

BILE DUCT SYSTEM MALFORMATION - EMBRYOLOGICAL AND PATHOLOGICAL ASSOCIATION. TREATMENT /REVIEW ARTICLE/

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ABSTRACT

Cystic diseases of the liver which are in most cases hereditary, are related to an embryonic disorder know as ductal plate malformation. These diseases correspond to partial or total arrest of remodeling of the ductal plate, leading to more or less complete persistence of the excess of embryonic biliary structures. The ductal plate malformation may concern different segments of the intrahepatic biliary tree (segmental bile ducts, interlobular bile ducts and the smallest bile duct ramifications) leading to various pathoclinical entities. Congenital cystic lesions of bile ducts may affect intra or extrahepatic bile ducts. Intrahepatic lesions include five entities: congenital hepatic fibrosis, Caroli's syndrome, von Meyenburg complexes, simple cyst of the liver and polycystic liver disease. Congenital hepatic fibrosis and von Meyenburg complexes are secondary to ductal plate malformation affecting the smallest intrahepatic bile ducts.

Choledocal cysts, Caroli's disease and Caroli's syndrome belong to the some family of congenital malformations of the large bile ducts (1). The former affects the extrahepatic bile duct (including occasionally the left and right branch of the hepatic duct) while the latter affects segmental intrahepatic bile ducts. Both are extremely rare (in the order of 1:10.000 or 100.000 and 1:1.000.000 births respectively).

Key words: Caroli's disease, biliary dilation, complications

INTRODUCTION

The malformation responsible for Caroli's disease is an anomalous rearrangement of the ductal plate, part of hilum plate (2). It is consisted of bile ducts and vessels surrounded by a sheath that is continuous with Glisson's capsule intrahepatecally and hepatoduodenal ligament extrahepatically. Insaid it contain lymphatic, venous and arterial network.

Portal vein usually is dislocated posterior to the common hepatic bile duct and hepatic artery and by the description of Caunaud it is covered by separate sheath of loose connective tissues that permit easy dissection from other components.

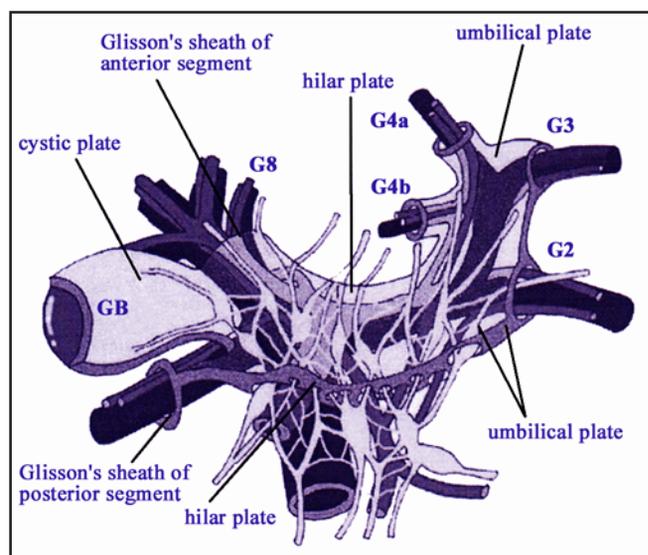


Fig. 1. Hilum plate system

The hilum plate is that structure that separates the biliary confluence from the inferior part of the quadrate lobe (S4a). It is bounded above by the surface of S4a-inferior part of the medial segment, on the right by the Rounvier sulcus (depression between S5 and S6) and cystic plate, and in the left it is continuous with umbilical plate.

EMBRYOGENESIS

During early embryogenesis, there is a single-layer ductal plate surrounding the portal vein followed by the formation of double layered plates. In the normal

developmental, extensive resorption of the primitive bile ducts leads to the final stage, in which a network of fine bile ducts surrounds the portal vein. Insufficient resorption of ductal plate can lead to large dilated segments of the primitive bile duct surrounding the central portal vein (bile ducts that originally encircle the portal vein fail to involve properly, giving rise to a cystic dilation). This malformation may occur at the level of the large segmental ducts (giving rise to Caroli's disease with enlarged segmental ducts, sometimes localized) or of intermediate size bile ducts (giving rise to Caroli's syndrome with combined enlarged segmental bile ducts that are more diffuse and congenital hepatic fibrosis). These events can also occur at the level of the interlobular bile ducts (giving rise to Von Meyerburg complexes or to polycystic liver disease (3)).

The malformation responsible for (most) choledocal cyst is an anomalous junction of the biliary and pancreatic ducts. In the normal situation, both ducts join into a common channel, the length of which is shorter than the length of Oddi's sphincter. Hence, reflux from pancreatic fluid into common bile duct (or of bile duct into the pancreatic duct) is prevented. Should an anomalous proliferation of the biliary epithelium occur during fetal life, this common duct will become longer than the length of the sphincter (which remains constant) and reflux will occur. The reflux of pancreatic fluid into common bile duct is thought to be responsible for bile duct dilation and inflammation of the epithelium.

This common channel which can be identified by cholangio-pancreato MRI, endoscopic ultrasound or retrograde cholangiography, is present in 95% or more of choledocal cysts.

However, a common channel will not necessarily produce a choledocal cyst; besides, functional pancreato-biliary reflux may occur despite a normal common channel (this entity is called occult pancreatico-biliary reflux) (4).

The common consequences of Caroli's disease / syndrome and choledocal cysts are bile stasis, pigmental stone formation (as well as protein plugs in the case of choledocal cyst) and malignant transformation. As a rule, the disease may remain silent for decades or give rise to biliary pain (simple obstruction) or pancreatitis (should a stone or a protein plug migrate). However, symptoms become much more severe once bile becomes infected, either spontaneously, or as a result of endoscopic manoeuvres. Cholangitis at that stage becomes the leading symptom and endoscopic (or percutaneous) invasive approaches should be avoided in asymptomatic or symptomatic patients.

MALIGNIZATION

The risk of malignant transformation (a likely dysplasia, adenoma, adenocarcinoma sequence) is related to stasis and chronic inflammation. This risk is correlated

with age (is exceptional in children) and septic contamination of bile (5, 6). For choledocal cysts, the incidence is estimated to be 8% before age of 40 and 25% thereafter and is clearly increased when a prior cysto-digestive anastomosis has been performed (this treatment is nowadays contraindicated) (7). For Caroli disease/syndrome, the reported incidence ranges between 10 and 25% (8). Of note, pancreatic fluid reflux (for choledocal cysts) may in itself result in malignant transformation, not only in the choledocal cyst but also anywhere else in the bile duct and in particular the gallbladder where stasis naturally occurs. Hence, gallbladder malignancy may occur not only in patients with a choledocal cyst with anomalous pancreato-biliary junction, but also in patients with an anomalous pancreato-biliary junction without a choledocal cyst (and recognizing this condition is an indication for prophylactic cholecystectomy).

TREATMENT

The risk of malignant transformation is an indication for treatment of choledocal cyst that should include resection of all the cystic dilation, cholecystectomy and Roux-en-Y biliary-digestive anastomosis. This apparently straightforward procedure in fact turns out to be associated with high morbidity rate, in particular from the intra- and retropancreatic dissection of the cystic dilation (5).

Treatment of Caroli's disease (without congenital hepatic fibrosis) may occasionally rely on partial liver resection if the involvement is localized. Caroli's syndrome (diffuse involvement with congenital hepatic fibrosis) can only be cured by liver transplantation.

The most common indication for transplantation in these series was recurrent cholangitis. Most patients had associated polycystic kidney disease or hepatic fibrosis. As the risk of this treatment is not very different from the risk of malignant transformation, there is no consensus that prophylactic transplantation should be indicated in symptomatic patients.

CONCLUSION:

Cystic diseases of the system are congenital disorders, related to the embryological developmental and basis structure called hilar plate. Clinical presentation includes dilatation of intra and extra hepatic bile ducts, cholangitis, bile duct stone formation, dilatation and jaundice. The malignant transformation is the most dangerous complication. Used imaging techniques such as ultrasound, CT, MRI cholangiography diagnosis can be verified. If monolobar liver dilatation is diagnosed, liver resection is method of choice. For complicated and bilobar liver involvement liver transplantation is indicated.

Extra hepatic dilatation presented by choledocal cysts necessitates resection and biliary-digestive anastomosis.

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