CASE REPORT

# Choledochal Cyst in 1-Year-Old Female Following A Single-Step Surgical Procedure: Post Operative Evaluation

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## ABSTRACT

Choledochal cyst is a congenital disorder causing dilation of bile ducts. It results from abnormal bile duct development and manifests in jaundice, abdominal discomfort, and masses. Procedure management involves external drainage, cyst removal, and bile duct reconstruction. We reported a 1-year-old female with choledochal cyst type I. The patient came with complaints of vomiting. The diagnosis was confirmed through ultrasound and magnetic resonance cholangiopancreatography (MRCP). Laboratory examination showed elevated liver enzymes. The patient underwent intraoperative cholangiography followed by single-step cyst excision with cholecystectomy, the cyst was found in the proximal CBD measuring 12 x 8 x 6 cm. This procedure was followed by Roux-en-Y hepaticojejunostomy. Postoperatively, the patient received antibiotics and medication, showing improvement in liver enzyme levels. After seven days in the hospital, she was discharged with a closed surgical wound, indicating a successful recovery from the procedure.
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## INTRODUCTION

Choledochal cyst is a congenital disorder that can result in dilation of the biliary tree and bile ducts (1). The incidence of choledochal cyst among Asian populations is approximately 1 in 13,000 live births, with most cases reported in Japan. The reason for the higher prevalence in Asian populations remains unclear. The condition is more common in women, with a female-to-male ratio of 1.5:1. This condition is the result of an anomalous development of the bile ducts during fetal life, which can obstruct the flow of bile (1,2). The symptoms of choledochal cysts can be presence of an abdominal mass, abdominal discomfort, and jaundice which most of infant often presenting with palpable abdominal mass (1). Early diagnosis is essential to prevent complication such as cholangitis, pancreatitis, and liver damage, which typically achieved through the use of ultrasound imaging (1,2). The management of complicated choledochal cysts comprises two stages. The initial stage involves external drainage, followed by definitive management with surgery. The most effective treatment for choledochal cysts is removal of the cyst and reconstruction of the bile duct (2). This case report describes a pediatric patient who presented with a choledochal cyst and elevated liver enzymes, who underwent total cyst excision and Roux-en-Y ductal reconstruction.

## CASE REPORT

The patient, a 1-year-old girl weighing 10 kg and 79 cm tall, came with initial complaints of vomiting. Vomiting was reported to be >5 times in a day since 5 days before admission. In addition, the family said the patient was fussy and had a fever 4 days before admission. The patient was treated at another hospital for 5 days before referral, where an ultrasound showed a firm-border cyst (2.15 x 1.98 cm) suggestive of a choledochal cyst. The patient's laboratory showed leukocytosis (16.2 x $10^3$/µl), neutrophilia (78.4%), and lymphopenia (16.2%). The family denied any history of jaundice and loose stools. After the initial examination, the patient was scheduled for MRCP examination. Prior to MRCP, the patient underwent laboratory examination and was found to have elevated liver enzymes (SGOT: 47 u/l; SGPT: 32 u/l; Gamma GT: 81 u/l). The MRCP examination showed a fusiform fluid intensity lesion in the proximal to media CBD causing ecstasize intra- and extrahepatic biliary system (common hepatic duct, bilateral IHBD and ductus cysticus) with a size of 1.8 x 2.3 x 2.1 cm which was a picture of choledochal cyst type I (Todani classification) and multiple choledocholithiasis in the media CBD with a size of 0.5 cm (Fig. 1).

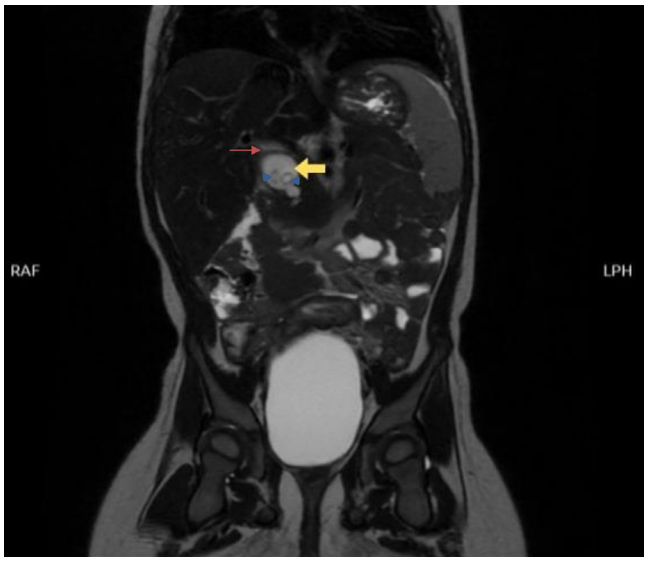


**Fig 1. Coronal view from MRCP showing a fusiform, fluid-filled dilation of the proximal to mid CBD measuring 1.8 x 2.3 x 2.1 cm (yellow arrow), consistent with a Todani type I choledochal cyst. Additional findings were dilatation of the intrahepatic and extrahepatic bile ducts (red arrow), along with multiple choledocholithiasis in the mid CBD, with the largest measuring 0.5 cm in diameter (arrowhead).**

Based on the results of the examination, the patient was planned to undergo intraoperative cholangiography (IOC), cyst excision, and Roux-en-Y shunting. Before the action was taken, the patient underwent another laboratory examination which showed an increase in liver enzymes compared to the previous examination results (SGOT: 54 u/l; SGPT: 78 u/l; Gamma GT: 103 u/l). Before the procedure, the patient received ampicillin sulbactam 25 mg/kgBW/6 hours and metronidazole 7.5 mg/kgBW/8 hours as prophylactic antibiotics, and received vitamin K 0.3 mg/kgBW/24 hours for pro-coagulant. During the procedure, a cyst was found in the proximal CBD measuring 12 x 8 x 6 cm. The cyst and gallbladder were then removed without external drainage considering the patient's stable condition. Roux-en-Y hepaticojejunostomy and jejunojejunostomy were then performed (Fig. 2). End-to-side anastomosis is used to create connection between the hepatic duct and the jejunum with a 1 cm length pouch. As an anti-reflux mechanism, the Y-site length of the Roux-en-Y procedure is about 40 cm. The action lasted for 5 hours with a post-operative care in the PICU, medication every 2 days, fasting for 3 days, installing DC, and positioning fowler. In addition, the patient was also given D½ normal saline, ampicillin sulbactam 200 mg/8 hours, metronidazole 150 mg/8 hours, paracetamol 200 mg/8 hours, and ranitidine 15 mg/12 hours. Two days after surgery, the patient was re-checked with liver enzymes which showed a decrease in liver enzymes compared to before (SGOT: 42 u/l; SGPT: 65 u/l; Gamma GT: 60u/l). The patient was then transferred to the isolation ward and treated for 3 days before finally being discharged in a stable condition and a non-leaking surgical wound. Before discharge, the patient was re-examined with

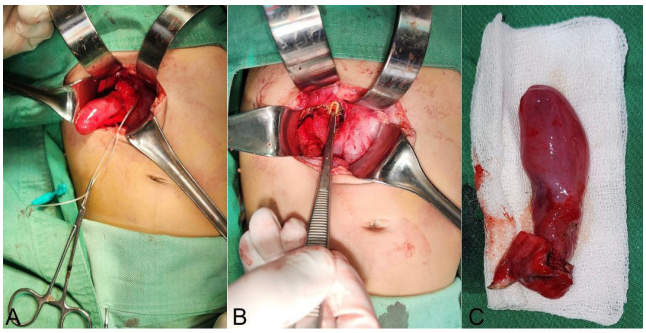


**Fig 2. (A) Cholecystectomy, (B) Roux-en-Y hepatico-jejunostomy, (C) Gallbladder with its ducts removed.**

normal liver enzyme results (SGOT: 30 u/l; SGPT: 32 u/l; Gamma GT: 56 u/l). Seven days after discharge from the hospital, the patient was discharged with a dry wound and showed wound improvement. Fourteen days after the patient was discharged, the patient returned with a fully closed surgical wound without any complications (Fig. 3).

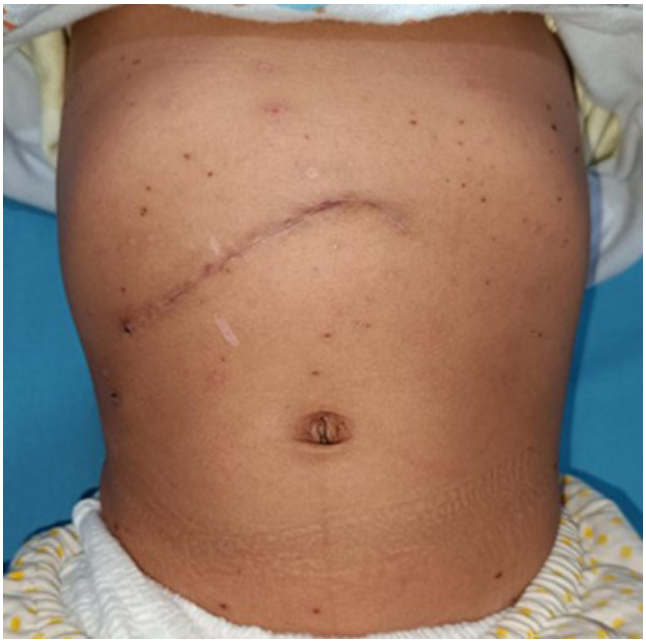

**Fig 3. Wound condition three weeks after surgery showed complete closure and no complications.**

## DISCUSSION

Choledochal cyst is an uncommon congenital disorder that can result in dilation of the biliary tree and bile ducts. Our patient was found to have choledochal cyst type I. Type I choledochal cyst is a cystic or fusiform appearance that causes dilatation of the extrahepatic bile duct, which is the most common case in patients, about 75-85% of cases (1,2).

The current study revealed that nausea, vomiting, and abdominal pain were the most common presenting symptoms in older children (1–18 years of age at presentation), while abdominal mass was predominant in infants (<1 year of age at presentation). The findings

of this case are in line with the findings of a study that vomiting symptoms were predominant in infant patients. The exact etiology of choledochal cyst is still unknown. A popular theory is that the cyst develops from an anomalous pancreaticobiliary junction (APBJ) (1). As a result, the long channel formed is not covered by the sphincter and allows for the backflow and mixing of pancreatic and biliary secretions, which leads to the activation of pancreatic enzymes. This results in a rise in pressure, which eventually causes dilation, inflammation, epithelial damage, dysplasia, and malignancy of the biliary tree (1,2). Ultrasound imaging is usually used to obtain an early diagnosis, which is essential for preventing such complications. The patient was found to have an ultrasound screening leading to suspicion of a choledochal cyst. MRCP was performed on the patient as diagnosis tools of choice to confirm the findings on ultrasound examination (2).

The definitive surgical procedure is total cyst excision followed by Roux-en-Y hepaticojejunostomy, which creates a new pathway for bile drainage to the small intestine, thereby preventing complications and protecting liver function. Typically, management of complicated giant choledochal cysts is conducted in two stages, beginning with external drainage prior to definitive surgical intervention (2). In this case, it was determined that external drainage should not be performed prior to definitive surgery, given the patient's stable condition and the absence of a significant increase in intra-abdominal pressure. This approach offers several benefits, it provides a definitive cure in one operation, effectively removing the cyst and restoring normal bile flow without temporary drainage tubes or additional surgeries. Early surgical intervention contributes to better liver preservation by preventing progressive fibrosis or cirrhosis that could result from prolonged cyst-related damage (3).

For the biliary reconstruction, we performed an end-to-side anastomosis between the common hepatic duct and the Roux limb of jejunum because of the significant discrepancy in diameters between the structures. On the other hand, end-to-end anastomosis is recommended when the ratio of the diameter of the main hepatic duct to that of the proximal Roux-en-Y jejunum is 1:2.5 or lower. End-to-side anastomosis requires attention to the blind jejunal pouch, which can elongate with growth and cause complications like bile stasis and cholangitis. To reduce these risks, we limited the pouch length to 1 cm, following recommendations to perform the anastomosis at its distal end (4). In this study, a 40 cm Y-limb was used in the Roux-en-Y reconstruction to prevent reflux and related complications, aligning with the recommended 40–60 cm range to ensure effective separation of the bilioenteric anastomosis from the intestinal stream. This procedure carries risks, including anastomotic leak, stricture formation causing obstruction, and intestinal blockage from bowel twisting or adhesions (5).

Post operatively, the patient was admitted to the pediatric intensive care unit (PICU), fasting for 3 days and medication every 2 days. The patient was also received intravenous fluid to maintain hydration and antibiotics to prevent infection. A nasogastric (NG) tube may also be placed temporarily to decompress the stomach and prevent nausea or vomiting. Liver enzyme levels typically return to normal within 3 to 20 weeks after surgery (5). In this patient, liver enzymes exhibited a decline 2 days after surgery and reached normal levels within 6 days after surgery. Discharge may be considered once the infant demonstrates tolerance to full enteral feeds, no signs of infection, and normal laboratory values. Follow-up is essential, involving monitoring for symptoms like fever, jaundice, or pale stools, liver function test, hepatobiliary ultrasound, and imaging like ERCP or MRCP may be required to assess for anastomotic stricture (2).

## CONCLUSION

Managing giant choledochal cysts can be a challenge. This case report describes the successful excision of the cyst and Roux-en-Y hepaticojejunostomy without prior external drainage, despite the considerable cyst size. The patient had a favorable postoperative outcome and showed rapid recovery.

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