Pediatric cholelithiasis and laparoscopic management: A review of twenty-two cases

J Deepak, Prakash Agarwal, R K Bagdi, S Balagopal, R Madhu, P Balamourougane
Department of Pediatric Surgery, Sri Ramachandra Medical College, Porur, Chennai - 600 116, India

Address for correspondence: Dr. J Deepak, Department of Paediatric Surgery, Sri Ramachandra Medical College, Porur, Chennai - 600 116, India. E-mail: drjdeepak@yahoo.co.in

Abstract

AIM: To evaluate the role of laparoscopic cholecystectomy (LC) in the management of cholelithiasis in children. MATERIALS AND METHODS: A retrospective review of our experience with LC for cholelithiasis at our institution, between April 2006 and March 2009 was done. Data points reviewed included patient demographics, clinical history, haematological investigations, imaging studies, operative techniques, postoperative complications, postoperative recovery and final histopathological diagnosis. RESULTS: During the study period of 36 months, 22 children (10 males and 12 females) with cholelithiasis were treated by LC. The mean age was 9.4 years (range 3 to 18 years). Twenty-one children had symptoms of biliary tract disease and one child was incidentally detected with cholelithiasis during an ultrasonogram of the abdomen for an unrelated cause. Only five (22.7%) children had definitive etiological risk factors for cholelithiasis and the remaining 13 (77.3%) cases were idiopathic. Twenty cases had pigmented gallstones and two had cholesterol gallstones. All the 22 patients underwent LC, 21 elective and one emergency LC. The mean operative duration was 74.2 minutes (range 50-180 minutes). Postoperative complications occurred in two (9.1%) patients. The average duration of hospital stay was 4.1 days (range 3-6 days). CONCLUSION: Laparoscopic cholecystectomy is confirmed to be a safe and efficacious treatment for pediatric cholelithiasis. The cause for an increased incidence of pediatric gallstones and their natural history need to be further evaluated.

Key words: Children, cholelithiasis, laparoscopic cholecystectomy

DOI: 10.4103/0972-9941.59306

INTRODUCTION

Cholelithiasis, although increasing in frequency in children, is still far less common than in the adult population.[1] In a population-based study prevalence of gallstones in children was 1.9%.[2] The nature of the disease process is different in children 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.[3] Laparoscopic cholecystectomy (LC) is considered to be the ‘gold standard’ surgical procedure for cholelithiasis in adults, with a vast amount of published data supporting this. However, there is a paucity of reports in the literature pertaining to the clinicopathological characteristics and laparoscopic management of gallstones in children.

MATERIALS AND METHODS

A retrospective review of all the children who underwent LC for cholelithiasis in our institution between April 2006 and March 2009 was done. The patient medical records were examined and the data pertaining to demographic information, clinical history, diagnosis, operative findings and operative technique, postoperative complications and recovery and the final histopathological diagnosis were obtained. LC was performed by different surgeons using the standard four ports technique [Figure 1]. A 10 mm umbilical camera port was inserted using the open technique in all the cases, which was also used for retrieval of the gall bladder specimen. Two 5 mm working ports for the surgeon were placed in the epigasium and right midclavicular line in the hypochondrium or the lumbar region. Another 5 mm port was inserted in the
right anterior axillary line, to help the assistant surgeon grasp the fundus of the gall bladder for retraction. The positions of the ports were adjusted, (by placing them away from the site of the surgery) according to the size of the child. Intraoperative cholangiography was not deemed to be necessary in any of our patients. In a pediatric population the dissection around the Calot’s triangle is easier and faster compared to adults, as the fat deposit is very minimal and the peritoneal covering layer is thin, allowing clear visualization of the anatomy [Figure 2]. The patients were discharged when they were able to tolerate a regular diet and were ambulatory. They were followed up in the outpatient clinic at least once after the discharge.

RESULTS

During the study period, 22 patients underwent LC for cholelithiasis. The mean age was 9.4 years (range 3 to 18 years). Two children were less than five years, 14 were aged between five and 12 years and six were adolescents. Fourteen (63.6%) children had typical symptoms of biliary tract disease (right upper quadrant or epigastric pain, nausea, vomiting and food intolerance), seven (31.9%) had fever in addition to the above-mentioned symptoms (calculous cholecystitis), and one child had asymptomatic gallstones, which were diagnosed incidentally on ultrasound examination of the abdomen, done for an unrelated cause.

Duration of symptoms at diagnosis varied from one month to 12 months (mean-2.9 months). Risk factors for development of gallstones were present in five (22.7%) children only. Two had a family history of gallstones, two were obese (BMI > 30) and one child had undergone previous abdominal surgery and had received an injection of Ceftriaxone for 14 days. After a complete workup, it was found that none of our patients were detected with having haemolytic disorders such as sickle cell disease, thalassemia or hereditary spherocytosis. A complete haemogram, peripheral blood smear and liver function tests were within normal limits in all the patients. All the children underwent an abdominal ultrasound and were detected to have single or multiple gallstones. In addition, ten (45.4%) children had inflammatory features around the gall bladder.

Twenty-one children underwent elective LC and one child was taken up for emergency LC after treating acute cholecystitis with intravenous antibiotics for two days. The mean operative duration was 74.2 minutes (range 50-80 minutes). Operative findings included omental or small bowel adhesions around the gall bladder (with or without edematous gallbladder) in 13 (59.1%) patients. The child who underwent emergency LC had empyema along with the above-mentioned inflammatory features. Twenty children had pigmented stones [Figure 3] and two had cholesterol stones. Among the 16 children with pigmented gallstones, two had multiple gravel-like (<1 mm) stones. Tube drains were placed in three (13.6%) cases, wherein intraoperative bile spillage or gallbladder fossa ooze was present.

Two drains were removed within 24 hours; the remaining one was kept for 96 hours, as significant serous fluid discharge was present during the first two days postoperatively. The average duration of hospital stay was 4.1 days (range 3-6 days). Postoperative complications occurred in two (9.1%) patients. One child had significant prolonged serous discharge from the tube drain as mentioned earlier, which resolved spontaneously. The other child who underwent emergency LC had postoperative fever for three days, which resolved with intravenous antibiotics.

Histopathological analysis of the cholecystectomy specimen revealed chronic cholecystitis in 18 cases, chronic cholecystitis with focal ulceration in two cases and one each of acute cholecystitis and acute chronic cholecystitis. Follow-up duration ranged from four months to 35 months (average 17 months) and there
were no cases of retained common bile duct stones in our study.

DISCUSSION

Cholelithiasis is considered as an uncommon condition in children, however, recent studies have documented increasing incidents of this disorder.[2-4] This may be explained by the increased availability and use of the abdominal ultrasonogram in children. Pediatric cholelithiasis was viewed as a disease of prematurity, usually related to total parenteral nutrition. Various risk factors for cholelithiasis in children include haemolytic disorders, obesity, family history of gallstones, abdominal surgery, IgA deficiency, cystic fibrosis, therapy with ceftriaxone and Gilbert’s disease.

In our series, only 22.7% of the patients had the above-mentioned risk factors, the remaining 77.3% had idiopathic cholelithiasis. The incidence of idiopathic cholelithiasis in other reported series varies from 23 to 52.5%. [5,6] The trend of the increasing incidence of non-haemolytic cholelithiasis is also reflected in our series, with all of them belonging to the non-haemolytic cholelithiasis category. The mechanism of gallstone formation in these children is probably due to a combination of interacting processes, including, dehydration, transient hepatic dysfunction, dietary, inflammatory, hereditary and endocrine influences, which affect the composition of bile.[7]

Approximately 80% of the adults with gallstone are asymptomatic.[8,9] However, in children, asymptomatic gallstones are less frequent, with a reported incidence of 10 and 33% in two different studies.[6,7] In our study 4.5% children had asymptomatic gallstones. The incidence of gallstones among boys and girls is almost equal, with a slightly high incidence among boys.[5,10,11] The sex ratio in our study was slightly in favour of females. LC in children differs from that in adults in various aspects. First and foremost it is the constraint of space. The importance of positioning the epigastric cannula in the left upper quadrant in small children cannot be overemphasized. Similarly, the working and retracting ports on the right side should be placed in the lumbar or iliac region in younger children. Second, as mentioned earlier, the dissection at the Calot’s triangle is relatively easier and faster in children, as the fat deposit is less and the peritoneal covering layer is thin in children.

Routine intraoperative assessment for common duct stones was not done in our series. Shawn et al., have reported that the incidence of subclinical common bile duct stones is low in children.[1] This finding has also been described in a small prospective pediatric study.[12] In the present series, as there was no evidence of common bile duct stones or altered liver function tests preoperatively in any of the patients, an intraoperative cholangiogram was not done. None of the patients had any evidence of residual ductal stones during the follow up period. Hence, a routine intraoperative cholangiogram was not recommended for the children.

The natural history of cholelithiasis in children is not known,[9] hence, the treatment remains controversial. The clinical presentation, findings on ultrasound imaging, intraoperative findings and the final histopathological
diagnosis of the gall bladder specimen did not correlate completely in our study. While only seven (31.9%) patients had fever suggestive of clinical inflammation, 10 (45.4%) patients had ultrasound findings suggestive of inflammation and 13 (59.1%) had intraoperative evidence of inflammation. However, on histological analysis, all the 22 resected gallbladder specimens showed either acute or chronic inflammation. As the natural history of gallstones in the children was not known and histological evidence of inflammation was present in all the cases of cholelithiasis in our series, we suggested an LC for all children with cholelithiasis. A recently conducted multicenter study also reported structural alterations in the majority of gallbladders removed for cholelithiasis. [14] These authors also suggest that because of the expectancy of long life for children, expectant management of cholelithiasis may not be safe. However, in adults where the natural history is well-documented, only 1 to 4% per year develop symptoms or complications of gallstone disease, only 10% develop symptoms in the first five years after diagnosis and approximately 20% by 20 years. [13-15]

The mean operative duration for LC was 74.2 minutes in our study. This duration was between 70 and 80 minutes in other reported series. [11,11] 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. [11] The other advantages of LC, such as, decreased pain, avoidance of upper abdominal muscle cutting incision, faster return to activity and cosmetically better scar, are well-documented. [16-18]

CONCLUSIONS

Laparoscopic cholecystectomy (LC) is confirmed to be a safe and efficacious treatment modality for pediatric cholelithiasis. The cause for increased incidence of pediatric cholelithiasis and their natural history need to be further evaluated. LC is much simpler in children compared to adult population, when it is performed by an experienced surgeon.

REFERENCES

1. Kaechele V, Wabitsch M, Thiere D, Kessler AL, Haenle MM, Mayer H, et al. Prevalence of gallbladder stone disease in obese children and adolescents: Influence of the degree of obesity sex and pubertal development. J Pediatr Gastroenterol Nutr 2006;42:66-77.
2. Wescrop I, Bosman D, de Graaff A, Aronson D, vander Bliif FM, Taminiau J. Clinical presentations and predisposing factors of cholelithiasis and sludge in children. J Pediatr Gastroenterol Nutr 2000;31:411-7.
3. Bailey PV, Connors RH, Tracy TF Jr, Sotelo-Avila C, Lewis JE, Weber TR. Changing spectrum of cholelithiasis and cholecystitis in infants and children. Am J surg 1989;158:585-8.
4. Miltenburg DM, Schaffer R 3rd, Breslin T, Brandt ML. Changing indications of Pediatric cholecystectomy. Pediatrics 2000;105:1250-3.
5. Della Corte C, Falchetti D, Nebbia G, Calacoci M, Pastore M, Francavilla R, et al. Management of cholelithiasis in Italian children: A national multicenter study. World J Gastroenterol 2008;14:1383-8.
6. Holcomb GW Jr, O’Neill JA Jr, Holcomb GW 3rd. Cholecystitis, cholelithiasis and common duct stenosis in children and adolescents. Ann Surg 1980;191:626-44.
7. Babitt DP. Gallstones in children. Am J Dis Child 1956;92:5-8.
8. Pieretti R, Auddlist AW, Stephens CA. Acute cholecystitis in children. Surg Gynecol Obstet 1975;140:16.
9. Davidoff AM, Branum GD, Murray EA, Chong WK, Ware RE, Kinney TR, et al. The technique of Laparoscopic cholecystectomy in children. Ann Surg 1992;215:186-91.
10. Oak SN, Parekar SV, Akhtar T. Role of laparoscopic cholecystectomy in children. J Indian Assoc Pediatr Surg 2005;10:92-4.
11. St. Peter SD, Kecklers J, Nari A, Andrews WS, Sharp RJ, Snyder CL, et al. Laparoscopic cholecystectomy in infants and children: Modifications and cost analysis. J Pediatr Surg 1994;29:900-4.
12. Mattioli G, Pini-Prato A, Castagnetti M, Gandullia P, Toma P, Jasonni V. Is perioperative cholangiography necessary in children undergoing elective laparoscopic cholecystectomy? Eur J Pediatr Surg 2007;17:76-9.
13. Meshikhes AW. Asymptomatic gallstones in laparoscopic era. J R Coll Surg Edinb 2002;47:742-8.
14. Vauthey JN, Saldinger PF. The natural history of gallstones and asymptomatic gallstones. In: Blumgart LH, Fong Y, editors. Surgery of the liver and biliary tract. 3rd ed. London: Company LTD, Saunders WB; 2000. p. 643-9.
15. Sakorafas GH, Miligos D, Peros G. Asymptomatic cholelithiasis: Is cholecystectomy really needed? A critical reappraisal 15 years after the introduction of laparoscopic cholecystectomy. Dig Dis Sci 2007;52:1313-25.
16. Peters JH, Ellison EC, Innes JT, Liss JL, Nichols KE, Lomano JM, et al. Safety and efficacy of laparoscopic cholecystectomy: A prospective analysis of 100 initial patients. Ann Surg 1991;213:3-12.
17. Graves HA, Ballinger JF, Anderson WJ. Appraisal of laparoscopic cholecystectomy. Ann Surg 1991;213:1073-8.
18. Holcomb GW 3rd, Sharp KW, Neblett WW 3rd, Morgan WM 3rd, Pietsch JB. Laparoscopic cholecystectomy in infants and children: Modifications and cost analysis. J Pediatr Surg 1994;29:900-4.