

# Surgical management of choledocal cyst in different techniques: a 4-year experience

## Abstract

**Objective:** The aim of this study was to evaluate the efficacy and complications of different techniques in the treatment of choledocal cyst in children.

**Materials and methods:** Data was collected retrospectively from 32 patients with choledocal cyst (type I), managed in the Department of Pediatric Surgery, Dhaka Medical College and Hospital (DMCH), Dhaka, Bangladesh conducted during the period of January 2015 to December 2018. Roux-en-Y hepatico-jejunostomy, Hepatico-duodenostomy, Choledocho-cholecysto-duodenostomy, Hepatico-jejunostomy done in 9, 14, 3 and 6 patients respectively.

**Results:** There were 8 males and 24 females. The age of patients at diagnosis varied from 13 months to 12 years (mean age 71.9 months). The early postoperative complication rate after cyst excision and biliary reconstruction was 12.5% (4 of 32). One patient in each type (1/9, 1/14, 1/3, 1/6) of operation developed an anastomotic leakage and there was no mortality.

**Conclusions:** Hepatico-duodenostomy is an acceptable technique in the management of choledocal cyst as it's a simple, quick technique and being more physiological with maintaining normal anatomy in attaining biliary drainage.

**Keywords:** roux-en-Y hepatico-jejunostomy, hepatico-duodenostomy, choledocho-cholecysto-duodenostomy, hepatico-jejunostomy, choledocal cyst

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**Abbreviations:** DMCH, Dhaka medical college and hospital; APBJ, anomalous pancreaticobiliary junction; POD, postoperative day

## Introduction

Choledocal cysts are rare congenital anomalies of the biliary tract characterized by dilatation of either intra or extrahepatic biliary tract or both. These cysts are uncommon in Western countries, but are not rare in Bangladesh. Among the five types of Choledocal cysts, type I cysts are the most common types, which are associated with anomalous pancreaticobiliary junction (APBJ). Complete excision of the cyst and bilioenteric anastomosis is the treatment of choice in choledocal cyst. Biliary reconstruction after complete excision of the cyst can be done by various techniques. Roux-en-Y hepatico-jejunostomy or hepatico-duodenostomy is the most commonly performed operations. Roux-en-Y hepatico-jejunostomy is a classical procedure that involves two anastomosis with a significant late complications namely intestinal obstruction, anastomotic stricture and peptic ulcer.<sup>1,2</sup> Hepatico-duodenostomy is another preferred technique as it more physiological and simpler to perform.<sup>3,4</sup> Choledocho-cholecysto-duodenostomy is a new surgical technique that preserve the gall bladder and used as the biliary conduit.<sup>5</sup> Hepatico-jejunostomy is latest technique. It requires complete excision of the cyst and anastomosis of hepatic duct with jejunum without Roux-en-Y limb. This newer technique requires less operation time. There is a debate regarding the optimal technique for biliary reconstruction. The aim of this study was to analyze the outcomes of our experience of 32 patients of choledocal cyst underwent various types of surgical procedures.

## Materials and methods

It was a retrospective study of 32 patients with choledocal cyst (type I) managed in the Department of Pediatric Surgery, Dhaka Medical College and Hospital (DMCH), Dhaka, Bangladesh conducted during the period of January 2015 to December 2018. Roux-en-Y hepatico-jejunostomy, Hepatico-duodenostomy, Choledocho-cholecysto-duodenostomy, Hepatico-jejunostomy done in 9, 14, 3 and 6 patients respectively.

## Surgical technique

**Roux-en-Y hepatico-jejunostomy:** After cyst excision in the usual technique, the jejunum approximately 20 cm from the ligament of Treitz was divided. The Roux limb was passed through a created window in the transverse colon to the sub-hepatic region and hepatico-jejunostomy performed. Gastro-intestinal continuity was maintained by jejunostomy in an end to side fashion.

**Hepatico-duodenostomy:** Following cyst excision in the standard technique, common hepatic duct was anastomosed with distal first part of duodenum.

**Choledocho-cholecysto-duodenostomy:** The choledocal cyst was excised in the usual method. This technique differs with others technique that gall bladder with its neck was kept in situ with preservation of cystic artery. The fundus and part of body of gall bladder was mobilized from the liver bed for its easily access to first part of duodenum with the advantages of tension free anastomosis. The gall bladder neck was anastomosed with the common hepatic

duct and fundus of gall bladder was anastomosed with the distal first part of duodenum.

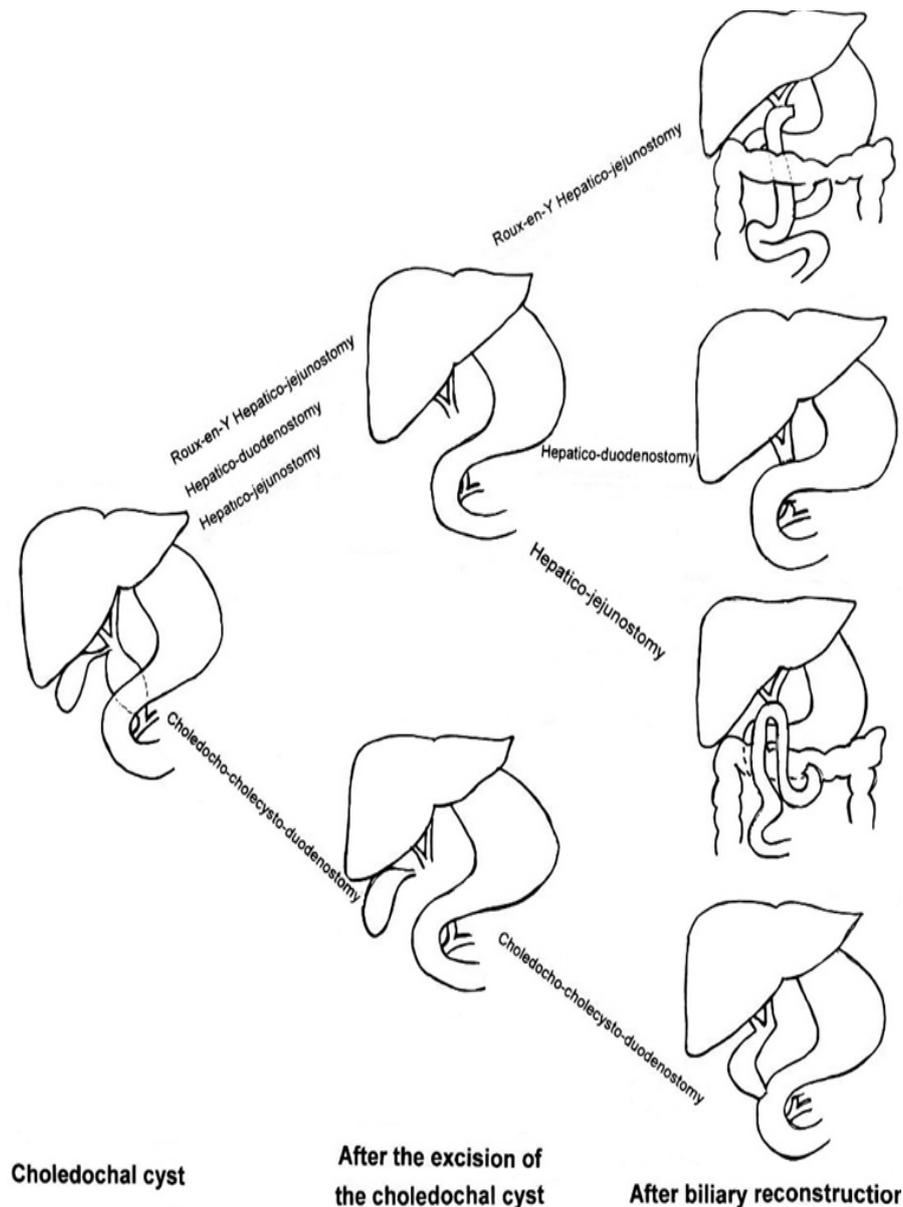
**Hepatico-jejunostomy:** In this newest technique, the cyst was excised at first, then a loop of jejunum approximately 20-30 cm from the ligament of Treitz was brought out to sub-hepatic region in the way anterior to transverse colon. Anastomosis of the common hepatic duct with the side of jejunum was done in an end to side manner.

The presenting complaints, examination findings, investigations, treatment, operative details and postoperative courses were analyzed.

Follow up information was carried out during the post operative follow up in outpatients department. History was taken particularly to pain, cholangitis, features of gastritis and examined Table 1. Liver function test and abdominal imaging were done at three months after operation. Then the patients were followed up every six months interval. Outcomes evaluated included operation time, hospital stay and incidence of postoperative bile leak, cholangitis, reflux gastritis, anastomotic stricture, bleeding, intestinal obstruction and re-operative rate. The statistical test applied was chi-square test. P value <0.05 was considered to be statistically significant.

**Table 1** Patients characteristics

	<b>Roux-en-Y Hepatico-jejunostomy</b>	<b>Choledocho-cholecysto-duodenostomy</b>	<b>Hepatico-duodenostomy</b>	<b>Hepatico-jejunostomy</b>
Number of patients	9	14	3	6
Sex (M/F)	2-7	4-10	1-2	1-5
Age (Months)				
Ranges	18-144	30-144	18-84	13-132
Mean	76	72.85	50	74.66
Presentation				
Pain	5	11	2	4
Jaundice	4	6	2	3
Lump	4	4	1	1
Investigation				
USG	9	14	3	6
MRCP	5	7	3	3
Operation time (Minutes)				
Range	130-180	85-110	175-180	90-120
Mean	164	95.78	177.66	100.66
Liver biopsy	2	2	0	2
Peroperative findings	Cholelithiasis: 2	Cholelithiasis: 1		Cholelithiasis: 1
Oral feeding				
Usual	4 <sup>th</sup> POD	4 <sup>th</sup> POD	4 <sup>th</sup> POD	4 <sup>th</sup> POD
Delayed	1 (6 <sup>th</sup> POD)	1 (8 <sup>th</sup> POD)	1 (10 <sup>th</sup> POD)	1 (7 <sup>th</sup> POD)
DT removal				
Usual	5 <sup>th</sup> POD	5 <sup>th</sup> POD	5 <sup>th</sup> POD	5 <sup>th</sup> POD
Delayed	1 (8 <sup>th</sup> POD)	1 (8 <sup>th</sup> POD)	1 (12 <sup>th</sup> POD)	1 (8 <sup>th</sup> POD)
Hospital stay (Days)				
Range	7-10	6-9	8-14	7-9
Mean	8.33	7.57	10.33	7.83
Complications				
Anastomotic leakage	1 (11.11%)	1 (7.14%)	1 (33.33%)	1 (16.66%)
Late	Adhesive pain: 1	Bil. Gastritis: 1	Adhesive pain: 1 Cholangitis: 1	Cholangitis: 1



**Figure 1** Diagrammatic presentation of different techniques of operation.

## Results

There were 8 males and 24 females with a male: female ratio of 1:3. The age of patients at diagnosis varied from 13 months to 12 years (mean age 71.9 months). All patients had type I choledochal cysts, and were symptomatic on admission; presenting symptoms included pain in 22 (68.7%), jaundice in 15 (46.8%), lump in 10 (31.2%). Among them, only 4 patients presented with the classical triad. In addition to ultra sonogram as an imaging studies, MRCP done in 18 patients for evaluating the biliary anatomy before planning operation. One patient of hepatico-duodenostomy had history of previous drainage due to pus formation. All patients' underwent complete excision of the cyst. The mean duration of the operation time was 123.5 minutes (range 85 to 180 minutes). Usual oral feeding started on 4<sup>th</sup> postoperative day (POD) but delayed on four patients who developed anastomotic leakage. The average time of drain removal was 5<sup>th</sup> post operative

day. In 4 cases of anastomotic leakage, drain tube were removed on 8<sup>th</sup> POD in 3 patients but one patient of Choledochcho-cholecysto-duodenostomy who had progressive drainage of bile, drain tube was removed on 12<sup>th</sup> POD. The average hospital stay was 8 days (range: 6-14 days). The early postoperative complication rate after cyst excision and biliary reconstruction was 12.5% (4 of 32) and there was no mortality. One child of Roux-en-Y hepatico-jejunostomy had a bile leak with features of peritonitis. One 3 years female patient of Hepatico-duodenostomy had a bile leak upto 7 days postoperatively and healed spontaneously. One patient of Choledochcho-cholecysto-duodenostomy was recovering well upto 7<sup>th</sup> POD. After that, the patient developed abdominal distension with progressive drainage of bile through the drain tube and improved gradually. Another one patients of hepatico-jejunostomy had scanty bile leak that was healed spontaneously.

## Discussion

Still the choledochal cyst management is challenging. Surgical treatment was carried out with total excision of the cyst, cholecystectomy and bilio-enteric reconstruction. The bilio-enteric bypass can be fashioned in different techniques. Roux-en-Y Hepatico-jejunostomy has been accepted as classical procedure in treating choledochal cyst.<sup>6</sup> This technique requires longer operation time with two anastomosis. Several studies have reported some early and late post operative complications of this procedure including anastomotic leakage, cholangitis, anastomotic stricture, twisted loop and biliary stone formation.<sup>7,8</sup> In this study, one patient of Roux-en-Y Hepatico-jejunostomy had anastomotic leakage and on follow up, one patient developed mild adhesive abdominal pain without features of cholangitis. Hepatico-duodenostomy has reported as an alternative technique of Roux-en-Y Hepatico-jejunostomy solves some of these complications and accepted as a more physiological procedure.<sup>3,9</sup> Maximum number of patients (43.75%) in this series underwent hepatico-duodenostomy and one patient has mild leakage in the early postoperative period. Till date, overall complications rate are low and comparable to other center.<sup>3</sup> Choledocho-cholecysto-duodenostomy is a new technique introduced by an author that uses native biliary channel for bile drainage instead of intestinal conduit. No significant early complications have been observed in the new technique. No late follow up mentioned but noted that anastomotic leakage, anastomotic stricture, biliary fistula, reflux, recurrent cholangitis, gall stones, carcinoma of gall bladder may developed in the late postoperative period.<sup>5</sup>

Hepatico-jejunostomy without Roux-en-Y reconstruction is a newest technique practiced in our center. It requires shorter time. One patient in this group experienced scanty biliary leakage in the early postoperative period that was healed spontaneously. This technique developed with the possibilities of reflux cholangitis, kinking of anastomotic jejunal loop. To date, after a mean follow up of 19.9 months, no significant complications noticed. Another important advantage is that this operation can be converted into Roux-en-Y Hepatico-jejunostomy or Hepatico-duodenostomy in later if needed. Liver biopsy was done in 6 cases and two of them revealed per portal fibrosis as reported in other studies.<sup>10,11</sup> The mean duration of the operation time was higher (177.66 minutes) in Choledocho-cholecysto-duodenostomy and lower (95.78 minutes) in Hepaticoduodenostomy. One patient in each type (1/9, 1/14, 1/3, 1/6) of operation developed an anastomotic leakage. Highest rate of anastomotic leakage observed in Choledocho-cholecysto-duodenostomy (33.3%) and lowest rate found in Hepatico-duodenostomy (7.1%). Here significant difference was not found ( $p=0.64$ ). In our study, there was no mortality. This is in parallel with mortality rate in other studies.<sup>12,13</sup> There is a reported case of mortality in a patient of Choledocho-cholecysto-duodenostomy where the author mentioned unexplained cause of death without any abdominal signs and symptoms.<sup>5</sup> In a another study, one late mortality due to liver failure occurred 6 months after Roux-en-Y Hepatico-jejunostomy with preoperative severe liver cirrhosis.<sup>14</sup>

## Conclusion

Besides the conventional Roux-en-Y hepatico-jejunostomy, Hepatico-duodenostomy is an acceptable technique in the management of choledochal cyst as it's a simple, quick technique and being more physiological with maintaining normal anatomy in attaining biliary drainage. In addition, it has less bile leak rate and has advantages of early feeding and shorter hospital stay. It also avoids

multiple intestinal anastomoses. So, Hepatico-duodenostomy may be the choice of options. Other techniques may be the alternative options in future but need a prospective, randomized controlled trial and long term follow up with a large series of patients.

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## Conflicts of interest

The authors declare that there are no conflicts of interest.

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