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Original Article

Surgery Section

Clinical Profile, Evaluation and Management of Gallstone Disease in Children in a Rural Referral Tertiary Centre

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ABSTRACT

Introduction: Cholelithiasis or gallstone disease is primarily a disease of adults. Recently, there has been a global increase in the incidence in children resulting in an increased number of cholecystectomies both by open technique as well as by laparoscopy at a very young age.

Aim: To study the epidemiology and to evaluate the management options and outcomes of cholelithiasis in children from a rural background.

Materials and Methods: A prospective study was done on 30 children diagnosed with cholelithiasis in a tertiary care medical college and hospital from April 2014 to April 2016. The data was analysed and evaluated for clinical presentation and management outcomes. Observations were made on the type of surgery (open/laparoscopic cholecystectomy), economical aspects, morbidity and mortality in these patients by descriptive statistics.

Results: Amongst the 30 children, males were more commonly affected than females. Children taking a mixed diet (vegetarian and non-vegetarian) had a greater tendency to form gallstones. Laparoscopic cholecystectomy was performed in (n=24, 80%) of cases while (n=6, 20%) cases underwent open cholecystectomy. Mixed stones were common with an incidence of (n=20, 66.6%) while cholesterol stones and pigment stones had an equal incidence of 16.7% in the persent study. No intraperitoneal drainage was done and there were no early or late complications in the present study.

Conclusion: Laparoscopic cholecystectomy is a safe, economical and efficacious procedure. It does not have significant morbidity and there is no surgery related mortality.

Keywords: Cholelithiasis, Laparoscopic cholecystectomy, Open cholecystectomy

INTRODUCTION

Cholelithiasis is quite common in adults with a prevalence rate of 10-20% in the western world. Asian population appears to have a lower incidence of gallstones. The incidence of gallstone disease in Indian population is between 3-6% with a female preponderance [1]. Cholelithiasis is infrequent in children less than 16 years of age (<1%) and rather rare in the less than 12 years of age group [2,3]. Though, it has long been considered comparatively less common in children, but in recent years the condition has been increasingly diagnosed mainly due to wide spread use of ultrasonography [4].

Extensive use of ultrasound scanning of the abdomen in children for various reasons has helped in diagnosing gallstones at very young ages. This has in turn resulted in an increasing number of cholecystectomies in children less than 11 years of age (1.9-4%) [5]. Antenatal diagnosis of foetal gallstones has been reported since 1983 [6]. A high incidence of spontaneous resolution has been documented up to one year of postnatal life.

The three main etiological causes of paediatric cholelithiasis are haemolytic disease (20-30%), other known causes like Total Parenteral Nutrition (TPN), ileal resection, ceftriaxone therapy, choledochal cyst and Progressive Familial Intrahepatic Cholestasis (PFIC) (40-50%) and idiopathic causes in (30-40%) [4]. In sickle cell disease, accelerated haemolysis with multiple blood transfusions results in cholelithiasis [7,8]. Children with ileal resection requiring TPN for more than three months have high incidence of cholelithiasis in the range of 43% [9]. The suggested mechanisms in idiopathic cholelithiasis include dehydration, transient hepatic dysfunction, dietary, inflammatory and endocrine factors affecting the bile composition [10].

The spectrum of clinical presentation of cholelithiasis in children is varied. Majority of them present as right hypochondriac pain (50%), 30% as nausea and vague pain abdomen, 20% are asymptomatic (incidentally detected stones). Clinical presentation has also been related to age. Children more than six years point to pain in right hypochondrium whereas younger children tend to present with vague pain [11].

Most gallstones in children are mixed stones composed primarily of calcium bilirubin pigment and various amounts of cholesterol and calcium carbonate [4]. Cholecystectomy is the treatment of choice for either acute or chronic cholecystitis with cholelithiasis. Spontaneous resolution is more common in infancy and in patients with idiopathic gallstones. Cholecystectomy is indicated for symptomatic cholelithiasis, asymptomatic cholelithiasis persisting beyond 12 months and radioopaque calculi [12,13]. Laparoscopic cholecystectomy is a safe and efficacious procedure with a low complication rate of 3% [14]. Presently, day case laparoscopic cholecystectomy is being attempted in many hospitals and has been reported as an equally safe procedure even in very young children [15]. Hence, we planned to evaluate the efficacy of laparoscopic cholecystectomy over open cholecystectomy in paediatric population.

MATERIALS AND METHODS

This was a prospective study of all children of cholelithiasis who presented for treatment at Maharishi Markandeshwar Institute of Medical Sciences and Research, Mullana, Ambala, Haryana, India (April 2014 to April 2016). A total of 30 children aged between 1 and 18 years (mean age 12 years) were included in the study. An informed written consent was taken from the parents of the children

included in the study. Sample size was calculated on the basis of number of children admitted with the gallstone disease in the surgery ward during the study period. Out of the total admissions of 45 children with cholelithiasis, 30 children were operated upon and hence included in the study.

The inclusion criteria of the study were all the children in the age-group of 1-18 years undergoing cholecystectomy (open or laparoscopic) during the study period. All the other children who did not undergo cholecystectomy were excluded from the study (those not giving consent for the study, not fit for anaesthesia and those with acute cholecystitis with conservative management). Approval from Institutional Ethics Committee was obtained for conducting the study.

All children were admitted to the hospital and their blood tests, liver function tests, coagulation parameters and renal function tests were done as per the protocol. A unit of blood was also arranged for all children whose haemoglobin was less than 10 gm%. A routine pre anaesthetic check-up and a paediatric evaluation were also done whenever required.

All patients were operated under general anaesthesia. An injectable antibiotic was given at the time of induction. Laparoscopic cholecystectomy was performed in 24 patients in a supine position with the standard four port technique. In six patients, open cholecystectomy was performed as the children were not fit to tolerate pneumoperitoneum (these children had history of bronchial asthma and had deranged pulmonary function tests, hence not suitable for laparoscopic cholecystectomy, even at low pressure). All the gall bladders removed at surgery were subjected to histopathological examination and the stones were analysed.

Postoperatively, all children were allowed to take oral fluids once bowel sounds appeared. Intravenous antibiotics (cefotaxime, ciprofloxacin) and parenteral analgesics (diclofenac) were given to keep the patients pain free.

The outcome measures assessed were postoperative pain, duration of hospital stay and time taken to resume normal daily activities. All children were followed up in Outpatient Department (OPD) regularly for upto three months. There were no early (postoperative nausea vomiting, fever) or late (jaundice, bile-leak) postoperative complications in the present study. The data was analysed using descriptive statistics.

RESULTS

Majority of the patients were in the age group of 13-18 years constituting (n=20, 66.7%) patients [Table/Fig-1]. In the present study, (n=12, 40%) patients were vegetarian and patients (n=18, 60%) were consuming mixed diet.

When the risk factors were analysed, the most common cause of cholelithiasis was found to be idiopathic, accounting for (n=14, 46.7%) cases [Table/Fig-2].

Acute right upper quadrant abdominal pain was the most common presentation in (n=18, 60%) patients. Dyspeptic symptoms were found in (n=6, 20%) cases and one child presented with jaundice (3.3%). In our study, (n=5, 16.6%) patients were asymptomatic and were admitted in paediatrics ward for fever and loss of appetite. They were later shifted to the surgical side when an ultrasound examination revealed gallstones.

Sr. No.	Age (in years)	n (%)	Sex	
			Males n (%)	Females n (%)
1	01-06	2 (6.6%)	2 (100%)	0
2	07-12	8 (26.7%)	7 (87.5%)	1 (12.5%)
3	13-18	20 (66.7%)	13 (65%)	7 (35%)

[Table/Fig-1]: Distribution of patients according to age and sex.

Sr. No.	Risk factors for cholelithiasis	Number of patients (n=30)
1	Familial	1
2	Haemolytic disorders*	3
3	Antibiotic therapy	6
4	Hypertriglyceridaemia	4
5	Obesity	1
6	History of prematurity	1
7	No risk factors	14

[Table/Fig-2]: Risk factors for cholelithiasis.
*3 cases of sickle cell anaemia which were diagnosed by peripheral smear and Hb electrophoresis.

Of the symptomatic patients, (n=22, 73.3%) patients had symptoms lasting from 3 to 6 months at time of presentation. Physical examination showed no abdominal signs in majority of patients (n=18, 60%); while, mild right hypochondrial tenderness was present in (n=7, 23.3%) patients. There were (n=5, 16.6%) patients who had a palpable lump in their right hypochondrium.

Laparoscopic surgery was performed in (n=24, 80%) patients who were deemed fit to undergo this procedure. Open cholecystectomy was performed in the remaining (n=6, 20%) patients [Table/Fig-3]. Operative findings recorded showed (n=23, 76.7%) patients had multiple stones, single stones were present in (n=5,16.6%) patients and biliary sludge in (n=2, 6.7%) patients. Stone analysis showed that more than half the patients had mixed stones i.e., (n=20, 66.6%) and (n=5, 16.7%) patients had pigment stones and cholesterol stones respectively. Histopathological examination of gall bladders revealed that (n=18, 60%) patients had normal mucosal pattern, (n=8, 26.7%) patients had chronic cholecystitis and (n=4, 13.3%) patients had acute cholecystitis.

There were no difficulties encountered during cholecystectomies. No drains were put in any patient and there were no complications. Postoperatively, all patients were assessed for intensity of pain according to the analgesic demand. Shoulder pain was the chief complaint in children who had laparoscopic cholecystectomy while pain in the main wound was the chief complaint in children who underwent open cholecystectomy. About (n=26, 86.7%) patients had mild pain which was relieved by injection paracetamol. About (n=4, 13.3%) patients needed additional support with voveran by way of pain relief. Patients operated laparoscopically were discharged on second postoperative day whereas those operated by open method were discharged on fifth postoperative day.

All children were followed up in OPD regularly for a period of three months. First visit was after a week and then follow up was done every 15 days thereafter. There were no early or late complications in either of the groups. Children went to school within one week (after laparoscopic cholecystectomy) and 1-3 weeks (after open cholecystectomy). All parents and children over six years were questioned regarding scar tenderness, dyspepsia, jaundice and loss of vigour by the child. No significant incapacitation was reported by the parents.

Sr. No.	Age group (years)	Type of Surgery			
		Laparoscopic		Open	
		No. of patients	% of the patients	No. of patients	% of the patients
1	01-06	0	0	2	100%
2	07-12	6	75%	2	25%
3	13-18	18	90%	2	10%

[Table/Fig-3]: Details of the surgeries in the study group.

DISCUSSION

Gallstone disease has always been considered as a disease of the adults. It is relatively uncommon in childhood. A review of literature has suggested an increase in the frequency of cholelithiasis in children and resultant cholecystectomies [3,4,16]. An increased use

of ultrasound for every case of pain in the abdomen also has helped in establishing a diagnosis of very small and single gallstones as well as biliary sludge.

Very little is known about the natural history and management of cholelithiasis in the childhood. Earlier, many non surgical techniques like ursodeoxycholic acid therapy and antibiotic usage were adopted to treat this disease [17]. As these techniques proved ineffective by way of having severe restriction in their applicability, cholecystectomy is presently considered as the gold standard for the treatment of gallstones in children.

In the present study, the mean age of children was 12 years and majority of them were in the age group of 13-18 years (n=20). Bogue CO et al., in their study of 382 cases, observed the mean age to be 9.4 years which was slightly younger than our mean age [5]. A study by Mehta S et al., with 404 patients found the mean age to be 13.1 years which is almost similar to present study [7].

Male children have been shown to have a higher incidence of gallstones unlike in adults where females show preponderance [17]. Review of literature has shown a strong positive family history with the mothers more affected than fathers [18]. A positive sibling history has not been documented. There was no family history of cholelithiasis in any of present patients.

Gökçe S et al., in their study on 124 children observed that 43.5% children had no identifiable risk factors and were considered idiopathic [19]. Obesity is a significant risk factor for hospital admission in children with cholelithiasis [20]. In the present study however, only one child (out of 30 children) was found to be obese [Table/Fig-2]. As most of present patients were from a rural background so obesity and its association with cholelithiasis could not be established [16]. Patients without any risk factors dominated the present study.

A review of literature showed that abdominal pain was the most common initial symptom that led to an ultrasound examination and detection of gallstones [21]. The other symptoms reported include fever, vomiting, diarrhoea and jaundice. Most children had these symptoms for about 6 to 12 months before presentation [21]. In the present study, most of the children presented late as they were on symptomatic treatment and herbal medicines were given to them before they were finally referred for an ultrasound to our hospital.

A laparoscopic cholecystectomy may need to be converted to open cholecystectomy due to adhesions, difficult Calot's triangle anatomy and a small contracted gall bladder [22]. In the present study, 80% of patients underwent laparoscopic cholecystectomy and none of them had to be converted to open cholecystectomy for the above reasons. Multiple stones in the gall bladder are a very common finding in paediatric age group [21]. Similar findings were also observed in the present study. None of present patients had stones in common bile duct. A single patient who presented with jaundice had hepatitis with altered enzyme functions. No intraperitoneal drainage was used as was also reported by Hajong R et al., [23]. All surgeries were performed by senior laparoscopic surgeons and hence the time taken was also less in our study (45-60 minutes). The range of operating time reported in many studies is approximately 70-80 minutes [24].

In the present study, parenteral analgesia required in the laparoscopic group was only for a single day while for the open cholecystectomy patients, it was needed for three days. Similar analgesic requirement was also seen in other studies [25,26]. Although, the hospital operative charges for open and laparoscopic cholecystectomy are similar, most of the patients with laparoscopic cholecystectomy were discharged within 48 hours; however, those with open cholecystectomy were discharged on 7-8th day after stitch removal. Open procedure thus was costlier as it included bed charges, drugs etc., for a longer period as compared to laparoscopic cholecystectomy. None of the children had neither early nor late complications. They resumed their normal daily activities by 4th day in the laparoscopic group and by the 7th day in the open cholecystectomy group. By three weeks, children from both groups were going to school.

LIMITATION

A better correlation with the causes of cholelithiasis would have been obtained with a larger sample size in the present study.

CONCLUSION

An early ultrasound confirmation is recommended for all children who present to the OPD with a vague abdominal pain. Early cholecystectomy is the treatment of choice. Laparoscopic cholecystectomy is a safe, economic and efficacious procedure without any significant morbidity and no surgery related mortality. It has the benefits of no scar and minimal pain. Recovery is quick and this has a great impact on the psyche of both parents and patients. Cholelithiasis in children from a rural background does not reveal association with obesity as contrary to those from urban areas. These children also present late in the hospital due to lack of diagnostic facilities in rural areas. Hence, tertiary care facilities are warranted in rural areas for early diagnosis and management of such paediatric problems.

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