



Pediatric Laparoscopic Cholecystectomy: Clinical Significance of Cases

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Abstract

Background: Cholecystectomy in children is relatively uncommon, despite being one of the most common surgical procedures in adults. However, the number of cholecystectomies in children has increased over the past two decades. The most common reason for juvenile patients to have cholecystectomy, according to a few research conducted on Western cultures, is biliary dyskinesia. However, in the majority of pediatric patients, gallstones are the cause of symptomatic gallbladder illness. The aim of this study was to describe the characteristics of pediatric patients who underwent laparoscopic cholecystectomy. **Material & Methods:** This was a retrospective study and was conducted in the Department of Pediatric Surgery of Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh during the period from May, 2017 to February, 2020. In our study, we included 24 cases with gallbladder illness who underwent pediatric laparoscopic cholecystectomy. **Results:** A total 24 pediatric patients underwent laparoscopic cholecystectomy during the study period. Out of them 17 (70.8%) were 10 to 18 years old and 7 were below 10 years old. The cases comprised 10 male (41.7%) and 14 female (58.3%). Mean body weight was 53.3 Kg. Mean height was 151.3 cm and mean BMI was 24.43 Kg/m², with 15 patients (62.5%) being overweight. Fever (83.3%) and vomiting (79.2%) were the most common presenting feature. Most of the cases (87.5%) presented with multiple gall stone. 33.3% of patient comes with anemia, where hemolytic disorder is predominant comprising 29.3% of patient. Comparison between overweight and non overweight patients reveal that preoperative complications like CBD dilatation, CBD stone and choledocholithiasis were significantly high in overweight patients. **Conclusion:** In conclusion, cholecystectomy is rarely performed in pediatric populations. We found Laparoscopic cholecystectomy (LC) is a safe and effective treatment for pediatric cholelithiasis. The cause of the increased incidence of pediatric cholelithiasis is obesity and life style as well as its natural history, must be investigated further.



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INTRODUCTION

Cholecystectomy in children is relatively uncommon, despite being one of the most common surgical procedures in adults.^[1,2,3] However, the number of cholecystectomies in children has increased over the past two decades.^[4,5,6] The most common reason for juvenile patients to have cholecystectomy, according to a few research conducted on Western cultures, is biliary dyskinesia.^[7,8,9] However, in the majority of pediatric patients, gallstones are the cause of symptomatic gallbladder illness. Prematurity, parenteral feeding, abdominal surgery, or sepsis are risk factors for the formation of gallstones in pediatric patients; whereas, hematologic diseases or obesity are risk factors for adolescents.^[10,11,12,13] Patients with hemolytic diseases were the ones who developed pediatric gallstones the most commonly.^[14,15] Despite an increase in prevalence, cholelithiasis in children is still far less common than in the general adult population.^[16] A population-based study found that 1.9% of children had gallstones.^[15] The nature of disease process is different as compared to adults, with a higher proportion of pigment stones and less cholesterol-based stone disease in the pediatric population, especially in those younger than 10 years.^[1]

Recently, some reports have indicated that the proportion of hemolytic disease has decreased, and that of other conditions without hemolytic disease has increased whereas idiopathic

etiology is estimated between 20% and 65%.^[4,5,15,17,18] The estimated prevalence of gallstone in children in Western populations has been reported between 0.1% and 4.0%, but it has been reported as less than 0.13% in Japan.^[3,18] In contrast to adult patients, pediatric patients with gallstone present with non-specific abdominal symptoms, and approximately 10-20% of these patients undergo cholecystectomy due to severe symptoms.^[19,20,21,22,23]

While previously rare and largely attributable to hemolytic disorders, the prevalence of pediatric cholelithiasis has increased with the epidemic of childhood obesity. Several estimates report the prevalence of cholelithiasis among children to be as high as 1.9% to 4%, with the increase in prevalence being proportional to the rising rate of childhood obesity.^[24,25,26,27] The distribution of disease processes requiring cholecystectomy is different in children, as compared to adults, with a higher degree of hematologic problems and less cholesterol-based stone disease in the pediatric population. Further, we have clinically recognized that acute, chronic cholecystitis with severe inflammation and/or scarring of the gallbladder and surrounding tissues is less commonly encountered in children.^[28] Laparoscopic cholecystectomy (LC) is regarded the "gold standard" surgical technique for cholelithiasis in adults, with an enormous amount of published data to back this up. However, there are few studies in the literature

on the clinicopathological features and laparoscopic therapy of gallstones in children. Therefore we aimed to examine the indications for this operation and the results with our most recent 3 years experience with laparoscopic cholecystectomy.

Objective of the study

The main objective of the study was to describe the characteristics of pediatric patients who underwent laparoscopic cholecystectomy.

MATERIAL AND METHODS

This was a retrospective study and was conducted in the Department of Pediatric Surgery of Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh during the period from May, 2017 to February, 2020. In our study we included 24 cases with gallbladder illness who underwent pediatric laparoscopic cholecystectomy.

These are the following criteria to be eligible for the enrollment as our study participants: a) Patients aged up to 18 years; b) Patients with gallstone; c) Patients who needed cholecystectomy for their gallbladder illness; d) Patients who were willing to participate were included in the study. And a) Patients with hepatobiliary diseases, b) Patients with previous surgical history; c) Patients with known allergy to anesthetic drugs; d) Patients with any history acute illness (e.g., renal or pancreatic diseases, ischemic heart disease etc.) were excluded from our study.

Basic demographic characteristics included sex, age, height, weight, BMI (body mass index). Clinical characteristics included fever, emesis, jaundice, anemia, choledocholithiasis,

gall stone number, gall stone size in cm, biliary sludge, CBD stone, CBD dilatation, NICU admission, birth history, hemolytic disorder, conservative management, pre-operative complication, per-operative haemorrhage, other hepatobiliary disorder were noted.

Statistical Analysis

All data were recorded systematically in preformed data collection form and quantitative data was expressed as mean and standard deviation and qualitative data was expressed as frequency distribution and percentage. Statistical analysis was performed by using SPSS (Statistical Package for Social Sciences) for windows version 18. Probability value <0.05 was considered as level of significance. The study was approved by Ethical Review Committee of Bangabandhu Sheikh Mujib Medical University, Dhaka, Bangladesh.

RESULTS

Figure 1 shows that majority (70.83%) of our patients were aged 10-18 years old and followed by 29.17% were aged 1-9 years old.

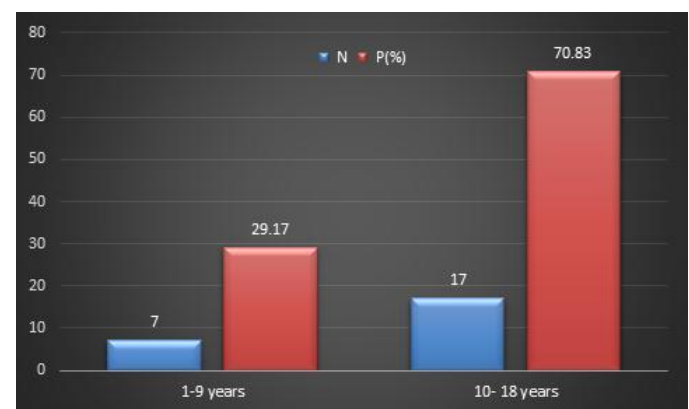


Figure 1: Age distribution of our study patients.

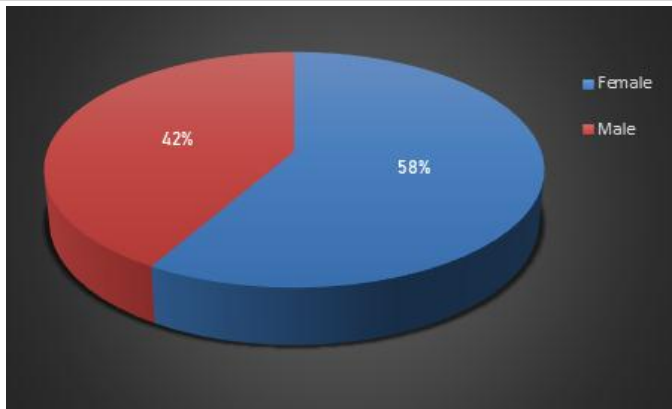


Figure 2: Gender distribution of our study patients

In [Figure 2] we distributed our patients by gender. Most of our patients were female (58%) compared to male (42%).

[Table 1] shows a majority (62.5%) of our patients were non - overweighted and 37.5% were overweighted. Among all patients, 66.67% in the non-overweight group and 77.78% in

overweighted were aged 10-18 years. Most of our patients were female in both groups. The mean BMI was 22.132 ± 2.079 & 28.28 ± 2.562 kg/m² in non-overweighted & overweighted patients respectively. Before surgery, CBD dilatation, CBD stone & Choledocholithiasis all were found in 33.33% of the overweighted group.

In [Table 2] we distributed our patients by presented symptoms. Fever (83.3%) and vomiting (79.2%) were the most common presenting feature and 33.3% had anemia. Most of the cases (87.5%) presented with multiple gall stone, 33.3% of patient comes with anemia, where hemolytic disorder is predominant comprising 29.3% of patient. CBD dilatation was absent in 87.5% of patients, biliary sludge was present in 70.8% and the majority (83.3%) of patients had gallstone size ranging from 0.03 to 0.06 in the study.

Table 1: Baseline characteristics of our study patients.

	Non- overweight		Overweight		P-value
	N=15	P (%)	N=9	P(%)	
Age					
1-9 years	5	33.33	2	22.22	0.669
10-18 years	10	66.67	7	77.78	
Mean age (years)	13.5 ±4.1		12.4 ±5.1		
Gender					
Male	5	33.33	5	55.56	0.403
Female	10	66.67	4	44.44	
BMI (Kg/m ²)	22.132 ±2.079		28.28±2.562		<0.0001
Height (cm)	150.3±7.4		152.3±6.2		0.324
Weight (kg)	47.3 ±14.4		59.3 ±19.4		0.415
Mean operative duration (days)	74.3 ±8.4		76.1 ±6.8		0.215
Pre-operative:					
CBD dilatation	0		3	33.33	0.042
CBD stone	0		3	33.33	0.042
Choledocholithiasis	0		3	33.33	0.042

Table 2: Distribution of our study patients by presented symptoms.

Presented symptoms	Frequency(n=24)	Percentage (%)
Fever	20	83.3
Anaemia	8	33.3
Vomiting	19	79.2
CBD dilatation		
Present	3	12.5
Absent	21	87.5
Gallstone number		
Single	3	12.5
Multiple	21	87.5
Gall stone size		
.03 to .06	20	83.3
>.07	4	16.7
CBD stone		
Present	3	12.5
Absent	21	87.5
Biliary Sludge		
Present	17	70.8
Absent	7	29.2
Conservative management		
Single	3	12.5
Multiple	21	87.5

Table 3: Distribution of our study patients by complications.

	Non- overweight		Overweight		P-value
	N= 15	P (%)	N=9	P (%)	
Per operative complication	0		2	22.22	0.130
Postoperative complication					
Abdominal colic after fatty meal	1	6.67	4	44.44	0.047
Postoperative pancreatitis	0		2	22.22	0.130

In [Table 3] we distributed our patients by complications. Peroperative complication was found in 22.22% of overweighted group. After surgery only 1 (6.67%) patient was found with abdominal colic after fatty meal and postoperative pancreatitis was found in 2 (22.22%) patients of overweighted group.

DISCUSSION

Cholecystectomy is relatively rarely performed in pediatric populations, though it is extremely common in adults. Although we performed 24 cholecystectomies during the study period, with pure gallbladder problems. Recently, many studies have reported the increased prevalence of pediatric cholecystectomy due to

gallstone disease in Western populations.^[4,5,6,29,30,31]

Our study also demonstrated that most cholecystectomies were due to CBD dilatation (12.5%), and multiple gallstones (87.5%). It was more common in female patients (58%) with a mean age of 13.5 years. Considering certain risk factors (advanced age and female sex) for gallstones in pediatric patients.

An idiopathic etiology of gallstone in the pediatric population has been proposed as between 20% and 65% and certain predisposing factors have been suggested as follows: lithogenic interventions in neonatal period, such as long-term parenteral nutrition, a progressive increase in pediatric obesity, and recently, liberal use of ultrasonography.^[15,29,32,33] In this study, we did not evaluate the gallbladder disease in neonatal cholestasis because most of those cases did not need a surgical management.^[13] Mehta et al. reported a series of pediatric cases with 53% of nonhemolytic gallstone cases occurring in overweight or obese children/adolescents, whereas Bogue et al,^[29] reported a series of cases with less than 1%.^[5,32]

This study also showed that female (58%) and overweight/obese (37.5%) individuals had a much higher frequency of complicated disease, which could be proposed as exacerbating factors to take into account in juvenile gallbladder disease. We conducted laparoscopic cholecystectomy in all cases to treat gallbladder disease in pediatric patients and noted any postoperative problems. As a result, the short-term results of cholecystectomy in the pediatric population are encouraging, but there may be additional long-term complications following

gallbladder removal. The majority of cases exhibited chronic cholecystitis when comparing the histological results, however it did not appear to change the clinical characteristics.

A similar study conducted in the United States in 2011 found an overall complication rate of 15% after pediatric laparoscopic cholecystectomy. The most common complication in that study was gastrointestinal, with a rate of 6.6%, compared with a rate of 0.6% for nausea or vomiting in our analysis.^[34] Another study from the United States, by Sacco Casamassima et al, used NSQIP-P data and found an overall complication rate of 13.6% for all pediatric laparoscopic cholecystectomies. Their 30-day readmission rate was 1.4% and their 30-day reoperation rate was 0.7%.^[35]

The natural history of cholelithiasis in children is not known, hence the treatment remains controversial.^[36] The clinical presentation, findings on ultrasound imaging, intraoperative finding and the final histopathological diagnosis of the gall bladder specimen did not correlate completely in our study.

Since the natural history of gallstones in children is not known and histological evidence of inflammation is present in all the cases of cholelithiasis in our series, we suggest an LC for all children with cholelithiasis. A recently conducted multicenter study also reports structural alterations in the majority of gallbladders removed for cholelithiasis.^[36] These authors also suggest that because of long life expectancy of children, expectant management of cholelithiasis may not be safe. However in adults where natural history is well documented, only 1–4% per year develop symptoms or complications of gallstone

disease, only 10% develop symptoms in the first 5 years after diagnosis, and approximately 20% by 20 years.^[37,38]

The mean operative duration for LC was 75.2 min in our study. This duration was between 70 and 80 min in other reported series.^[16] The comparison of various parameters between LC and open cholecystectomy in one study reported significantly less duration of hospital stay and decreased overall cost in patients undergoing LC. The other advantages of LC such as decreased pain, avoidance of upper abdominal muscle cutting incision, quicker return to activity, and cosmetically better scar are well documented.^[39]

Limitations of The Study

Our study was a single centre study. The major limitation was our small sample size. There are more adverse effects or complications of pediatric laparoscopic cholecystectomy that didn't get any evaluation in this study. After

evaluating once those patients we did not follow-up them and have not known other possible interference that may happen in the long term with these patients.

CONCLUSIONS

In conclusion cholecystectomy is rarely performed in pediatric populations. Generally, a simple gallbladder disease is more common than complicated gallbladder disease. In our study we found Laparoscopic cholecystectomy (LC) has been shown to be a safe and effective treatment for pediatric cholelithiasis. The cause of the increased incidence of pediatric cholelithiasis is obesity, and life style as well as its natural history, must be investigated further. So further study with a prospective and longitudinal study design including larger sample size needs to be done to identify more adverse effects of Laparoscopic cholecystectomy in pediatric population.

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