CLINICAL COURSE CHARACTERISTICS OF CYSTIC
TRANSFORMATIONS OF EXTAHEPATIC BILIARY DUCTS IN
CHILDREN AT ANOMALOUS JUNCTION OF THE
PANCREATOBILIARY SYSTEM

N.Sh. Ergashev
Tashkent Pediatric Medical Institute, Uzbekistan., ndm2@mail.ru

E.A. Yakubov
Tashkent Pediatric Medical Institute, Uzbekistan.

Follow this and additional works at: https://uzjournals.edu.uz/pediatrics

Recommended Citation
Ergashev, N.Sh. and Yakubov, E.A. (2020) "CLINICAL COURSE CHARACTERISTICS OF CYSTIC
TRANSFORMATIONS OF EXTAHEPATIC BILIARY DUCTS IN CHILDREN AT ANOMALOUS JUNCTION OF
Available at: https://uzjournals.edu.uz/pediatrics/vol3/iss1/4

This Article is brought to you for free and open access by 2030 Uzbekistan Research Online. It has been accepted for inclusion in Central Asian Journal of Pediatrics by an authorized editor of 2030 Uzbekistan Research Online. For more information, please contact sh.erkinov@edu.uz.
CLINICAL COURSE CHARACTERISTICS OF CYSTIC TRANSFORMATIONS OF EXTAHEPATIC BILIARY DUCTS IN CHILDREN AT ANOMALOUS JUNCTION OF THE PANCREATOBILIARY SYSTEM

Cover Page Footnote
Tashkent Pediatric Medical Institute, Uzbekistan.

This article is available in Central Asian Journal of Pediatrics: https://uzjournals.edu.uz/pediatrics/vol3/iss1/4
Clinical course characteristics of cystic transformations of extrahepatic biliary ducts in children at anomalous junction of the pancreatobiliary system

Ergashev N. Sh., Yakubov E. A.
Tashkent Pediatric Medical Institute

Abstract

Background. Today, the rarity of cystic transformations of the extrahepatic bile ducts (CTEBD) is refused by the scientific society and the number of patients with such congenital pathology is increasing. Despite the improvement in diagnostic and treatment methods, diagnostic criteria and specific clinical picture of cystic extensions, management of such patients is still debatable. We aimed to establish the prevalence of CTEBD in children, to draw clinical and anatomical parallels depending on the form of cystic expansion and the relevance of the cyst with the pancreatic duct.

Methods. The clinical and anatomical characteristics of cystic transformations of the extrahepatic bile ducts were observed in 82 children. The patients underwent complex clinical, laboratory and radiation diagnostic methods: ultrasound and CT of the abdominal cavity organs, MRI cholangiography, intraoperative cholangiography (IOCHG), histomorphological examination of the removed biomaterial.

Results. The age of patients ranged from 15 days to 16 years: newborns - 2; from 29 days to 3 months - ten; from 3 months up to 1 year - 11; 1-3 years - 20; 3-7 years - 26; 7-11 years old - 8; over 11 years old - 5. The distribution of patients according to the type of cystic enlargement by the classification of Alonso-Lej in the supplements of Flanigan, Todani and Lilly: type I — cystic enlargement of the CBD - 59 (72%); Type IV — cystic expansion of extra- and intrahepatic ducts - 22 (26.8%); atypical form (AF) - 1 (1.2%) was presented as a slight expansion of extrahepatic ducts and intrahepatic cystic lesion. Type II — diverticulum of CBD, type III — choledochocele, and type V — Caroli’s disease in our observations did not occur.

Conclusion. The most common forms of CTEBD are type I and type IV lesions. With a biliary-pancreatic cyst, the phenomena of cholecystocholangitis, pancreatitis are observed very frequently. Cysts of a similar structure are subject to spontaneous perforation. The method of choosing surgical treatment should be total cystectomy, cholecystectomy, the imposition of hepaticoenterostomy according to Roux.

Key words: biliary cysts, anatomical forms, clinic, diagnosis, complications, children.
BACKGROUND

Currently, the rarity of cystic transformations of the extrahepatic bile ducts (CTEBD) is rejected, as the number of published papers is increasing in the literature. Against the background of the accumulated clinical experience, diagnostic methods were improved using modern highly informative studies, which helped to improve the detectability of the undetermined true frequency of this defect (Nazyrov et al., 2002; Tumanyan & Lenyushkin, 2005; Ohashi et al., 2013; Xia et al., 2015; Ouaissi et al., 2016).

Despite the introduction of modern diagnostic methods into clinical practice, cases of late diagnosis with the development of complications are still observed, diagnostic criteria and the relationship of the clinical picture of cystic extensions with the anatomical forms of this pathology have not been finalized. Classifications proposed by Alonzo-Lej, (1959); Todani, (1977) of congenital cystic extensions of the bile duct, which distinguishes 5 types, has been used to date, however, in the publications of individual authors there are atypical forms (nondilated type), or expansion, localized in different segments of the biliary system (De et al., 2011; Ohashi et al., 2013). The abnormal fusion of the common bile duct (CBD) with the pancreatic duct (pancreas) detected during special research methods plays a significant role in the pathogenesis of CTEBD (Fumino et al., 2011; Gadelhak et al., 2014). With variants of such combinations, the cystic component is either absent or very weakly expressed. Therefore, Lilly J.R et al. (1985) suggested isolating atypical forms, in which the cystic expansion, forming a common long channel, encompasses the extra- and intrahepatic ducts (Lilly et al., 1985).

Some authors call this condition an abnormality of the pancreatobiliary ducts without expansion (nondilated type), although at the same time there are characteristic signs for CTEBD. The presence of this anomaly in children should be determined taking into account the age diameter of the common bile duct (Ono et al., 2008). The frequency of reports of a combination of CBD cysts with biliary abnormalities, i.e. a combination of disorders in the development of the pancreatobiliary system, such as intrahepatic biliary cysts, an elongated common canal, partial obstruction of the terminal section of the CBD.

The need for surgical treatment for CTEBD is emphasized by all authors, the method of choice is total cystectomy, cholecystectomy, Roux hepatopathy, but there are many disagreements regarding the surgical methods associated with the anatomical features of the structure with different variations in the size of the cystic expansion and the type of complications (Hakobyan, 1982; Lilly, 1982). According to Funabiki et al. (2009) with the "nondilated" type of bile duct cysts, surgical intervention is mandatory in the form of Roux hepaticoenterostomy or hepaticoduodenostomy, since this type of anomaly does not exclude further
development of malignancy of the bile ducts (Funabiki et al, 2009).

PURPOSE OF THE STUDY
To establish the prevalence of certain types of CTEBD in children, to draw clinical and anatomical parallels depending on the form of cystic expansion and the relationship of the cyst with the pancreatic duct.

MATERIAL AND METHODS

STUDY POPULATION
The data of 82 patients with CTEBD in the clinical databases of the Department of Hospital Pediatric Surgery and Pediatric Oncology of the Tashkent Pediatric Medical Institute were reviewed retrospectively.

CLINICAL EXAMINATIONS AND DATA COLLECTION
The patients underwent complex clinical, laboratory and radiation diagnostic methods: ultrasound and CT of the abdominal cavity organs, MRI cholangiography, intraoperative cholangiography (IOCHG), histomorphological examination of the removed biomaterial.

The data of complex preoperative (ultrasound, CT and IOCHG) studies showed the heterogeneity of forms, sizes and length of cystic expansion within the extra- and intrahepatic ducts. The distribution of patients according to the type of cystic enlargement was carried out in accordance with the classification of Alonso-Lejin the supplements of Flanigan, Todani and Lilly.

RESULTS
The age of patients ranged from 15 days to 16 years: newborns - 2; from 29 days to 3 months - ten; from 3 months up to 1 year - 11; 1-3 year - 20; 3-7 years - 26; 7-11 years old - 8; over 11 years old - 5.

The distribution of patients according to the type of cystic enlargement by the classification of Alonso-Lej in the supplements of Flanigan, Todani and Lilly: type I - cystic enlargement of the CBD - 59 (72%); Type IV - cystic expansion of extra- and intrahepatic ducts - 22 (26.8%); atypical form (AF) - 1 (1.2%) was presented as a slight expansion of extrahepatic ducts and intrahepatic cystic lesion. Type II — diverticulum of CBD, type III — choledochocele, and type V — Caroli’s disease in our observations did not occur (Fig. 1).
The clinical manifestations of CTEBD are multifaceted, vary in the absence of any sign of the disease, despite the cystic expansion of the bile ducts. The main clinical signs are paroxysmal abdominal pain (in the right hypochondrium, epigastric region, around the umbilicus), yellowness of the skin and mucous membranes, palpable tumor formation in the abdominal cavity, various combinations of them or the “classical triad” complex: the presence of jaundice, pain and palpable tumors in the abdominal cavity. The intensity of each symptom and their combination can vary, which makes it difficult to make the correct diagnosis, especially in young children.

The distribution of patients by clinical signs and age is presented in the table 1.

**Table 1**

<table>
<thead>
<tr>
<th>Clinical signs</th>
<th>0-3 month</th>
<th>3 – 12 month</th>
<th>1 - 3 years</th>
<th>3 - 7 years</th>
<th>7 - 11 years</th>
<th>Over 11 years</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pain</td>
<td>1</td>
<td>2</td>
<td>6</td>
<td>8</td>
<td>3</td>
<td>4</td>
<td>24</td>
</tr>
<tr>
<td>Jaundice</td>
<td>8</td>
<td>6</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>16</td>
</tr>
<tr>
<td>Palpable tumor of abdominal cavity</td>
<td>-</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Pain+jaundice</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>14</td>
<td>5</td>
<td>1</td>
<td>30</td>
</tr>
<tr>
<td>Pain+tumor</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Jaundice+tumor</td>
<td>-</td>
<td>-</td>
<td>1</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Pain+jaundice+tumor</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>12</td>
<td>11</td>
<td>20</td>
<td>26</td>
<td>8</td>
<td>5</td>
<td>82</td>
</tr>
</tbody>
</table>

Depending on the structure and size of the cystic expansion, its anatomical options, the nature of the complications and the course of the postoperative period change.

In our observations, 78 (95.1%) of 82 patients had the following preoperative
complications: cholecystocholangitis (25), persistent and prolonged obstructive jaundice with impaired liver function (21), stone formation (10), cyst ruptures (8); reactive pancreatitis (12), suppuration of the contents of the cyst (1), compression of the nearby abdominal organs by the cyst (1). Large or giant cysts, as well as thinning of their walls, are more prone to injury. Favorable conditions for suppuration of the contents, the formation of stones, the development of obstructive jaundice occur with violations of the outflow of bile due to stenosis and persistent dysfunction of the sphincter of Oddi. The main cause of reactive pancreatitis is the atypical fusion of the pancreatic duct into the cystic dilated biliary tract.

The data of preoperative ultrasound, CT, MRI cholangiography significantly supplemented the IOCHG performed by 69 (84.1%) of 82 operated patients. At the same time, it becomes possible to detail the results of preoperative ultrasound and CT examinations to more accurately determine the shape, size of the cystic formation, the nature of the expansion of the extra- and intrahepatic bile ducts, the symmetry of the expansion of the lobar ducts and the possibility of additional abnormal bile ducts opening into the lumen of the cystic expansion.

With IOCHG in 53 (76.8%) children, the shape and size of the cystic enlargement usually coincided; in 16 (23.2%) cases, there was a slight increase in the size of the cystic expansion, probably due to the stretching of its wall during tight filling with contrast medium during cholangiography. In this type of study, additional information on the anatomical ratio of the cyst to the pancreatic duct was more valuable. In 9 (13%) of 69 patients with IOCHG, the passage of contrast from the cyst cavity to the pancreatic duct was noted (Fig. 2.).

**Figure 2.** IOCHG of an atypical form of cystic expansion - a slight dilatation of the extrahepatic bile ducts with disproportional dilatation of the intrahepatic ducts is determined.

This confirms the need to distinguish between biliary cysts, the contents of which are bile, and biliary-pancreatic cysts, in which pancreatic enzymes enter the cystic-enlarged CBD due to the fusion of the Wirsung duct. In case of a biliary-pancreatic cyst, admission of pancreatic juice into the cyst cavity contributes to the development of a pathological vicious circle - enzymatic cholecystocholangitis. Patients noted severe pain in the abdomen, jaundice, fever, chills, intoxication phenomena and positive "cystic" symptoms of Kerr, Ortner, Murphy;
leukocytosis with a shift of the formula to the left, an increase in ESR and an increase in the activity of transaminases. The frequency of seizures and the occurrence of cholecystocholangitis increased with the addition of various intercurrent diseases.

Stagnation and difficulty in the outflow of contents from the cyst cavity leads to the development of reactive pancreatitis with characteristic clinical and laboratory signs (vomiting, pain with irradiation in the back, an increase in blood amylase up to 252.3 U/L activity in 12 (14.6%) patients of varying intensity and duration. To the same extent, these disorders can be caused by inflammatory and functional changes in the hepatopancreatoduodenal zone. The occurrence of reactive pancreatitis in one child in our observations can be associated with it is difficult to judge the involvement of the pancreas by the clinical manifestations of blood and urine, their dynamics during treatment with protease inhibitors. In 6 patients, acute manifestations of the disease subsided amylases normalized on the 3-4th day against the background of taking countercalal. In 5 cases, when the symptoms of the disease subsided, amylase indices returned to normal on the 6-7th day. It should also be emphasized that the influx of pancreatic enzymes into the cyst cavity under conditions of stagnation of bile causes circulatory disorders and necrosis of the walls of the cyst of the bile ducts and contributes to spontaneous rupture of the common bile duct cyst. In our observations, out of 8 patients with perforation of the common bile duct cyst, 3 were diagnosed with biliary pancreatic cyst during cholangiography. In one 2.5-month-old girl operated on with suspected intestinal invagination, a rupture of the CBD cyst was detected. The suturing of the gap was performed without drainage of the CBD. The baby is dead. Autopsy found that the cause of biliary peritonitis was a rupture of an OP cyst. In the lumen of the gallbladder, calculi were found. Histological examination revealed the presence of ectopic pancreatic tissue in the wall of the pancreas. In these observations, the entry of pancreatic enzymes from the gland itself or the production of its ectopic tissue into the biliary tract apparently caused enzymatic cholangitis and caused progressive destruction of the walls of the SVC and fibrosis of the Oddi sphincter, which contributed to increased pressure and spontaneous perforation in the biliary tract. In this case, favorable conditions are created for the formation of gallstones, as evidenced by the detection of autopsy stones in the gallbladder.

Surgical tactics in the biliary-pancreatic version of CTEBD consisted in excision of the enlarged section of the pancreas, cholecystectomy, the imposition of hepaticoenterostomy according to Roux.

We present one of our observations of a biliary-pancreatic cyst with the phenomena of pancreatitis.

Clinical case. Patient H. 4 years. He entered the clinic on April 2, 2009 from one region of the republic with complaints of abdominal pain, nausea, repeated vomiting, fever, redness of urine, and discoloration of
From the anamnesis, he is sick for 10 days. He was hospitalized in a local infectious diseases hospital with a diagnosis of viral hepatitis, but the diagnosis was not confirmed. Abdominal pain and vomiting did not stop. Pain attacks sometimes did not stop even with antispasmodics and analgesics. Ultrasound, the data was interpreted as a parasitic liver cyst, pancreatic head cyst, the patient was sent to our clinic. Upon admission, the patient's condition is moderate, the skin is pale. Complaints of epigastric and right abdominal pain under the hepatic region, nausea, vomiting.

**BIOChGemical analyzes:**
- Blood amylase - 203.0 mg/ml for 1 hour;
- Bilirubin: total - 9.5 mmol/l, direct - abs;
- AIAT - 2.6 mmol/l; urea - 5.3 mmol/l; blood glucose - 5.0 mmol/l.

An ultrasound examination of the liver, bile ducts on an empty stomach and after choleretic breakfast and pancreas was done at the clinic. Determined cystic enlargement of the OP. The contractility of the gallbladder and cystic enlarged common bile duct is 50%, the phenomenon of pancreatitis. Diagnosis: Cyst of the common bile duct. Reactive hepatitis, cholestasis, pancreatitis. The above diagnoses are supported by an additional CT scan of the abdominal organs. Intensive detoxification, antibacterial, restorative preoperative therapy was carried out. In the dynamics of blood amylase decreased to 7.0 mg / ml in 1 hour; ALT - 1.93 mmol/l.

04.16.09, the patient underwent surgery. During the operation, IOCHG was performed (Fig. 3).

**Figure 3.** IOCHG of a biliary-pancreatic cyst; spindle-shaped cystic enlargement of the common bile duct – 1st type.

In this case, a biliary-pancreatic cyst of the common bile duct was found. During the operation, the cyst cavity was opened and, under visual control, the distal part of the common bile duct was tied up above the site of the Wirsung duct inlet and a resection of the CBD cyst was performed. The operation was completed with cystectomy, cholecystectomy, and Roux hepatic enterostomy. The postoperative course is smooth. Recovery. The child is observed in dynamics, satisfactory condition, no complaints.

The abnormal inflow of segmental ducts into the pancreas and the anatomical variations in the formation of the gallbladder or biliary tract complicate the implementation of biliodigestive anastomoses, there is a possibility of iatrogenism (the probability of damage during excision of the cyst, complete or partial clamping during ligation) during the operation. Danger sharply arises in the face
of a pronounced adhesive process due to biliary peritonitis that occurs during rupture of a cyst or complications of an inadequate primary operation.

**DISCUSSIONS**

The most common forms of CTEBD are type I and type IV lesions. Clinical manifestations and the course of the disease depend on the severity of inflammatory, functional disorders and organic changes in the biliary system and the relationship of enlarged CBD with the pancreatic duct. The occurrence of certain complications of CTEBD is often associated with the size of the cystic expansion, the anatomical type of cyst. The final type and nature of cystic lesions in biliary - pancreatic fusion is established taking into account clinical data, preoperative ultrasound, CT studies and IOCHG.

According to published data, malignancy of the cyst is observed in 3-4% of cases (Tumanyan&Lenyushkin, 2005; Ohashi et al, 2013). In our observations, this complication was not observed.

The authors of one interesting study added 14 own observations to the literature on congenital cystic enlargement of CBD. Authors said that preoperative diagnosis was still difficult. The intravenous cholegraphy remains the best diagnostic procedure. The choledochocystoduodenostomy is justified by its usefulness and is the most frequently used. The late results of the treatment satisfactory (Bairov et al, 1978).

Zito et al (2005) presented the outcomes of their experience based on a series of 5 patients observed from 1991 till today. Apart from the rarity of this disease, their series is so interesting because 4 out of 5 are adult patients and the fifth one is over 15. In addition, differentiating from the literature trend, the group included only male patients. Were also discussed the most important aspects referring to nosology, epidemiology, etiopathogenesis, clinical pattern and its evolution of CDB, looking over a wide review too. The Authors extensively examine the diagnostic problems; owing to that the patients were observed in the period 1991-1999 it is necessary to clarify that some imaging methods, i.e. CSTscan and the bile duct MRI, were not yet introduced.

The surgical treatment has been investigated as well, developed during its historical evolution until nowadays and our solutions for the 5 cases have been presented and discussed. In their series the Authors haven't ever observed during hospitalisation a malignant transformation.

Dynamics in the local and systemic immune factors of patients with CTEBD were investigated by Nichitailo et al (2004). The authors concluded that for the patients with CTEBD quite high metabolic activity of neutrophils according to data of spontaneous test with nitrobluetetrazolium (NBT-test), reduction of IgA content in the initial period, significant raising of interleukin-6 (IL-6) level on the first postoperative day were characteristic. Quantity of active neutrophils of type II in the blood of patients with CTEBD depended on antigenic load. Neutrophils in the bile restore the NBT according to type I.
Local concentration of IL-6 and IL-8, and also the functional activity of neutrophils in ductal bile in patients with CTEBD are the sensitive indexes of clinical state and immunological reactivity.

CONCLUSION
Cystic transformations of the extrahepatic bile ducts are an indication for surgical intervention, regardless of the patient's age. The method of choosing surgical treatment for biliary and pancreatic cysts, as in other cases of anomaly, is total excision of the cystic enlarged section of the pancreas, cholecystectomy and the imposition of hepaticoenterostomy according to Roux.

STUDY LIMITATIONS
The number of cases are rare, so we could not perform sample size calculation for this research and the number of participants to prove the null hypothesis might be less than it supposed to be. Another limitation is that the style of the research – observational. The study is monocentre. Thus, the diagnostic and treatment methods were same and there were not any arm to compare the results of the research. Further researches may be required with an adequate sample size and with control groups to show more clear and exact results.

ACKNOWLEDGEMENTS
We are grateful to the staff of Department of Hospital Pediatric Surgery and Pediatric Oncology of the Tashkent Pediatric Medical Institute for the cooperation and support in our research. We also say thanks to the archive personnel of the clinic of Tashkent Pediatric Medical Institute. The parents of the participants kindly gave full written permission for this report.

ETHICAL APPROVAL
The ethical approval for the study was granted by the Committee of Ethical Approval for Researches under the Ministry of Health of the Republic of Uzbekistan.

CONSENT
Written informed consent was obtained from all participants’ parents of the research for publication of this paper and any accompanying information related to this study. A copy of the written consent is available for review by the authors.

CONFLICT OF INTEREST
The authors declare that they have no competing interests.

FUNDING
No funding sources to declare.

REFERENCES:


Entered 07.01. 2020