

Right-sided monolobar Caroli's disease with intrahepatic stones: Nonsurgical management with ERCP

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Caroli's disease, a rare disorder that may be related to hepatic vascular occlusion in prenatal life,¹ was first described by Caroli and coworkers in 1958.² The condition occurs in two forms. The simple type is a congenital dilatation of the intrahepatic biliary tree occurring in a segmental fashion; portal hypertension and hepatosplenomegaly are absent. The periportal fibrosis type is associated with the development of portal hypertension and, subsequently, esophageal varices. Frequent complications of Caroli's disease include intraductal lithiasis, repeated episodes of cholangitis, and liver abscesses.³ More than 180 cases of Caroli's disease have been reported, but monolobar Caroli's disease is a rare entity, with only 34 cases reported in the English literature. Of these, 8 cases have involved the right lobe of the liver. Six of these patients were treated surgically with a right lobectomy, 1 underwent excision of the intrahepatic cysts, and 1 was treated conservatively with antibiotics.^{3, 4, 5, 6, 7, 8, 9} Our case represents the first known report of right-sided Caroli's disease treated endoscopically with ERCP, sphincterotomy, and stent placement plus administration of ursodeoxycholic acid.

CASE REPORT

A 45-year-old man was admitted to a community hospital in April 1990 with recurrent right upper quadrant abdominal pain. He denied fever, chills, or malaise at the time of admission. Physical examination was remarkable for right upper quadrant tenderness. Laboratory data were as follows: total bilirubin 1 mg/dL, AST 110 IU/L, ALT 189 IU/L, GGTP 408 IU/L, and alkaline phosphatase 213 IU/L. A sonogram of the abdomen revealed a small, contracted gallbladder with acoustic shadowing, consistent with cholelithiasis. Several small echogenic areas scattered throughout the right side of the liver were noted. Subsequently, CT of the abdomen showed multiple filling defects in the right lobe of the liver, which were thought to represent dilated intrahepatic bile ducts containing stones (Fig. 1).



Fig. 1. Abdominal CT scan revealing multiple filling defects in the right lobe of the liver.

One day after admission, a cholecystectomy was performed, during which an intraoperative cholangiogram revealed dilatation of the right intrahepatic ducts as well as dilatation and multiple filling defects of the common bile duct (Fig. 2).

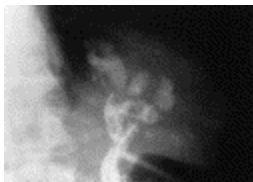


Fig. 2. Intraoperative cholangiogram revealing dilatation of the right intrahepatic ducts and common bile duct. In addition, multiple filling defects are seen in the common bile duct.

At operation only a few stones could be removed from the common bile duct, and a T-tube was placed. Two weeks after cholecystectomy, the patient was referred to our institution for further evaluation and management.

On admission, he was afebrile, anicteric, and in no distress. He had no peripheral stigmata of chronic liver disease. On abdominal examination, right upper quadrant tenderness without rebound was elicited around the T-tube site. Laboratory data were as follows: total bilirubin 0.7 mg/dL, AST 75 IU/L, ALT 198 IU/L, alkaline phosphatase 227 IU/L, GGTP 508 IU/L, amylase 43 IU/L, and lipase 146 IU/L. An ERCP (Fig. 3) demonstrated gross cystic dilatation of the right intrahepatic ductal system, consistent with monolobar (right-sided) Caroli's disease.

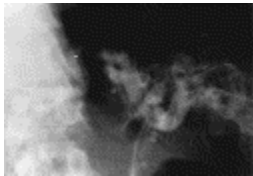


Fig. 3. ERCP demonstrating gross cystic dilatation of the right intrahepatic ductal system.

Numerous stones were present in the right intrahepatic ducts and common bile duct. The left intrahepatic ductal system did not demonstrate cystic dilatation or the presence of stones. The common bile duct was dilated to 1 cm, which was attributed to associated papillary stenosis. An endoscopic sphincterotomy was performed, followed by balloon extraction of several stones from the common bile duct. At the time of endoscopy no evidence of esophageal or gastric varices was noted. The patient did well and was discharged on broad-spectrum antibiotics for 1 week along with ursodeoxycholic acid 300 mg b.i.d., the latter for its known beneficial choloretic effect. In August of 1990, the patient was admitted for re-evaluation of his disease. On T-tube cholangiogram, several stones previously noted to have been lodged in the right intrahepatic duct had migrated down into the common bile duct. Balloon extraction of multiple common bile duct stones was again performed. In February of 1991, a 7F, 10-cm Soehendra stent was placed into the right hepatic duct in order to facilitate bile flow, and several common bile duct and intrahepatic stones were extracted with both a balloon and basket. The T-tube was removed. The stent was subsequently replaced in September of 1991 and removed in February of 1992 after extension of the sphincterotomy. An ERCP performed in February of 1993 revealed no stones in either the intrahepatic or common bile duct. Follow-up evaluation will include yearly physical examination and liver function tests. Should symptoms recur or laboratory parameters indicate recurrent obstruction, ERCP will then be performed. Since his condition was diagnosed in 1990, the patient remains asymptomatic and continues treatment with 600 mg of ursodeoxycholic acid daily. It is our hope that this therapy will prevent recurrent intrahepatic stone formation.

DISCUSSION

Caroli's disease, a rare entity, may be monolobar or bilobar. The disease can be further classified into a simple type, in which fibrosis and portal hypertension are absent, and a fibrosis type, either congenital or acquired. Todani et al. have most accurately classified Caroli's disease as a type V choledochal cyst.¹⁰ The mean age of onset of Caroli's

disease varies according to the type. In contrast to bilobar Caroli's disease, most monolobar cases have been diagnosed after the age of 20.¹¹ The bilobar and left-sided forms of Caroli's disease do not appear to be correlated with sex. However, 6 of the 8 reported cases of right-sided Caroli's disease have occurred in women. The significance of this preponderance is unknown.

The pathophysiology of Caroli's disease is not completely understood. The congenital fibrosis type, probably inherited as an autosomal recessive trait, is strongly associated with progression to cirrhosis and portal hypertension. Other manifestations of the congenital fibrosis type include hepatosplenomegaly, polycystic kidneys, and esophageal varices, the latter as a result of portal hypertension. Carcinoma, mainly cholangiocarcinoma, develops in 7% of patients with Caroli's disease, although a few cases of squamous cell carcinoma have been reported.^{12, 13} Dysplasia of the biliary epithelium has been recognized as a premalignant lesion in Caroli's disease.^{14, 15} Chronic inflammation and bile stagnation are considered to be factors in the development of dysplasia. Prevention of bile stagnation and subsequent inflammation may avert progression to malignancy; this can be achieved via ERCP with endoscopic sphincterotomy, thereby obviating the need for surgical resection of the affected lobe. A 20-year follow-up of a patient who underwent papillotomy for the treatment of Caroli's disease has been reported; no progression to malignancy was noted.¹⁶ However, studies with larger numbers of patients are needed to substantiate this finding.

The presenting signs and symptoms of Caroli's disease are similar for both the bilobar and monolobar types. Caroli's disease, by definition, is a segmental, saccular dilatation of the intrahepatic bile ducts. These saccular areas or intrahepatic cysts are lined by epithelium that may be ulcerated and hyperplastic. The cysts may contain inspissated bile, calculi, and purulent material.¹⁷ Stagnation and obstruction to bile flow allow bacteria to accumulate, leading to recurrent episodes of cholangitis, the most common manifestation of Caroli's disease, occurring in approximately 50% of patients. Sepsis and intermittent jaundice, with formation of liver abscesses, may occur during these episodes, and calculi may develop as a result of poor biliary drainage, complicating the treatment of cholangitis. Recurrent abdominal pain may be seen in up to 32% of patients.¹¹ Liver function tests in Caroli's disease may be normal or show mild increases in bilirubin, alkaline phosphatase, and gamma-glutamyl transpeptidase levels. The diagnosis of Caroli's disease is often delayed. None of the reported cases of right-sided monolobar Caroli's disease were diagnosed at initial hospitalization, and preoperative diagnosis was unusual. The advent of ERCP and percutaneous trans-hepatic cholangiography (PTC) may change this trend. Details of 9 reported cases (including our case) of right-sided Caroli's disease are outlined in Table 1.

Table 1.

Details of the nine reported cases of right-sided monolobar Caroli's disease

Case	Year	Ref no.	Sex	Intrahepatic stones	Symptoms	Method diagnosis	of Treatment
1	1984	3	F	Yes	Recurrent cholangitis	CT	R i g h t lobectomy
2	198	3	F	Yes	Recurrent	No data	R i g h t

	4				cholangitis		lobectomy
3	1986	4	F	No data	No data	No data	R i g h t lobectomy
4	1991	5	F	No data	RUQ pain	Laparotomy	R i g h t lobectomy
5	1991	6	M	No data	Recurrent cholangitis	ERCP	R i g h t lobectomy
6	1991	7	F	Yes	RUQ pain	PTC/ERCP	Antibiotics
7	1991	8	F	Yes	Recurrent fever	PTC	R i g h t lobectomy
8	1989	9	M	Yes	R U Q mass	Laparotomy	Excision of cysts
9	1993	—	M	Yes	RUQ pain	ERCP	ERCP/stone extraction

RUQ, Right upper quadrant; *PTC*, percutaneous trans-hepatic cholangiography.

In this series only 2 patients underwent laparotomy for diagnosis. Four cases were diagnosed at ERCP or PTC and 1 case was diagnosed based on CT. Methods of diagnosis were not reported in 2 cases.

Treatment of Caroli's disease is complex. The aim of therapy is to decrease the morbidity and mortality associated with recurrent cholangitis, hepatic abscess, and cholangiocarcinoma. After appropriate antibiotic coverage, every attempt must be made to relieve biliary obstruction, preferably through the establishment of internal drainage. Of the 9 reported cases of right-sided Caroli's disease, 7 required therapeutic surgical intervention. In our patient, sphincterotomy and stone extraction with the placement of internal stents during ERCP were found to be extremely effective. We believe that ursodeoxycholic acid was beneficial to our patient, by promoting stone dissolution; administration of this agent has been shown to soften and decrease the size of common bile duct stones, thereby facilitating removal.¹⁸ External drainage by PTC can also be established but is associated with higher morbidity. Patients with monolobar or diffuse Caroli's disease who fail to respond to drainage procedures should be referred for surgical lobectomy or liver transplantation. This approach may have the added benefit of decreasing the incidence of biliary tract malignancies. Complications of surgery include high postoperative morbidity in patients with persistent intrahepatic

infection and injury to the blood supply of the unaffected lobe.³ Increased expertise in surgical technique and extensive antibiotic therapy have reduced these complications. Nonsurgical biliary drainage techniques may improve patients' clinical course by preventing recurrent cholangitis and its sequelae. Ursodeoxycholic acid to prevent recurrent intrahepatic stone formation may prove to be very helpful, especially when combined with a drainage procedure. Whether this nonsurgical approach will prevent the development of cholangiocarcinoma remains to be seen.

In conclusion, the diagnosis of Caroli's disease in adults is often missed at initial presentation. This is probably because of a low index of suspicion and the rarity of the disease. Preoperative diagnosis can be made using ERCP or PTC. ERCP, endoscopic sphincterotomy, and stone extraction may obviate the need for hepatic resection in symptomatic patients with monolobar Caroli's disease and multiple intrahepatic stones. Placement of common bile duct stents and administration of ursodeoxycholic acid may serve as useful therapeutic adjuncts until the stone burden is eliminated. Thereafter, continued use of ursodeoxycholic acid may prevent recurrent intrahepatic stone formation.

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