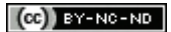


Hepaticojejunostomy vs. Hepaticoduodenostomy after Excision of Choledochal Cyst in Paediatric Population- A Retrospective Study

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ABSTRACT

Introduction: Choledochal cyst is a rare congenital anomaly of the bile duct with female predominance. Surgical excision of the choledochal cyst with hepaticoduodenostomy or hepaticojejunostomy is the standard of care in the last few decades. Many surgeons favour hepaticojejunostomy.

Aim: To evaluate the outcomes of open hepaticoduodenostomy vs. hepaticojejunostomy procedure in excision of choledochal cyst in paediatric population.

Materials and Methods: This was a retrospective cohort study conducted from January 2015 to December 2019 on data of 16 paediatric patients who underwent choledochal cyst excision with biliary reconstruction in a tertiary health institute. The data of these patients were collected from Medical Records Department (MRD) on type of surgery performed, mean operating time, postoperative hospital stay, the onset of oral feeds and complications associated with the surgery and were analysed and evaluated in July 2021. All statistical analyses were performed with Statistical Package for Social Sciences (SPSS) version 23.0. A p-value of <0.05 was considered as statistically significant.

Results: A total of 16 patients (5 males and 11 females) were included, out of them 9 (56%) had undergone hepaticoduodenostomy and 7 (44%) had undergone hepaticojejunostomy. The most common type of choledochal cyst was Type 1 (n=7, 43.7%). Operative time was longer for the hepaticojejunostomy than the hepaticoduodenostomy (212.86±31.33 vs 88.89±15.16 min; p-value 0.001). Patients who underwent hepaticoduodenostomy early feeds were started as compared to the hepaticojejunostomy (2.22 vs 5.29 days; p-value 0.001). Hospital stay was longer with the hepaticojejunostomy than the hepaticoduodenostomy (14.71±7.76 days vs 8.11±4.48 days; p-value 0.05). There were three complications (biliary enteric fistula that opened into the anterior abdominal wall at the previous surgical site incision, jejunal stump formed the fistulous tract with high output bile leak and surgical site infection was noted) in total noted in both groups.

Conclusion: The present study concluded that hepaticoduodenostomy had a better outcome in factors such as operating time, the onset of feeds and hospital stay than with the hepaticojejunostomy.

Keywords: Biliary reconstruction, Choledochal cyst, Roux-en-Y hepaticoduodenostomy

INTRODUCTION

Choledochal cysts have been defined as congenital anomalies of the bile duct with cystic dilatation of the biliary tree [1]. Incidence of bile duct cyst ranges from 1 in 13,000 to 1 in 2 million births. It is more common in females than in males, with a ratio of 8:1. In the first decade of life, most patients with bile duct cysts are being diagnosed, and few go undiagnosed into adulthood. Their presentation in adulthood is different compared to childhood cases [1,2]. Patients seldom present with the classical triad of jaundice, right upper quadrant mass and abdominal pain (0-17%). It is more common in children than in adults. They can also present with features of cholangitis, pancreatitis and biliary peritonitis due to cyst rupture [1,3,4]. The first systematic description of choledochal cysts was given by Lej AF based on the clinical and anatomical findings in 96 cases in 1959. They classified choledochal cysts into three types [5]. Todani T et al., refined the previous classification, including five major types and several subtypes [6].

The accepted management of choledochal cyst is complete resection of the extra-hepatic bile duct with bilio-enteric anastomosis. The management of choledochal cysts has evolved from simple drainage procedures to the most advanced being bilio-enteric anastomotic reconstruction [7,8]. The different reconstruction techniques performed now include Roux-en-Y Hepaticojejunostomy and Hepaticoduodenostomy. The most preferred surgery by

many hepatobiliary surgeons is Roux-en-Y hepaticojejunostomy reconstruction, and it has been a gold standard for biliary reconstruction for many years [9,10]. It has been observed that there is an increasing trend of performing hepaticoduodenostomy due to the technical ease of a single anastomosis and other advantages such as being more physiological, and this technique allows endoscopic access to the anastomotic site if a stricture or a stone occurs [7,11].

This study was conducted to compare the clinical outcome of open hepaticoduodenostomy and hepaticojejunostomy in a single tertiary care institution.

MATERIALS AND METHODS

A retrospective cohort study was conducted at Yenepoya Medical College Hospital, Mangalore, Karnataka, India, from January 2015 to December 2019 after the data was collected from MRD and its analysis was done in July 2021. A total of 16 patients were admitted under the Paediatric Surgery Department and treated for choledochal cyst. The Institutional Ethical Committee approval was obtained (protocol number YEC2/857). All the patients who fit into the inclusion criteria during the stated period of time form the sample population.

Inclusion criteria: All patients in the age group of 0-14 years diagnosed with the choledochal cyst, and undergone the procedures were included in this study.

Exclusion criteria: Patients who have not undergone surgery or data missing on surgical procedures have been excluded from this study.

Data was collected on gender, presenting complaints, type of surgery performed, mean operating time, postoperative hospital stay, the onset of oral feeds and complications associated with the surgery.

A qualified, experienced paediatric surgeon performed the procedure, and the surgeon was free to choose either of the two anastomoses (hepaticoduodenostomy and hepaticojejunostomy) to restore biliary continuity. Hepaticoduodenostomy was performed by an end biliary anastomosis to the junction of the first and second part of the duodenum, while the creation of the Roux limb is necessary for hepaticojejunostomy anastomosis. Vicryl 4-0 sutures have been used in both methods for biliary enteric anastomosis.

STATISTICAL ANALYSIS

All statistical analyses have been performed with International Business Management (IBM) SPSS version 23.0. Statistical significance was determined using independent t-test for continuous data. A p-value of ≤ 0.05 was regarded as statistically significant.

RESULTS

A total of 16 patients were included in the study. The overall gender distribution was predominantly female with a ratio of 1:2.2. In present study, pain abdomen (81.3%) was the most common symptom; jaundice (37.5%) and abdominal distension (6.3%) were other presenting symptoms [Table/Fig-1]. The majority of the patients (7/16) were diagnosed with type 1 choledochal cyst [Table/Fig-2].

Variables	Hepaticojejunostomy (n=7)	Hepaticoduodenostomy (n=9)	Total
Mean age (years)	9.28 \pm 3.77	6.55 \pm 5.09	7.75 \pm 4.59
0-5 years	2	4	6
6-10 years	2	3	5
11-14 years	3	2	5
Gender (Male: Female)	1:2.5 (2/5)	1:2 (3/6)	1:2.2 (5/11)
Presenting complaints			
Pain abdomen	7	6	13 (81.3%)
Jaundice	1	5	6 (37.5%)
Distended abdomen	1	1	2 (6.3%)

[Table/Fig-1]: Demographic representation of the study population.

Types	Description	Study sample
Type I	Dilation of the extrahepatic bile duct (75-85% of cases). Variant A: Cystic Variant B: Focal Variant C: Fusiform	7
Type II	Diverticulum of the common bile duct.	2
Type III	Dilatation of the intramural portion of the common bile duct.	1
Type IV	Multiple cystic dilations	3
	Variant A: involves both the intra and extrahepatic bile ducts. Variant B: limited to the extra-hepatic bile ducts.	3
Type V	Multiple segmental intrahepatic cystic biliary dilatations (Caroli disease).	0

[Table/Fig-2]: Todani classification of types of choledochal cysts [6].

The mean operative time was significantly more in patients who underwent hepaticojejunostomy than hepaticoduodenostomy (p-value 0.001). The onset of oral feeds was earlier in the hepaticoduodenostomy group with a mean duration of 2.22 days and was also statistically significant (p-value 0.001) compared to the hepaticojejunostomy group. The duration of hospital stay was smaller in the hepaticoduodenostomy group than in the hepaticojejunostomy group, it was statistically significant (p-value 0.05) [Table/Fig-3].

Outcome analysis	Hepaticojejunostomy (n=7) (Mean \pm SD)	Hepaticoduodenostomy (n=9) (Mean \pm SD)	p-value*
Mean operative time* (minutes)	212.86 \pm 31.33	88.89 \pm 15.16	0.001
Intra operative blood loss* (mL)	97.14 \pm 12.53	92.78 \pm 12.52	0.501
Onset of oral feeds* (days)	5.29 \pm 2.13	2.22 \pm 0.44	0.001
Postoperative hospital stay* (days)	14.71 \pm 7.76	8.11 \pm 4.48	0.05

[Table/Fig-3]: Analysis of outcome of patients who underwent hepaticojejunostomy and hepaticoduodenostomy.

*Mean value \pm SD; *Independent t-test

In this study, there was one complication of hepaticojejunostomy presented during the regular follow period, on postoperative day 15, as a biliary enteric fistula that opened into the anterior abdominal wall at the previous surgical site incision [Table/Fig-4]. The jejunal stump formed the fistulous tract with high output bile leak [Table/Fig-5]. The patient was managed conservatively for two months until the fistula matured, after which the fistula closure was done. Surgical site infection was noted one in each group managed conservatively with antibiotics.



[Table/Fig-4]: Biliary enteric fistula at the surgical site.

[Table/Fig-5]: Fistulous tract attached to the jejunum and skin. (Images from left to right)

DISCUSSION

In 1977, Todani T et al., found choledochal cyst to be more common in females with a ratio of 2.4:1, which has greatly increased to 8:1 presently [2,6]. In this study, the ratio was 2.2:1 with female predominance. The choledochal cyst usually presents with a classical triad of pain abdomen, jaundice and right upper quadrant mass [1]. In this study, the most common presentation of patients was complaints of pain abdomen, compared to the classical triad. According to the classification given by Todani T et al., the most common type of choledochal cyst is type 1, which is also the most common type in the present study [6].

For many years, hepaticojejunostomy has been the choice of reconstruction in patients with choledochal cyst by many

surgeons [10]. However, hepaticoduodenostomy is gaining more popularity and is considered a simpler procedure compared to the hepaticojejunostomy in matters such as operative time, the onset of oral feed, hospital stay, and post-operative endoscopic accessibility of the anastomosis [7,8,10,11]. Hepaticoduodenostomy is considered a simpler procedure because it involves a single anastomosis compared to hepaticojejunostomy, which involves two anastomosis that is hepaticojejunostomy and jejunojejunostomy. In addition, hepaticojejunostomy requires mobilisation of jejunum via the transverse mesocolon, increasing the operative time [11]. This study showed a significantly shorter operative time in the hepaticoduodenostomy group that was in concordance with the results of Santore MT et al., study [8]. The oral onset of feeds was earlier in the hepaticoduodenostomy group since there is no mobilisation of jejunal loops and involves single anastomosis. The studies conducted by Santore MT et al., and Liem NT et al., demonstrated a shorter hospital stay, which was in concordance with the present study results [8,12].

The closeness of the anastomosis to the stomach makes hepaticoduodenostomy have a greater chance of cholangitis and bile gastritis [7,8,11]. A study conducted by Liem NT et al., showed cholangitis in 1.7% and bile gastritis in 3.8% of patients [12]. Bile gastritis and cholangitis in patients who underwent hepaticoduodenostomy can be avoided by performing hepaticoduodenostomy anastomosis at the junction of the first and second portions of the duodenum [7,8]. All the patients in this study underwent hepaticoduodenostomy anastomosis at the junction of the first and second part of the duodenum. Hence, none of the patients in this study presented with symptoms of bile gastritis, cholangitis, and intestinal obstruction during the follow-up period of one year; which can be compared to the results observed in the Mukhopadhyay B et al., study [13]. Intestinal obstruction has been a major complication of hepaticojejunostomy due to the adhesions formed as the Roux-en-Y limb passes through the transverse mesocolon after accessing the infracolic compartment. Since hepaticoduodenostomy involves dissection and anastomosis limited in the supra-colic compartment, there is less chance of adhesions or internal herniation, hence less chance of intestinal obstruction [7,9].

Limitation(s)

Since the study sample size was small, it cannot be extrapolated for the entire population. A prospective study design with larger sample size is required.

CONCLUSION(S)

Hepaticoduodenostomy can be used in the reconstruction after cyst excision due to its technical simplicity and being more physiological. In the present study, the hepaticoduodenostomy had a shorter operative time, early onset of feeds, and reduced hospital stay without the potential disadvantages of the hepaticojejunostomy approach. However, a long-term prospective study would be needed to deduce definitive conclusions.

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