CHOLEDOCHAL CYSTS: DIAGNOSIS AND TREATMENT

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Abstract: The aim of this study is to show the different diagnostic procedures and treatment in patients diagnosed with congenital choledochal cysts. Choledochal cysts are congenital anomalies of the bile ducts and include cystic dilatation of the extrahepatic and intrahepatic biliary ducts or both.

The study shows ten patients diagnosed as having choledochal cysts. Diagnosis was established by clinical and radiographic findings including: ultrasound (US), magnetic resonance cholangiopancreatography (MRCP), endoscopic retrograde cholangiopancreatography (ERCP), percutaneous transhepatic cholangiography (PTC) and cytological examination of the bile juice.

In the study choledochal cysts were classified according to the Todani classification. Most common cysts were type I (six cases); type III (one case), type IVa (one case) and two patients were type V cysts (Caroli disease). The most frequent symptoms were abdominal pain, jaundice and cholangitis. US findings were sensitive for the preliminary diagnosis of choledochal cysts in all the patients. MRCP accurately defined the cyst anatomy and the site of the biliary origin in all the cases with extrahepatic cysts. In three cases ERCP clearly demonstrated the cyst and by PTC smaller cysts were well defined. Cytological examination of the bile juice obtained during the PTC procedure showed malignant cells in one case. Therefore pancreaticoduodenectomy was performed and pathological examination showed associated cholangiocarcinoma. Five years after the operation the patient was well and free of the disease. Five patients underwent surgical treatment with a total cyst excision and Roux-en-Y hepaticojejunostomy while the surgical approach in two patients was partial cyst excision and cystojejunostomy. Patients with Caroli disease were conservatively treated and 3 with interventional endoscopic procedures.
Despite US evidence suggesting choledochal cyst diagnosis, other supportive radiographic imaging modalities such as MRCP, ERCP and PTC are required to define the precise cyst anatomy and are essential for the preoperative assessment. Total cyst excision is recommended for reducing cyst-related complications and risk of cholangiocarcinoma.

**Key words:** choledochal cyst, ultrasound, magnetic resonance cholangiopancreatography, endoscopic retrograde cholangiopancreatography, percutaneous transhepatic cholangiography, cholangiocarcinoma.

**Introduction**

Choledochal cysts are congenital anomalies of the bile ducts that include cystic dilatation of the biliary tree (principally of the extrahepatic bile ducts and intrahepatic biliary radicles or both). The pathogenesis of choledochal cysts is still unclear. One accepted theory is an anomalous pancreatobiliary junction that allows pancreatic secretions to reflux into the common bile duct. Pancreatic proenzymes are activated into the bile duct which results in inflammation and weakening of the bile duct wall. Another pathway in pathogenesis is congenital weakness of the bile duct caused by a defect in epithelialization and recanalization of the bile ducts during the organogenesis [1–3]. The incidence in the Republic of Macedonia is not well known, but it is estimated to be 1 case per 100,000–150,000 population, similar to Western countries. Choledochal cysts are a rare disease, more prevalent in females (female: male ratio, 4 : 1).

The classification of choledochal cysts is given by Todani and it includes five main types. Type I choledochal cysts are most common and are subdivided into type Ia-cystic dilatation of the common bile duct and common hepatic duct or the major portion of the extrahepatic bile ducts, type Ib-focal, segmental dilatation of the common bile duct and type Ic-fusiform dilatation of the extrahepatic bile ducts (entire or segmental portion). The type II choledochal cyst is diverticula on the common bile duct and may be sessile or connected with a stalk. Type III choledochal cysts are also referred to as choledochocele and are located in the intraduodenal portion of the common bile duct. Type IV cysts are subdivided into type IVa-multiple cysts involving both intra- and extrahepatic bile ducts (frequently a large solitary cyst of the extrahepatic bile ducts and multiple cysts of the intrahepatic bile ducts) and type IVb cysts with only an extrahepatic bile ducts location. Type V cysts (Caroli disease) are confined to the intrahepatic bile ducts only, regularly found in both hepatic lobes [4, 5].

Most frequently the disease is present in childhood with symptoms related to the cyst such as jaundice and acholic stool. However, about one third of the patients are unnoticed until adulthood when they most commonly present
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Symptoms of abdominal pain, jaundice, cholangitis and palpable mass in the right abdominal quadrant. The risk of cholangiocarcinoma development increases with age and therefore early resection is the appropriate treatment [6].

The diagnostic algorithm includes ultrasound (US) as an initial screening examination. It is noninvasive and the method of choice in patients with biliary diseases and choledochal cysts. The other imaging modalities, such as magnetic resonance cholangiopancreatography (MRCP), endoscopic retrograde cholangiopancreatography (ERCP), and percutaneous transhepatic cholangiography (PTC), are necessary for defining the disease precisely [7].

The treatment for choledochal cysts is surgical. Total cyst excision of the extrahepatic duct and hepaticojejunostomy is recommended. Cysts located on the intrahepatic bile ducts (Caroli disease) are treated when complications occur such as bile duct strictures, cholangitis, liver abscess and liver cirrhosis. Most of these cases are treated conservatively or by endoscopic and US interventional procedures and surgically in selected patients [8].

The aim of this retrospective study is to show the value of different diagnostic procedures and treatment approach in patients diagnosed with congenital choledochal cysts.

Material and methods

The study shows ten patients diagnosed as having choledochal cysts from 1998 to 2008, hospitalized at the Gastroenterology Clinic in Skopje. The age in nine patients was in the range of 16–60 years (mean 39 years), while one patient was a child 1.5 years old. Eight patients were female and two patients were males. Diagnosis was established by clinical and radiographic findings. The most frequent symptoms were: abdominal pain, jaundice and cholangitis. Laboratory tests included: blood tests, leukocyte count, sedimentation, liver enzymes and bilirubin. The imaging diagnostic workup of the choledochal cysts were ultrasound (US), magnetic resonance cholangiopancreatography (MRCP), endoscopic retrograde cholangiopancreatography (ERCP) and percutaneous transhepatic cholangiography (PTC). In addition, cytological examination of the bile juice obtained during the PTC procedure was done. Eight patients were surgically treated and operated specimens were pathohystologically examined.

Results

According to the Todani classification, the present study classified choledochal cysts as: type I (six patients) with cysts involving the extrahepatic bile ducts and were subdivided as type Ia (two patients), type Ib (three patients) and type Ic (one patient); type III (one patient) with cyst located in the distal,
intraduodenal portion of the ductus choledochus; type IVa (one patient) with several cysts involving the intrahepatic bile ducts and two cysts on the extrahepatic biliary tree; and two patients as type V (Caroli disease) presented with multiple dilatations of the intrahepatic bile ducts. All patients with cysts localized on the extrahepatic bile ducts were females and two patients with type V cysts were males. Nine patients were adults and one a child.

The most frequent symptom was abdominal colic pain presented in 8 patients with all cyst types. Six patients had obstructive jaundice, two patients had cholangitis (cholostasis and fever) and one patient had a palpable abdominal mass. Laboratory studies revealed findings for biliary obstruction in four patients, and elevated liver function test in one patient.

Ultrasound examination showed cysts localized on the extrahepatic bile ducts in eight patients, one of these patients had intra and extrahepatic bile duct involvement (type IVa) and two patients had intrahepatic cysts (Caroli disease). US clearly demonstrated the direct communication between cysts and bile ducts in seven patients and a large cyst localized on the extrahepatic bile ducts was highly suspected for the diseases. Patients with Caroli disease presented with multiple cysts in both liver lobes, with intrahepatic lithiasis in one patient while the other patient demonstrated liver cirrhosis and portal hypertension. Bile duct dilatation was present in six patients and lithiasis in three patients (Figure 1a, 1b).

![Figure 1 – Ultrasound findings: a) choledochal cyst and bile duct dilatation, b) choledochal cyst on the distal portion of choledochus and no tumor mass was visualized, although cholangiocarcinoma was diagnosed on the cyst wall](image)

MRCP was performed in all eight patients with extrahepatic cysts and accurately defined the cyst anatomy, the site of biliary origin and distinctly revealed the extent of ductal involvement in all of the cases (Figure 2a).

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ERCP was performed in six patients with cysts localized on the extra-hepatic bile ducts. In three of these patients the cyst was clearly demonstrated while in the other three cases ERCP examination was not feasible due to duodenal compression caused by the large cyst, and canulation of the papilla Vateri was difficult and unsuccessful. The main pancreatic duct was well visualized in all patients (Figure 3). ERCP with papilotomy as a therapeutic procedure was done in one patient with Caroli disease.
Percutaneous transhepatic cholangiography (PTC) was done in four cases. Two cysts were poorly visualized because of their large size, and two patients with smaller size cysts were well demonstrated. In one of these patients, percutaneous biliary drainage (PBD) was performed prior the PTC procedure (Figure 4). In addition, cytological examination of the bile juice obtained during PTC revealed malignant cells in one patient.

![Figure 4 – PTC and PBD performed in patient with choledochal cyst associated with bile duct dilatation and cholangitis](image)

All patients with cysts localized on the extra hepatic bile ducts were operated, five patients underwent total cyst excision with Roux-en-Y hepaticojejunostomy (Figure 2b), one patient had partial cyst excision and cystojejunostomy and the patient with a type IVa cyst underwent choledochus resection and choledochoduodenoaanastomosis. This patient was successfully treated preoperatively with percutaneous biliary drainage (PBD) because of bile duct obstruction and cholangitis. The patient with a type III choledochal cyst (choledochocela) underwent a radical pancreaticoduodenectomy-Whipple procedure. The decision for this surgical approach was based on cytological examination of the bile juice, which revealed malignant cells. Pathohystological examination of the resected specimen showed associated cholangiocarcinoma limited to the mucosa of the cyst.

Type V cysts (Caroli disease) were found in two patients and presented with multiple dilatations of the intrahepatic bile ducts. One patient with multiple small cysts was followed up for 12 years with recurrent biliary colic and cholangitis. During one hospitalization because of cholangitis, US revealed a small abscesses in the liver and choledocholithiasis. ERCP with papilotomy was applied

successfully for stone extraction from the common bile duct. The other patient diagnosed with Caroli disease and liver cirrhosis had several admissions to the hospital because of different complications. Over the period of 17 years, the patient developed liver cirrhosis with portal hypertension and thrombosis of the splenic vein. He was surgically treated with splenectomy because of pancytopenia. Seven years later, because of gall bladder and choledochus stones, he underwent cholecystectomy and choledochotomy. Esophageal variceal bleeding was treated with endoscopic ligation. Summarized results are shown in Table 1.

Table 1

**Clinical features, diagnostic procedures and treatment approach in patients with choledochal cysts**

<table>
<thead>
<tr>
<th>Case</th>
<th>Symptoms</th>
<th>US</th>
<th>ERCP</th>
<th>PTC</th>
<th>MRCP</th>
<th>Cytological findings</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>F. 16 y.</td>
<td>Pain, Jaundice</td>
<td>3 × 7 cm Bile duct dilatation Stones</td>
<td>No*</td>
<td>No</td>
<td>Well defined</td>
<td>Total cyst excision with Roux-en-Y hepaticojejunostomy</td>
</tr>
<tr>
<td>Type Ia</td>
<td>Bile duct dilatation</td>
<td></td>
<td></td>
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<tr>
<td>2</td>
<td>F. 18 m.</td>
<td>Palpable mass, Jaundice</td>
<td>3 × 3 cm Bile duct dilatation</td>
<td>No</td>
<td>No</td>
<td>Well defined</td>
<td>Total cyst excision with Roux-en-Y hepaticojejunostomy</td>
</tr>
<tr>
<td>Type Ia</td>
<td>Procedure not feasible</td>
<td></td>
<td></td>
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<tr>
<td>3</td>
<td>F. 38 y.</td>
<td>Pain, Jaundice</td>
<td>7 × 8 cm Bile duct dilatation Stones</td>
<td>Procedure not feasible</td>
<td>Poorly defined</td>
<td>Well defined</td>
<td>Normal cells in bile juice</td>
</tr>
<tr>
<td>Type Ib</td>
<td>Procedure</td>
<td></td>
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<tr>
<td>4</td>
<td>F. 17 y.</td>
<td>Pain</td>
<td>3 × 4 cm Stones</td>
<td>Cyst well defined</td>
<td>No</td>
<td>Well defined</td>
<td>No</td>
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<tr>
<td>Type Ib</td>
<td>Cyst well defined</td>
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<tr>
<td>5</td>
<td>F. 59 y.</td>
<td>Pain</td>
<td>5 × 6 cm Stones</td>
<td>Cyst well defined</td>
<td>No</td>
<td>Well defined</td>
<td>No</td>
</tr>
<tr>
<td>Type Ib</td>
<td>Procedure not feasible</td>
<td></td>
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</tr>
<tr>
<td>6</td>
<td>F. 35 y.</td>
<td>Pain, Jaundice</td>
<td>4 × 8 cm Bile duct dilatation</td>
<td>Procedure not feasible</td>
<td>Poorly defined</td>
<td>Well defined</td>
<td>Normal cells in bile juice</td>
</tr>
<tr>
<td>Type Ic</td>
<td>Procedure</td>
<td></td>
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<tr>
<td>7</td>
<td>F. 60 y.</td>
<td>Pain, Jaundice</td>
<td>3 × 5 cm Bile duct dilatation</td>
<td>Cyst-distal portion of choledochus</td>
<td>Well defined</td>
<td>Well defined</td>
<td>Malignant cell in bile juice</td>
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<tr>
<td>Type III</td>
<td>Procedure</td>
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<tr>
<td>8</td>
<td>F. 53 y.</td>
<td>Pain, Jaundice, Fever</td>
<td>Several cysts Bile duct dilatation</td>
<td>Procedure not feasible</td>
<td>PBD**</td>
<td>Well defined</td>
<td>Normal cells in bile juice</td>
</tr>
<tr>
<td>Type IVa</td>
<td>Procedure</td>
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</table>

*PBD** denotes Pylorus Blinder Dismemberment
**Case 9**  
M. 50 y.  
Type V Caroli disease  
Upper GI bleeding  
Multiple cysts  
Portal vein thrombosis  
Liver cirrhosis  
No  
No  
No  
No  
Interventional procedures: Splenectomy

**Case 10**  
M. 40 y.  
Type V Caroli disease  
Pain  
Fever  
Multiple cysts  
Hepatic lithiasis  
Small abscess  
ERCP as therapeutic procedure  
No  
No  
No  
No  
Interventional endoscopy: papilotomy and stones extraction. Cholecystectomy

*No – examination was not performed; **PBD – Percutaneous biliari drainage

**Discussion**

There are different classification systems for choledochal cyst. Todani et al. described five types of choledochal cyst on the basis of anatomical location. The most common are type I, accounting for 70–90%, and type IVa which account for 19–26% [4, 5]. Taking into consideration the pathogenesis of choledochal cysts and the anomalous union of the biliopancreatic ducts which is present in up to 92% of the patients, Komi gave another classification [9]. Visser et al. concluded that the standard classification scheme is confusing and recommend morbus Caroli, choledochal diverticula and choledochocela to be referred to by their names, and the term congenital choledochal cyst should be reserved for congenital dilatation of the extrahepatic and intrahepatic bile ducts apart from Caroli disease [10]. Recent publications describe an additional subtype cyst involving the cystic duct, named type Id or type VI [11, 12]. However, the present study utilised the Todani classification of choledochal cysts because it is the most widely-accepted classification system. In our series the majority of the cysts had extrahepatic localization and were mostly type I (six cases).

Clinical symptoms in adult patients with choledochal cysts are nonspecific and disease manifestation mainly occurs with complications such as cholangitis, bile duct obstruction, pancreatitis, liver function impairment and cholangiocarcinoma. In our study, abdominal pain was the main presenting symptom, and jaundice was associated with extrahepatic cysts localization and obstruction of the biliary tree [13].

Concerning diagnostic imaging modalities, ultrasound has a primary role in the imaging of the biliary tree, related diseases and detection of choledochal cysts. Akhan et al. demonstrated the continuity of the cyst with the bile duct in 93% of their patients, which is a pathognomonic sign of choledochal cysts. Beside cyst visualization, US enables an accurate evaluation of the biliary tree, gall bladder, liver, pancreas, portal vein and other anatomical structures.
Therefore, accompanying diseases such as bile duct obstruction, gall bladder and bile duct lithiasis, pancreatitis, liver abscess, malignances of the bile ducts and other abdominal diseases can be diagnosed. In the present study, a preliminary diagnosis of choledochal cysts was made by US in all 10 patients. Bile duct dilatation is frequently associated with choledochal cysts and was present in 6 of the 10 patients [14, 15].

Additional imaging methods, MRCP, ERCP and PTC, confirmed the diagnosis. These methods demonstrated the cysts’ extent, clearly defined the cyst wall, the site of biliary origin and its relationship to surrounding anatomical structures (portal vein, duodenum, liver). It is necessary to perform one or more of these modalities for the preoperative assessment of choledochal cysts, although diagnosis was made by US initially [7].

MRCP is a noninvasive method and is considered as the gold standard for diagnosis of choledochal cysts with a highly accurate rate and reported sensitivity as 90–100% [13]. In addition, this method well demonstrates an anomalous junction of the pancreatic and common bile duct. MRCP is a superior method of choledochal cysts diagnosis and biliary tree visualization, particularly when ERCP cannot be performed. In our study, MRCP clearly defined choledochal cysts in all patients with an extrahepatic bile duct location but did not revealed an anomalous biliopancreatc junction in any of the patients [16–18].

ERCP is the golden standard for visualization of the biliary tree and pancreatic duct and provides detailed information for these structures. ERCP may identify an anomalous biliopancreatic junction, precisely delineate cysts and bile duct wall and demonstrate cyst or ductal filling defects (stones or tumor mass). Performing ERCP is not feasible in certain cases with very large cysts that may compresses duodenum, and the canulation of the papilla Vatery is either difficult or impossible. Also clear visualization of a large cyst need a large amount of dye contrast and increases the risk of complications such as cholangitis and pancreatitis [16].

Percutaneous transhepatic cholangiography guided by US is used predominantly in patients with choledochal cysts associated with bile duct dilatation. If cholangitis is present, PTC combined with percutaneous biliary drainage (PBD) resolves the septic condition and is both a diagnostic and a therapeutic procedure. One of our patients with cholangitis and marked biliary obstrucion benefited from this interventional procedures. PTC demonstrated smaller cysts well, while large cysts were poorly visualized due to faint contrast opacification. In addition, we recommend cytological examination of the bile juice obtained during the PTC procedure in order to prove or disprove the presence of malignant cells [19].

Computed tomography and endoscopic ultrasonography are additional imaging modalities for the diagnosis of choledochal cysts, and particularly ERCP.
combined with intraductal ultrasound might be useful in evaluating the bile duct wall layers and demonstrating small tumors within the bile duct and cyst [20].

Surgical treatment is recommended for choledochal cysts localized on extrahepatic biliary ducts, which reduces cyst-related complications and the risk of malignant transformations. The treatment of choice is total cyst excision and Roux-en-Y hepaticojejunostomy, especially for patients with choledochal cysts type I, type II and type IV. In the present study, five patients with type I cysts underwent this operation. Total cyst excision might be difficult in patients with very large cysts and incomplete cyst excision with bilioenteral anastomosis is a surgical option, and that was the case in one of our patients. However, these patients have to be regularly followed up because of the risk of malignance. The therapeutical approach in patients with type III cysts depends on cyst size, and it can be treated endoscopically or surgically. Duodenopancreatectomy-Wipple procedure was performed in one patient diagnosed with malignancy within the cyst [21–23]. Recent advances in laparoscopic and endoscopic techniques have become options for minimally invasive approaches in the management of choledochal cysts, with promising results [24].

Patients with asymptomatic intrahepatic cysts, type V, usually do not need any treatment. Caroli disease often presents with recurrent cholangitis and intrahepatic gallstones. Long-lasting disease and complications lead to impaired liver function. Therefore, it is important to evaluate the liver function and that will determine treatment choice. Lipsett recommended an individualized approach depending on whether both lobes are involved, the presence of strictures and stones, cirrhosis or an associate malignancy. Surgical resection might be undertaken when cysts are localized in one lobe, or liver transplantation for patients with advanced liver cirrhosis. The present study shows two patients with Caroli disease who have been followed for years and were treated when complications were present. A patient with liver abscesses was conservatively treated with antibiotics and papilotomy for choledocholithiasis. The other patients with liver cirrhosis and portal hypertension, because of esophageal variceal bleeding, underwent endoscopic ligation [23, 25, 26].

The incidence of cholangiocarcinoma developing within a choledochal cyst is greater than that of the general population and increases with age. It is reported to be between 9–28% and by the age of 50 years it is 50%. A retrospective multicentre study of 808 patients with choledochal cysts showed associated biliary malignancies in 9.9%, especially in aged patients [27]. Hollinger et al. reported the pathogenetic multi-stage cascade towards cholangiocarcinoma, suggesting that cholangiocarcinoma arises from precancerous lesions. Neoplastic transformation of the biliary epithelium follows the metaplasia, dysplasia, carcinoma sequence [28]. Repeated inflammation of the bile duct mucosa caused by pancreatic juice reflux into the biliary tree and biliary stasis within

the cyst with infection and the generation of unconjugated secondary bile acids increase the risk of metaplasia of biliary mucosa and malignant epithelial transformation [29]. In the present study, one out of 10 patients was diagnosed with cholangiocellular carcinoma limited to the cyst epithelium. Preoperative diagnosis was challenging because none of the diagnostic imaging modalities were able to visualize the tumor and differentiate the lesion from the cyst wall (no irregularity or thickened wall were described). Diagnosis of cholangiocarcinoma within the cyst type III was established by the cytological examination of the bile juice obtained during PTC procedure which revealed malignant cells. This finding determined the surgical approach and a duodenopancreatectomy-Wipple operation was performed. The histopathology of the operated (surgical) specimen confirmed the diagnosis of cholangiocarcinoma in an early stage, limited to cyst mucosa. The patient has been well and free of disease for a period of five years after the operation. A complication of biliary malignancies arising in a choledochal cyst has to be considered very carefully by meticulous examination of the imaging findings and operated specimen. Patients with choledochal cysts have to be regularly followed up because of the significant risk of developing cholangiocarcinoma even after surgical treatment [30–37].

**Conclusion**

Choledochal cysts are a rare congenital anomaly of the biliary tree and more frequently with extrahepatic bile ducts location. Ultrasound has a primary role and high sensitivity for the diagnosis of choledochal cysts. Other diagnostic imaging techniques such as MRCP, ERCP and PTC are important for precise cyst delineating, topography to the bile duct and surrounding structures. These diagnostic procedures and mainly MRCP as noninvasive and highly accurate are necessary for planning the appropriate surgical approach. Each diagnostic procedure may prove to be more effective in selected cases. Cytological examination of the bile juice may lead to a diagnosis of malignances within the cyst.

Surgical treatment for choledochal cysts localized on extrahepatic bile ducts is total cyst excision with bilioenteral anastomosis. The operation resolves the symptoms relating to choledochal cysts and is a prevention of the development of cholangiocarcinoma. Long-term surveillance is recommended for patients operated for choledochal cysts because of cholangiocarcinoma risk. Patients with choledochal cysts localized on intrahepatic bile ducts, type V cysts (Caroli disease), are treated when complications are present, conservatively, by endoscopic and US interventional procedures or surgically.
REFERENCES


Резиме

ЦИСТИ НА ХОЛЕДОХУСОТ: ДИЈАГНОЗА И ТЕРАПИЈА

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Целта на оваа студија е да ги евалуира различните дијагностички и терапевтички можности за пациентите со цисти на холедохусот. Цистите на холедохусот се ректа аномалија на жолчните канали, која ги зафаќа посто и екстремалните жолчни канали но може и интрахепатални, или и двата сегменти на билијарното стебло.

Студијата испитува 10 пациенти дијагностицирани со цисти на холедохусот. Дијагнозата е поставена врз база на клиничките наоди и радиографските методи: ултрасонографија (УЗ), магнетна резонанцна холангиопанкреатографија (МРХП), ендоскопска ретроградна холангиопанкреатографија (ЕРХП), перкутаната трансепатична холангиографија (ПТХ), и цитолошко испитување на жолчната добиена при ПТХ процедура.
Цистите на холедохусот се класифицираат според Тодани класификацијата. Најмногу пациенти беа тип I (6 пациенти), тип III (еден пациент), тип IVa (еден пациент) и два пациенти имаа тип V цисти (Каролиева болест). Најчест симптоми кај пациентите беа, абдоминална болка, иктер и холангиитис. Со УЗ испитување беше предложено поставена дијагнозата за цисти на билијарното стебло кај сите десет пациенти. МРХП јасно ги дефинираше цистите и местото на потекло во однос на билијарното стебло кај сите пациенти. Каж три пациенти ЕРХП ги прикажа цистите, додека со ПТХ добро се демонстрираа помалите цисти. Цитолошкото испитување на жолцата добиена во тек на ПТХ, открива присуство на ѕиви клетки кај еден пациент. Затоа кaj овој пациент е направена панкреатохолоденектомија и патохистолошкото испитување потврди холангиокарцином. Пет години подоцна пациентот е во добра здравствена кондиција и нема наоѓ за рецидив на болеста. Пет пациенти беа оперирани со тотална екцизии на цистата и хепатикојуноанастроомоза, додека хируршки пристап кај двајца пациенти беше парцијална резекција на цистата со цисто-ентерална анастроомоза. Пациентите со Каролиева болест се лекувани конзеративно и со интервенциски ендоскопски процедури.

И покрај тоа што со ултразвук прво е поставена дијагнозата за цисти на холедохусот, другите дијагностички процедури како МРХП, ЕРХП, ПТХ се потребни за претцизно дефинирање на цистите и се неопходни за предоперативна процена. Терапија на цистите на холедохусот е тотална екцизии на цистата и билио-ентерална анастроомоза, ова го нама-лува ризикот од појава на компликации и ризикот од холангиокарцином.

Ключни зборови: цисти на холедохусот, ултразвук, магнетна холангиопанкреатографија, ендоскопска ретроградна холангиопанкреатографија, перкутанна транспатична холангиографија, холангиокарцином.

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