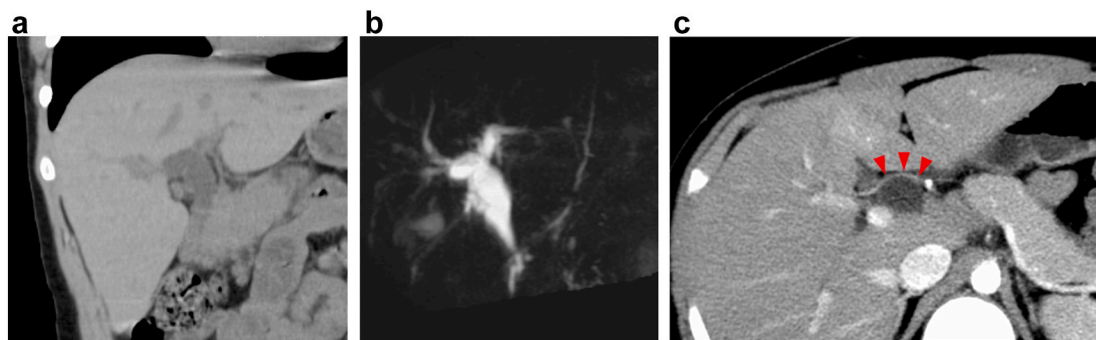


Fig. 1. Findings of preoperative imaging.

(a) A coronal slice of abdominal plain computed tomography (CT) on the initial examination, showing dilatation of the common bile duct, common hepatic duct, and intrahepatic ducts.

(b) Magnetic resonance cholangiopancreatography after improvement of abdominal symptoms, showing pancreaticobiliary maljunction.

(c) An axial slice of abdominal enhanced CT (arterial phase). The aberrant right hepatic artery (ARHA, arrowheads) crosses at the ventral side of the dilated common hepatic duct.

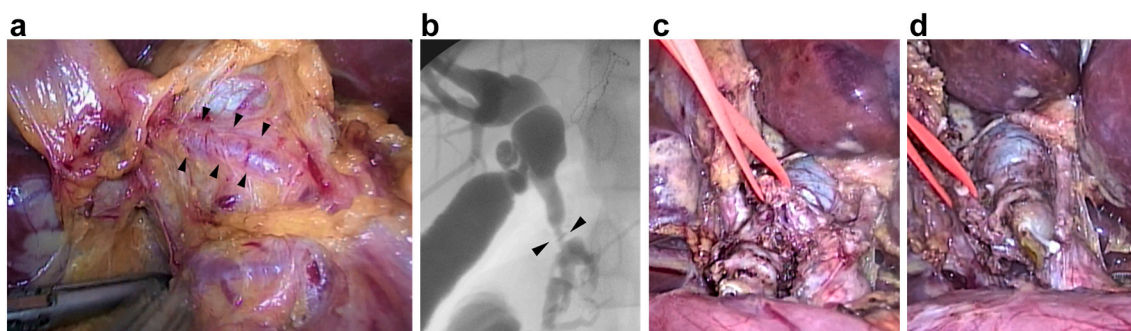


Fig. 2. Intraoperative findings. (a) ARHA (arrowheads) was located at the ventral side of the common hepatic duct.

(b) Intraoperative cholangiography shows pancreaticobiliary maljunction. CBD transection was performed just above the joint portion of the CBD and pancreatic duct (arrowhead).

(c) We dissected and taped the ARHA.

(d) We repositioned the ARHA behind the common hepatic duct.

2. Case presentation

A 14-year-old patient was diagnosed with a choledochal cyst. At 13 years old, the patient had visited the previous doctor for upper abdominal pain. Acute pancreatitis was suspected due to high levels of serum amylase on blood biochemical tests. Plain computed tomography (CT) of the abdomen showed dilatation of the common bile duct (CBD),

and intrahepatic biliary ducts (Fig. 1a). The abdominal symptoms and hyperamylasemia resolved within a few days by conservative therapy. Magnetic resonance cholangiopancreatography performed after abdominal symptoms resolved revealed pancreaticobiliary maljunction (Fig. 1b). The patient was referred to our institution for further treatment. Repeat abdominal enhanced CT showed an ARHA located at the ventral side of the CHD (Fig. 1c). With a diagnosis of choledochal

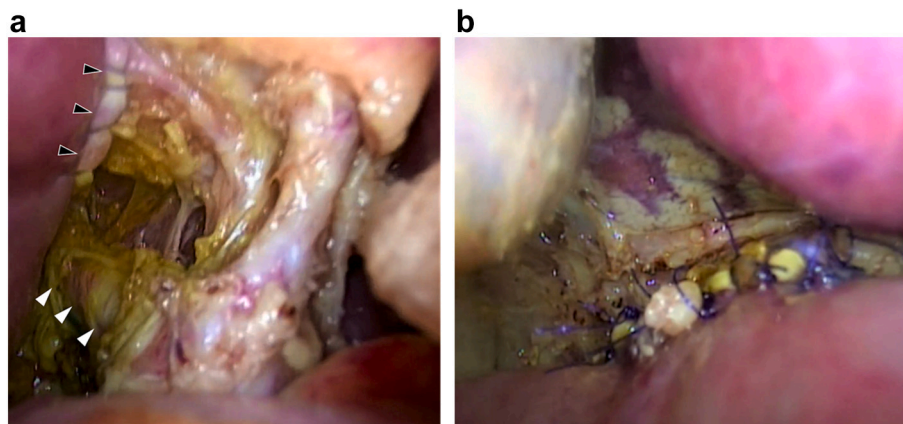


Fig. 3. Completed image of hepaticojejunostomy.

(a) The dorsal view of the anastomosis. The ARHA (white arrowheads) was repositioned at the dorsal side of the anastomosis (black arrowheads).

(b) The ventral view of the anastomosis. The anastomosis is located at the ventral side of the ARHA.

cyst (Type-IVA in Todani Classification), we planned laparoscopic choledochal cyst resection and Roux-en-Y hepaticojejunostomy.

Under general anesthesia with tracheal intubation, the patient was placed in a broad base position. The surgeon stood on the right side of the patient, with trocars placed as follows: 10 mm 30° laparoscope inserted via 12-mm trocar at the umbilicus, operator's left hand (5 mm) at the right upper abdomen, operator's right hand (5 mm) at the right side of the umbilicus, assistant's left hand (5 mm) at the left lateral abdomen, and a 2.4-mm percutaneous needle-type grasper at the left upper abdomen for gallbladder retraction. The intraoperative findings showed that the ARHA crossed at the ventral side of the dilated CHD (Fig. 2a). After dissection of the CBD using a vessel sealing system (EnSeal X1; Ethicon, Cincinnati, OH, USA), CBD transection was performed just above the joint portion of the CBD and pancreatic duct with confirming intraoperative cholangiography (Fig. 2b). After dissecting the ARHA, taping was performed (Fig. 2c, Video S1). Laparoscopic dorsal-side repositioning of the ARHA was performed because it seemed to compress the CHD and risked causing postoperative anastomotic stenosis (Fig. 2d). We performed laparoscopic hepaticojejunostomy by replacing the ARHA dorsally to facilitate suturing and prevent postoperative anastomotic stenosis (Fig. 3). After finishing anastomosis, the beating of the repositioned ARHA was recognized, confirming that blood flow was maintained. We placed a drain dorsally to the anastomosis.

Postoperatively, the patient showed no anastomotic leakage. We removed the drain on postoperative day 5 after confirming a decrease in drainage volume. We administered antibiotics CPZ/SBT intravenously for 7 days postoperatively. The patient was discharged on postoperative day 11. During the 5-month postoperative follow-up period, there was no elevation of serum bilirubin levels or dilatation of the intrahepatic bile ducts on abdominal ultrasonography suggestive of anastomotic stenosis.

3. Discussion

There are many anatomical variations in the right hepatic artery, with the artery crossing on the ventral side of the extrahepatic bile duct being a relatively frequent anomaly [1]. Vascular compression in the proximal CHD can be a congenital cause of obstructive jaundice. Some reports [1,3] have shown that the CHD can be compressed by abnormalities of the celiac and gastroduodenal arteries as well as ARHA.

Todani first reported the technique of placing the ARHA behind the CHD to restore a normal anatomy [4]. Lal reported that in 12.8% (15/117) of children with choledochal cyst, the ARHA crosses the anterior wall of the CHD [5]. These arteries were repositioned at the posterior side of the hepaticojejunostomy to restore a normal anatomy.

Diao reported cases in which the ARHA was replaced dorsally during laparoscopic redo hepaticojejunostomy [2]. They also mentioned that the ARHA crossed anteriorly to the proximal CHD in a high percentage of patients with postoperative recurrent biliary obstruction (7/30, 23.3%). They found that abnormality of the RHA was a primary cause of anastomotic stenosis after hepaticojejunostomy. Furthermore, they speculated that there were two potential causes of choledochal cyst: (1) Before surgery, the intraductal pressure of the dilated biliary system resists compression by the ARHA, and postoperatively, the dilatation of the biliary system is resolved, so the compression of the artery on the proximal CHD worsens; (2) the site of hepaticojejunostomy is close to the ARHA, and during the wound healing process, the artery may cause compression by the inflammatory edematous CHD, resulting in stenotic changes in the lumen.

Once anastomotic stenosis or stricture develops, bile stasis becomes apparent, sometimes causing cholangitis and leading to the formation of intrahepatic stones. Liver damage due to bile stasis may eventually lead to liver fibrosis and cirrhosis. However, once anastomotic stenosis occurs in hepaticojejunostomy, it is difficult to treat. In cases with intrinsic anastomotic stricture, percutaneous transhepatic cholangiodrainage (PTCD) and balloon dilation of the anastomosis can improve the stenosis

but induce prolonged tube placement, leading to cholangitis, bile stasis, and inflammatory stenosis of the bile duct at the drain placement site [6,7]. Ono et al. reported the management of postoperative intrahepatic stones using double-balloon enterotomy (DBE) [8], which can be applied to anastomotic stenosis; DBE can be less invasive than reoperation or PTCD. However, for anastomotic stenosis due to extrinsic factors, such as ARHA, these interventions have not proven effective, but palliative treatment. Initial judgment concerning the need to reposition the ARHA is important for laparoscopic choledochal cyst resection and hepaticojejunostomy. The decision should be based on intraoperative findings, such as the branching configuration of the ARHA.

4. Conclusions

We encountered a case of a choledochal cyst with ARHA in which the artery was replaced dorsally at the anastomosis during laparoscopic choledochal cyst resection and hepaticojejunostomy. In surgery for choledochal cyst with ARHA, replacing the artery to the dorsal side of the anastomosis is essential for preventing postoperative extrinsic anastomotic stenosis.

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.ijscr.2021.106300>.

List of abbreviations

ARHA	aberrant right hepatic artery
CBD	common bile duct
CHD	common hepatic duct
CT	computed tomography

Declaration of competing interest

All authors declare that they do not have any conflicts of interest.

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Ethical approval

All procedures used in this research were approved by the Ethical Committee of Miyazaki University Hospital.

Consent

Written informed consent was obtained from the patient for publication of this case report and accompanying images. A copy of the written consent is available for review by the Editor-in-Chief of this journal on request.

Author contribution

Ryuta Masuya wrote the initial draft of the manuscript. All other authors contributed to data collection and interpretation and critically reviewed the manuscript. All authors approve the final version of the manuscript and agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Registration of research studies

This case is registered in National Clinical Database; the major database of surgical case in Japan.

Guarantor

Satoshi Ieiri has accepted full responsibility for this work and the decision to publish it.

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