



Choledochal Cyst in Adult Patient with Malignant Development: Report of Two Cases

*Chin-Hu Tsai, Jen-Lung Chen, Yaw-Sen Chen**

Choledochal cysts (CCs) are commonly diagnosed in pediatric patients. Aging with recurrent cholangitis can cause malignant change. Here, we report two adult cases of CC with malignant change. First case: a 54-year-old woman experienced epigastric pain with vomiting for several days. Blood tests revealed abnormal liver and pancreatic enzyme levels and elevated carbohydrate antigen 19-9 (CA 19-9). Abdominal computed tomography (CT) revealed a 10-cm cystic mass over the hepatic hilum with intrahepatic duct dilatation. Magnetic resonance cholangiopancreatography (MRCP) showed a mucinous cystic tumor with a hypodense lesion in the hepatic hilum. Second case: a 39-year-old woman occasionally experienced epigastric pain and vomiting since childhood. Common bile duct (CBD) dilatation with elevated CA 19-9 was observed during a regular health examination. MRCP revealed dilatation of the CBD with a hypodense lesion. Both patients had no systemic diseases and underwent cyst excision with Roux-en-Y hepaticojejunostomy. Pathology revealed cholangiocarcinoma with lymph node metastasis. The CA 19-9 level decreased in both cases after surgery, and the patients were referred to an oncologist. Liver metastasis and peritoneal carcinomatosis were noted in the first patient, who died 18 months after surgery. The second patient did not undergo any further treatment at our hospital. CCs are rare in adults, and malignant change should be considered if CT or MRCP reveal mural nodules in cysts with elevated CA 19-9 levels. The prognosis is dismal if malignancy with lymph node metastasis is present even after operation. Early diagnosis and surgical intervention during childhood are optimal treatment options.

Key words: choledochal cyst, adult, carbohydrate antigen 19-9 (CA 19-9), mural nodule, cholangiocarcinoma

Introduction

Choledochal cysts (CCs) are a rare congenital condition characterized by cystic dilation of the biliary tract. They were first

described by Vater and Ezler in 1723. The incidence of CC varies from 1 in 10,000 to 1 in 150,000 live births in the Western population,¹ and it is more frequent in Asian female individuals, especially Japanese individuals, with approximately 1 in 1,000 live births.² Further-

From the Division of General Surgery, Department of Surgery, E-Da Hospital, Kaohsiung, Taiwan.

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* Address reprint request and correspondence to: Yaw-Sen Chen, Division of General Surgery, Department of Surgery, E-Da Hospital, No. 1, Yida Road, Jiaosu Village, Yanchao District, Kaohsiung City 824005, Taiwan.

Tel: +886-7-615-0011, ext. 2977, E-mail: ed102489@edah.org.tw

more, it occurs approximately three times more often in female individuals than in male individuals.²

CC is typically a pediatric disease. Over 60% of patients with CC are diagnosed during the first decade of life, and approximately 20% go undiagnosed until adulthood.³ In the pediatric group, the classic triad of CC includes a palpable mass in the right quadrant, abdominal pain, and jaundice. According to a previous study,³ 85% of pediatric patients with CCs had the classic triad; however, only 25% of the adult group reported this. In the adult CC group, the possibility of malignant change increased, indicating that the incidence of malignant change increases with age. The poor prognosis of CC-related cholangiocarcinoma was also mentioned.⁴ Approximately 10% – 30% of adults with CC develop cholangiocarcinoma. Currently, the expanded use of imaging examinations has increased the detection of CC in these patients.⁵ Considering that the most common type of malignancy in CCs is cholangiocarcinoma, another diagnostic tool is serum carbohydrate antigen 19-9 (CA 19-9) measurement, which is highly accurate for the prediction of cholangiocarcinoma, with sensitivity and specificity as high as 100% and 94%, respectively, using a cutoff of 186 IU/mL.⁶

In adult CC, the possibility of malignant change is higher, indicating that the incidence of malignant change increases with age. The poor prognosis of CC-related cholangiocarcinoma was also mentioned.⁴ Approximately 10% – 30% of adults with CC develop cholangiocarcinoma. Even after radical surgical excision, most patients die within two years of diagnosis.⁷ Another multi-institutional analysis including 394 patients with CC who underwent resection showed that the survival rate decreased to less than 60% within two years and less than 40% within five years in the malignant group, which was a significantly worse overall survival than that in the non-malignant group, although the overall survival was not

significantly different between adults and children.⁸

The definite etiology of CC and its malignant change are still a subject of debate, and the most favored hypothesis is an anomalous pancreatobiliary ductal junction, which causes reflux of pancreatic enzymes, amylase, and bile stasis. The increase in the intraductal concentration of bile acids contributes to the proliferative activity of bile duct mucosa cells, which ultimately causes malignant change.⁹ Complete surgical resection of the cystic lesions at an early age is recommended.³ For a smaller number of cases, there is no treatment consensus or guideline for CC with malignant change. The protocol for palliative or systemic treatment is the same as biliary tract cancer.¹⁰

Being a relatively rare disease with a poor clinical prognosis, correct diagnosis and treatment plans are important. Here, we share our experience with two cases of CC diagnosed in adulthood with malignant change.

Case Report

Our first case is that of a 54-year-old female patient with no history of systemic disease or surgery. The patient experienced epigastric pain and intermittent vomiting for several days. She denied any history of alcohol consumption or hepatitis virus infection. She visited our emergency department, and physical examination revealed right upper quadrant pain with Murphy's sign. Abnormal liver with jaundice and pancreas enzyme levels were revealed in serum laboratory data (total bilirubin = 1.96 mg/dL, lipase = 237 U/L, alanine transaminase = 169 U/L, alkaline phosphate = 470 U/L). Abdominal computed tomography (CT) showed a 10-cm cystic lesion in the liver hilum, with bilateral intrahepatic duct dilatation and a mural nodule (Fig. 1). CC with tumor transformation was suspected.

Magnetic resonance cholangiopancreatography (MRCP) was performed after admission



Fig. 1 Computed tomography (CT) scan of the first case, coronal view. A 10 cm cystic mass (arrow) with enhanced mural nodule at hepatic hilum with bilateral intrahepatic duct dilatation.



Fig. 2 Magnetic resonance cholangiopancreatography (MRCP) of the first case. A 10 cm cystic lesion with enhanced mural nodule (arrow) at hepatic hilum and bilateral intrahepatic duct dilatation.

for a further biliary tract survey, which showed a 10-cm cystic tumor at the hepatic hilum with a mural nodule over the cystic wall (Fig. 2). Tumor markers, including carcinoembryonic antigen (CEA) and CA 19-9 were checked. Elevated CA 19-9 levels (8,575.9 U/mL) were found; however, CEA levels were normal (2.09 ng/mL). A tentative diagnosis of Todani type I

CC with possible malignant change was made.

The cystic lesions were then excised. During surgery, a large CC with dense adhesion to the duodenum was observed (Fig. 3A). Radical excision of the CC from the bifurcation of the intrahepatic duct to the upper border of the pancreas was performed. Roux-en-Y hepaticojejunostomy was performed for biliary reconstruction (Fig. 3B). The surgical cystic specimen was opened and several hard mucosal nodules were found inside the cyst wall (Fig. 4). The pathology report revealed a CC with stage pT1N1Mx cholangiocarcinoma. The patient was discharged one week postoperatively.

The blood CA 19-9 levels decreased from 8,575.9 U/mL to 2,497 U/mL one month

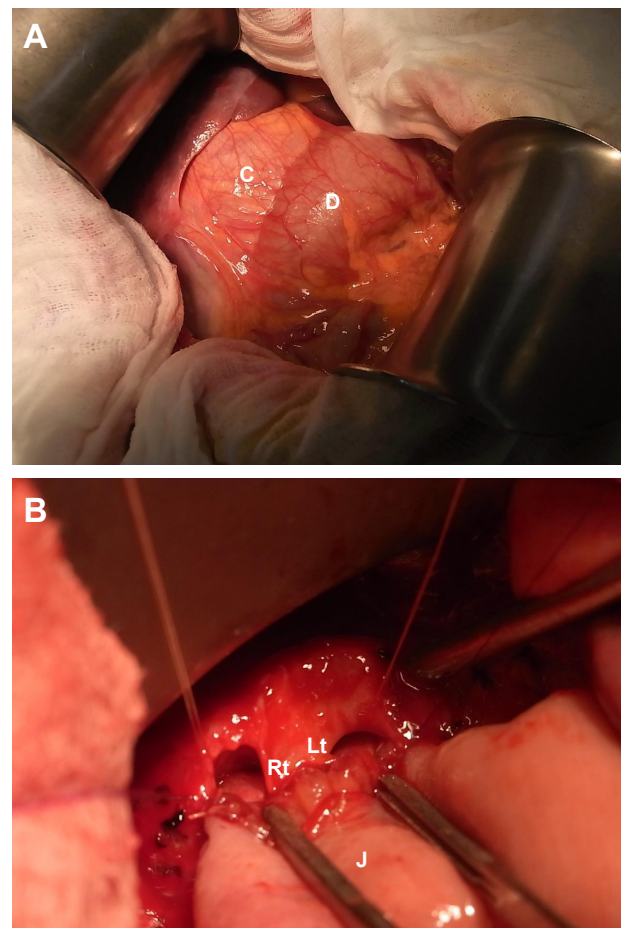


Fig. 3 Operation pictures of the first case. (A) Before excision, dense adhesion between choledochal cyst and duodenum. C: Choledochal cyst. D: Duodenum. (B) After excision, radical excision of the cyst with Roux-en-Y hepaticojejunostomy. Rt: Right hepatic duct. Lt: Left hepatic duct. J: Jejunum.

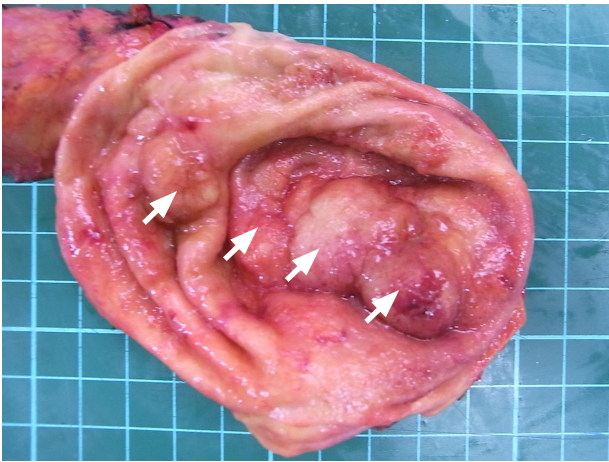


Fig. 4 Surgical specimen of the first case. Several hard mucosal nodules (arrow) were noted inside the cyst wall.

after surgery. The patient was transferred to the oncology department for further adjuvant chemotherapy. She received FLOFIRI (Folinic acid, 5-FU, IRInotecan) therapy with eight courses of radiotherapy. Abdomen CT scan 17 months after surgery revealed peritoneal carcinomatosis with massive ascites and liver metastasis (Fig. 5A & 5B). The patient died 18 months after surgery.

The second case is that of a 39-year-old female patient with no history of systemic diseases. The patient had occasionally experienced epigastric pain and vomiting during childhood. However, she did not undergo a detailed examination of her symptoms. She was transferred to our hospital because of high blood levels of CA 19-9 (1,068.02 U/mL) with a normal range of CEA levels (2.22 ng/mL). Abnormal serum laboratory data included Alanine Aminotransferase levels (138 U/L). Other hepatic and biliary parameters were normal (Aspartate Aminotransferase = 56 U/L, Total Bilirubin = 0.8 mg/dL, Amylase = 81 U/L). Common hepatic duct (CHD) dilatation was observed on sonography during a health examination at a local clinic. MRCP showed Todani type 1 CC with a mural nodule close to the cystic duct (Fig. 6).

Under the impression of a CC with suspected malignant change, the patient was

admitted for surgery. Radical excision of the cyst was performed along with hilar lymph node dissection. The bile duct was reconstructed using a Roux-en-Y hepaticojejunostomy. The opened surgical specimen showed an indurated mural nodule inside the cyst extending from the cyst wall to the cystic duct (Fig. 7).

The pathological report revealed a CC with cholangiocarcinoma, regional lymph node metastasis, stage IIB, and pT2N1Mx. The patient recovered well and was discharged on postoperative Day 10.

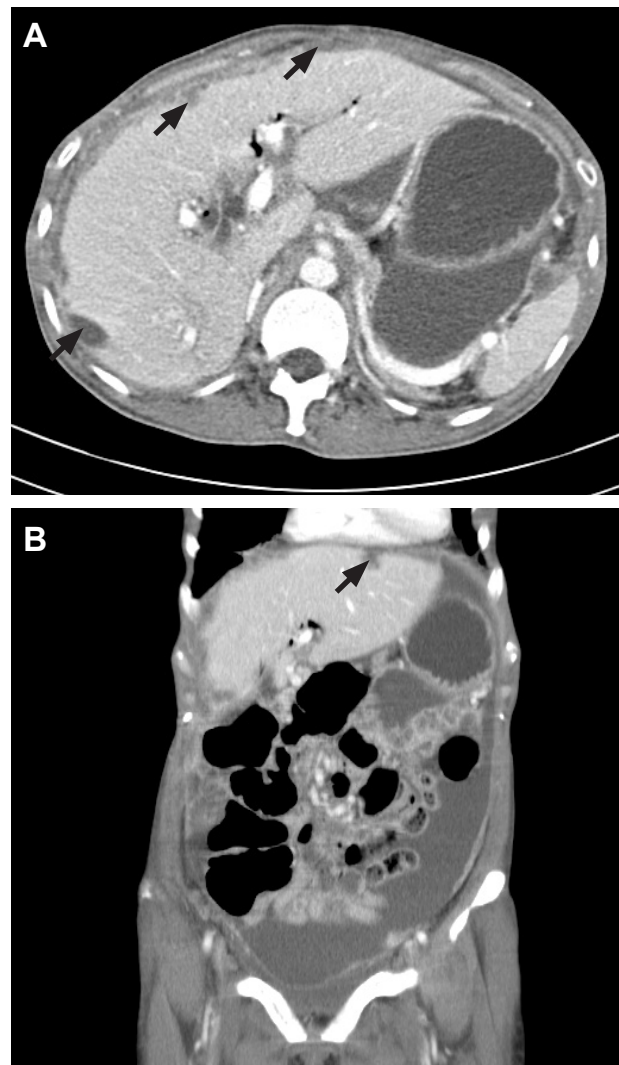


Fig. 5 Abdomen computed tomography (CT) scan 17 months after operation in the first case. (A) Sagittal view. Multiple peritoneal tumor seedings (arrow) in the subphrenic space. (B) Coronal view. Several peritoneal seedings in greater omentum, mesenteric space and pelvic cavity with massive ascites. A liver tumor in segment 2 (arrow), suspect metastatic lesion.

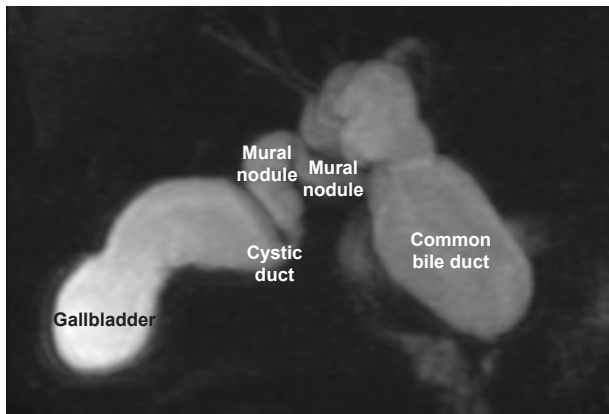


Fig. 6 Magnetic resonance cholangiopancreatography (MRCP) of the second case. Remarkable dilatation of common bile duct (30 mm) with mural nodule inside the cystic duct.

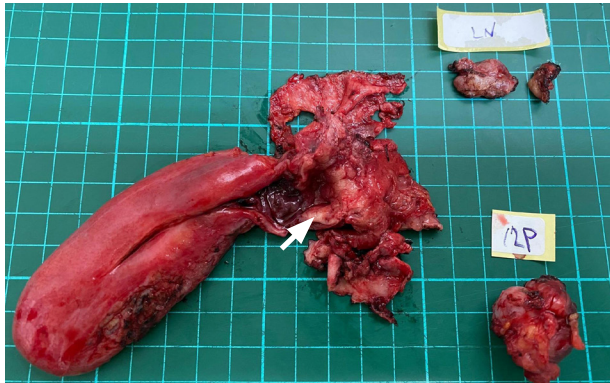


Fig. 7 Surgical specimen of the second case. Indurated mural nodule was found inside the cyst and extended to the cystic duct (arrow).

Follow-up CA 19-9 level one week after discharge at the outpatient department revealed a remarkable decrease, from 1,656.26 U/mL to 60.55 U/mL. She received adjuvant chemotherapy at another hospital owing to geographic convenience.

Conclusions

CCs are rarely diagnosed in adults, and malignant change should be suspected if abdominal CT or MRCP shows a mural nodule in the cyst with an elevated CA 19-9 level. Radical excision of the cyst with lymph node dissection along the hepatoduodenal ligament and common hepatic artery is suggested in cases suspected to be malignant. Despite

radical resection and adjuvant chemotherapy, the prognosis is poor if malignancy with lymph node metastasis is present. Early diagnosis and surgical intervention during childhood are the best methods to prevent malignant change.

Author Contributions

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Informed Consent Statement

Informed consent was obtained from all subjects involved in the study (two patents had signed agreement of photography during hospitalization and operation).

Data Availability Statement

Not applicable.

Conflicts of Interest

The authors declare no conflict of interest.

References

1. Howard ER: Choledochal cysts. In: Howard ER ed. Surgery of Liver Disease in Children. Oxford: Butterworth-Heinemann, 1991:78-90.
2. O'Neill JA, Jr.: Choledochal cyst. Curr Probl Surg 1992;29:371-410. doi: 10.1016/0011-3840(92)90025-X.
3. Søreide K, Körner H, Havnen J, et al: Bile duct cysts in adults. Br J Surg 2004;91:1538-48. doi:

- 10.1002/bjs.4815.
4. Nicholl M, Pitt HA, Wolf P, et al: Choledochal cysts in western adults: complexities compared to children. *J Gastrointest Surg* 2004;8:245-52. doi: 10.1016/j.gassur.2003.12.013.
5. Edil BH, Cameron JL, Reddy S, et al: Choledochal cyst disease in children and adults: a 30-year single-institution experience. *J Am Coll Surg* 2008;206:1000-5; discussion 5-8. doi: 10.1016/j.jamcollsurg.2007.12.045.
6. Wirth TC, Vogel A: Surveillance in cholangiocellular carcinoma. *Best Pract Res Clin Gastroenterol* 2016;30:987-99. doi: 10.1016/j.bpg.2016.11.001.
7. Liu CL, Fan ST, Lo CM, et al: Choledochal cysts in adults. *Arch Surg* 2002;137:465-8. doi: 10.1001/archsurg.137.4.465.
8. Soares KC, Kim Y, Spolverato G, et al: Presentation and clinical outcomes of choledochal cysts in children and adults: a multi-institutional analysis. *JAMA Surg* 2015;150:577-84. doi: 10.1001/jamasurg.2015.0226.
9. Lee SE, Jang JY, Lee YJ, et al: Choledochal cyst and associated malignant tumors in adults: a multicenter survey in South Korea. *Arch Surg* 2011;146:1178-84. doi: 10.1001/archsurg.2011.243.
10. de Groen PC, Gores GJ, LaRusso NF, et al: Biliary tract cancers. *N Engl J Med* 1999;341:1368-78. doi: 10.1056/NEJM199910283411807.