**Case Report**

# Caroli's Disease Presented as a Huge Hepatic Multilobulated Cystic Mass in a Newborn

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Caroli's disease is a rare congenital disorder characterized by cystic dilatation of the intrahepatic bile ducts. We reported a newborn with a prenatally detected huge hepatic multilobulated cyst, the diagnosis of which was confirmed by biopsy after birth. However, the hepatic cyst regressed gradually without complication. In addition, there have been totally six patients who were prenatally diagnosed as having Caroli`s disease and the prognosis of Caroli's disease varies, depending upon the severity of disease.

**Key words:** Caroli`s disease, hepatic cyst, newborn



## Introduction

Caroli's disease, characterized by cystic dilatations of the intrahepatic bile ducts that communicate with the biliary system, is a rare congenital disorder first described by Caroli in 1958.[1] It is also known as choledochal cyst type V, or type IVA if it is associated with an extrahepatic choledochal cyst.[2] Caroli's syndrome is defined as congenital bile ductal dilatation associated with features of congenital hepatic fibrosis, whereas Caroli's disease, which is less common, refers to isolated dilatation of large intrahepatic bile ducts without other apparent hepatic abnormalities.

Caroli's disease has been reported in adults, adolescents and children, with clinical presentations including abdominal pain, fever, recurrent acute cholangitis or cholangiocarcinoma. There is a limited number of reports on newborns, especially when detected prenatally. Herein, we presented a newborn with Caroli's disease detected antenatally. The diagnosis was confirmed by pathologic analysis of the surgical specimen after birth. In addition, we reviewed relevant literature on PubMed with search terms including "Caroli`s disease" OR "choledochal cyts type V", combined with AND "neonate" OR "newborn".

## Case Report

This term female neonate, 38 weeks of

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gestation with a birth weight of 3100 gm, was born to a Taiwanese non-consanguineous 36-year-old mother who was gravida 2, para 2, via cesarean section. The mother had Schizophrenia and took the anti-psychotic medication Haloperidol regularly. The first baby of this family had died at two years old of undiagnosed disease. There was no family history of liver or renal disease. At 28 weeks of gestation, polyhydramnios and a complex cystic mass in the fetal liver were noted on sonographic examination. There was no evidence of other structural anomalies in the fetus. After birth, she had a soft, flat abdomen with hepatomegaly, 7-8 cm below the right costal margin.

Liver function tests revealed that aspartate aminotransferase (AST) and alanine aminotransferase (ALT) were 34 U/L and 12 U/L, respectively, with normal prothrombin time and partial prothrombin time. The highest total bilirubin level was 6.86 mg/dL, with direct bilirubin of 0.34 mg/dL on day 7. The level of alkaline phosphatase (ALK-P) was 169 IU/L, gamma-glutamyl transpeptidase (GGT) of 119 U/L, and albumin of 3.74 g/dL. Alpha fetal protein (αFP) level was up to 57817 ng/mL on the 13th day. Hepatitis B and C titer surveys were all negative.

Abdominal sonography (Fig. 1A) revealed a multilobulated intrahepatic cystic mass of size 6.2 × 4.8 × 5.7 cm within the segment V of liver. The liver parenchyma and extrahepatic bile ducts were normal. There was neither splenomegaly nor ascites. The kidneys were normal in appearance. Magnetic resonance cholangiopancreatography (MRCP) showed a multilobulated cystic lesion in segment V of the liver of size 6.2 × 4.5 × 5.8 cm (Fig. 1B). No definite imaging evidence of choledochal cyst or biliary atresia was noted.

At 14th day of age, surgical exploration with laparoscopy was performed and a huge hepatic cyst connected to the biliary tree was found. Cholangiogram during operation showed that the hepatic cyst was communicated with the intrahepatic ducts of the biliary system, and no extrahepatic bile ducts were involved, compatible with the diagnosis of Caroli's disease. There was no obstruction of bile flow. Thirty-seven milliliters of turbid



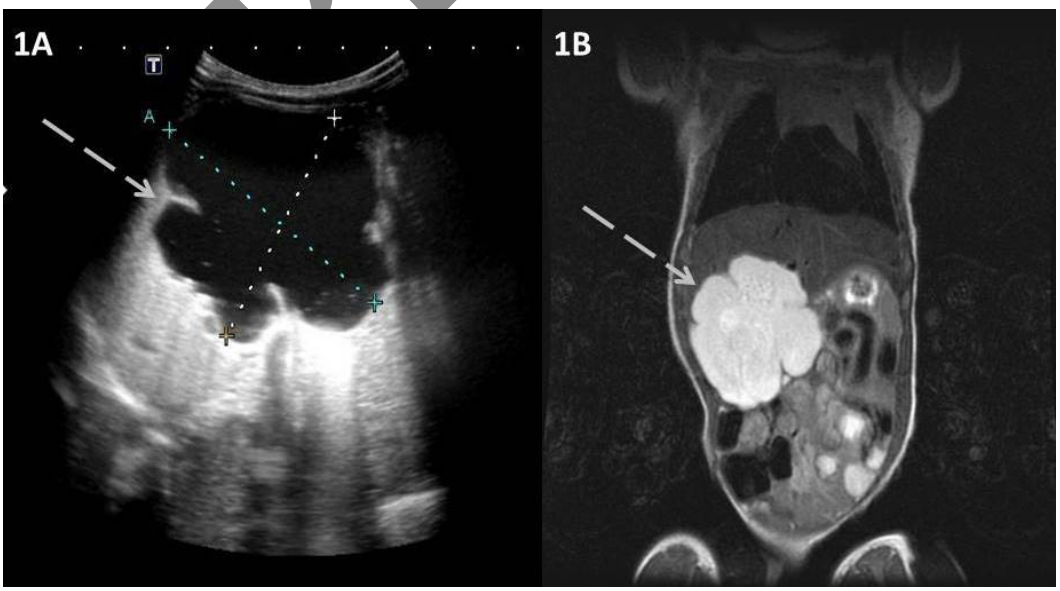


*Fig. 1 The image of intrahepatic cyst. (A) A multilobulated cystic mass (6.2 × 4.8 × 5.7 cm) within segment V of the liver from abdominal ultrasonogram performed after birth. (B) A multilobulated cystic lesion in the right upper quadrant of the abdomen was noted, measuring 6.2 × 4.5 × 5.8 cm from T1-weighted image of magnetic resonance cholangiopancreatography (MRCP).*

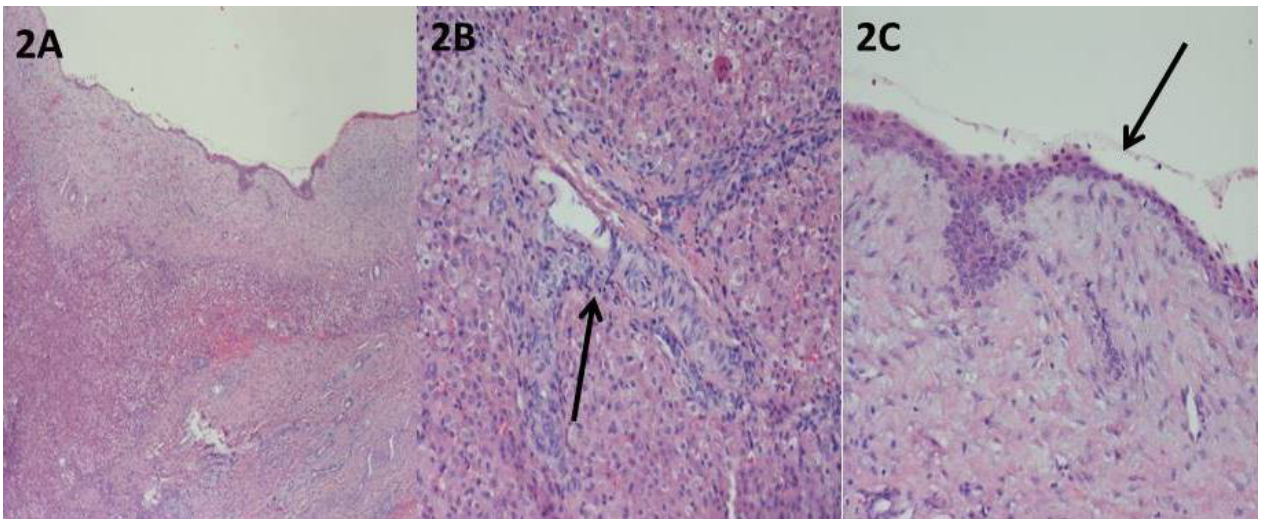


*Fig. 2 Pathology of liver biopsy (A) Fibrotic cystic wall lined with cuboidal or stratified flattened epithelium without evidence of biliary cirrhosis (Low-power microscopic photograph). (B) Few lymphocytic inflammatory infiltrate around partial area noted. Irregular architecture of biliary tracts consistent with plate malformation. (C) Fibrotic cystic wall lined by cuboidal or stratified flattened epithelium (High-power microscopic photograph).*



greenish fluid was drained from the cyst. Liver biopsy (Fig. 2) demonstrated dilated intrahepatic biliary tracts without congenital hepatic fibrosis and Caroli`s disease was confirmed.

This baby was growing well and asymptomatic at 3 months of age. Abdominal sonographic follow-ups showed progressive regression of the liver cyst at the age of 3 weeks and 2 months. The total bilirubin level returned to normal range at the age of 2 months. There was no evidence of congenital hepatic fibrosis or renal failure.

## Discussion

Caroli's disease, which is characterized by cystic dilatations of the intrahepatic bile ducts communicating with the biliary tract, is a rare congenital disorder.[1] Reviewing of related literature showed a limited number of reported newborns who were diagnosed as having the disease. To our knowledge, there have only been five reported cases with antenatal diagnosis in the literature[4-8] (Table 1). We presented a newborn of Caroli's disease detected antenatally and confirmed after birth. This is also the first patient with prenatally detected Caroli's disease whose diagnosis was also confirmed postnatally during surgery and after pathological analysis of the surgical specimen.

Review of literature revealed totally 6 patients whose live cysts were detected prenatally with confirmation of the diagnosis of Caroli`s disease including the present case[4-8] (Table 1). The overall survival was 66.7% in the absence of other comorbidities. Two patients (33.3%) showed gradual regression on sonographic follow-up. There have been no reports of cholangiocarcinoma till now.

Caroli's disease exists with a heterogeneity of clinical presentations ranging from asymptomatic in neonate to adult-onset recurrent cholangitis or liver cirrhosis.[3] The onset of symptoms can be as early as the neonatal period, especially in cases associated with congenital hepatic fibrosis.[8] The majority of adult patients present with abdominal pain, fever, acute cholangitis, recurrent cholangitis, cholangiocarcinoma and symptoms of portal hypertension such as ascites and esophageal varices hemorrhage.[3]

The diagnosis of Caroli's disease and

*Table 1. Reported cases of Caroli's disease detected prenatally and neonatal presentation*

| Case number | Gender | Age at detection | Image findings of liver from fetus | Renal involved | Operation/ biopsy | Outcome | Reference |
|---|---|---|---|---|---|---|---|
| 1 | Un | 36th weeks of gestational age | Two large hepatic cysts | Y (ARPKD) | N | Died at birth due to pulmonary hypoplasia | 4 |
| 2 | Un | 28th weeks of gestational age | Un | N | N | Survived at 3 years old | 5 |
| 3 | F | 25th weeks of gestational age | Several intrahepatic cysts | N | N | Survived at 1 years old The size of cyst regressed | 6 |
| 4 | F | 23th weeks of gestational age | Multiple cystic dilations in the liver | N | N | Died at 11 weeks of age due to sepsis | 7 |
| 5 | M | 33th weeks of gestational age | A cystic liver mass | Y (ARPKD) | N | Survived at 3 months old | 8 |
| 6 | F | 28th weeks of gestational age | A huge intrahepatic multiloculated cyst | N | Y | Survived at 3 months old The size of cyst regressed | |

Un: Unknown; F: Female, M: Male; ARPKD: Autosomal recessive polycystic kidney disease

Caroli's syndrome mainly relies on imaging studies that demonstrate continuity between the cystic lesions and the biliary tree. Although endoscopic retrograde cholangiopancreatography (ERCP) or percutaneous transhepatic cholangiography (PTC) have been considered the "gold standards" to demonstrate biliary anatomy,[9] Magnetic resonance cholangiopancreatography (MRCP), hepato-iminodiacetic acid (HIDA) scan, or intraoperative cholangiogram might be better choices in newborn for anatomical delineation of the biliary tract.[10] In our presented patient, imaging studies did not find evidence of communication between the cyst and bile ducts, making the diagnosis more difficult. Therefore, we relied on intraoperative cholangiogram to make a definite diagnosis.

The treatment of Caroli's disease depends on the clinical features and the location of the biliary abnormalities. In spite of acceptable conservative management of complication of Caroli`s disease such as acute cholangitis and intrahepatic cholelithiasis, surgery with hepatectomy offers a definite therapy for localized Caroli's disease. Symptomatic relief after hepatectomy which removed the whole lesion is often complete and permanent. However, most patients of Caroli's disease were not suitable for total removal of the lesion. These patients should be considered for liver transplantation if they develop recurrent cholangitis or serious complications of portal hypertension. Liver transplantation is an optimal option for patients with advanced Caroli's disease and should be considered in a timely fashion to prevent worsening complications including refractory cholangitis and cholangiocarcinoma.

The treatment of newborn diagnosed as having Caroli's disease prenatally has so far been conservative. It seems that possibility exists regarding regression of the cystic lesion. Although the natural history of Caroli's disease diagnosed in utero is still unclear, a period of observation appears warranted in asymptomatic patients[8] for symptoms and signs of cholangitis, cirrhosis, portal hypertension and cholangiocarcinoma.

The prognosis of Caroli's disease varies, depending upon the severity of disease and the presence of coexisting renal dysfunction. Recurrent infections and other complications related to biliary lithiasis can be associated with significant morbidity. Since Caroli's disease is a rare and possibly genetically heterogeneous condition, it remains unclear if cases presenting prenatally or neonatally have poorer prognosis compared with those diagnosed as having the disease as adults.[9]

In conclusion, we presented a newborn with Caroli's disease detected antenatally with

unique presentations, whose diagnosis was confirmed by surgical pathology after birth. This is the first case of prenatally detected Caroli's disease confirmed postnatally. Our case illustrates the unique presentation of Caroli's disease in a newborn and the need for considering Caroli's disease in the differential diagnosis of prenatally detected cystic liver lesions.

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