CASE SERIES

Pediatric Cholelithiasis: A Case Series of Clinical Presentation and Surgical Management

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ABSTRACT

Introduction: Pediatric Cholelithiasis previously considered rare, started to raise in incidence. It is often associated with underlying conditions such as hemolytic disorders, obesity, or metabolic syndrome. Laparoscopic cholecystectomy are now the standard treatment. Case Series: Case I: We present a case series of four pediatric patients with symptomatic cholelithiasis. A 14-year-old female presented with recurrent right upper quadrant pain and intermittent fever, with ultrasound showing multiple gallstones and gallbladder inflammation. A 17-year-old male reported intermittent right upper quadrant pain aggravated by fatty food intake, with ultrasound confirming cholelithiasis. A 10-year-old male had a 7-month history of episodic abdominal pain worsened by fatty meals, with ultrasound revealing multiple gallstones. A 16-year-old male presented with persistent right upper quadrant pain for one year, with ultrasound and MRCP supporting the diagnosis. All patients underwent laparoscopic cholecystectomy and had uneventful recoveries, being discharged within 2–3 days postoperatively. **Conclusion:** Pediatric cholelithiasis is increasingly becoming more common. Laparoscopic cholecystectomy remains the gold standard for treatment for this disease

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INTRODUCTION

Cholelithiasis, or gallstone disease, is a condition characterized by the formation of stones within the gallbladder or bile ducts. Although more commonly observed in adults, the prevalence of cholelithiasis in children has risen significantly in recent decades. According to literature, the prevalence of pediatric cholelithiasis ranges from 1.9% to 4%, with higher incidence rates in children with certain conditions, such as obesity, hemolytic diseases, and the use of total parenteral nutrition. This increase aligns with the rising rates of childhood obesity and the broader use of ultrasound imaging in diagnosing chronic abdominal pain, often associated with this disease [1,2,3]

The causes of cholelithiasis in children are multifactorial, involving an interplay of genetic and environmental factors. Among genetic factors, hemolytic diseases like hereditary spherocytosis and sickle cell anemia are major contributors to pigment stone formation in pediatric patients. On the other hand, non-hemolytic factors associated with modern lifestyles, particularly obesity, also play a significant role in increasing the risk of cholelithiasis in children and adolescents. Obesity leads to an increased production of cholesterol in bile, which can precipitate cholesterol stone formation in the gallbladder. During adolescence, cholesterol stones become more prevalent, whereas pigment stones are more common in prepubescent children [3,4].

Advancements in imaging technology and laparoscopic surgical techniques have also contributed to safer and more effective management of pediatric cholelithiasis. Laparoscopic cholecystectomy is now the preferred approach for treating symptomatic or complicated cholelithiasis in children, such as cases involving cholecystitis or pancreatitis. The primary advantages of laparoscopic methods include their minimally invasive nature, faster recovery times, and reduced risk of bile duct injury. Additionally, combined laparoscopic and ureteroscopic techniques have been introduced for managing more complex cases, particularly those involving bile duct stones (choledocholithiasis), and have proven effective in minimizing postoperative

complications [1].

One of the greatest challenges in diagnosing and managing pediatric cholelithiasis is the lack of risk assessment systems specifically tailored for children. Common criteria used in adult populations—such as symptom severity scales and optimal timing for surgical intervention—often do not directly apply to pediatric patients. Symptoms in children are generally nonspecific and can be easily overlooked or misdiagnosed. Consequently, thorough preoperative evaluation, including ultrasound and advanced imaging techniques like magnetic resonance cholangiopancreatography (MRCP), is essential to map out the anatomy of the biliary system and reduce the risk of complications during surgery [2,3].

Further research on the pathogenesis and risk factors of pediatric cholelithiasis is expected to deepen understanding of this disease's development. A multidisciplinary approach, involving pediatric surgeons, gastroenterologists, and radiologists, is crucial for optimizing cholelithiasis management in children. A better understanding of the disease mechanisms, along with the development of relevant pediatric-specific scoring systems, can support more effective prevention and therapeutic decision-making [4].

Thus, this paper aims to review essential aspects of the epidemiology, etiology, pathophysiology, diagnostic methods, and current management approaches in treating pediatric cholelithiasis. Based on existing literature, this study is expected to contribute to an improved understanding of pediatric cholelithiasis and identify optimal interventions to minimize complications and enhance quality of life for pediatric patients.

CASE SERIES

Case 1

A 14 years old female with recurrent right upper quadrant abdominal pain over 6 months, accompanied by intermittent fever. The patient was referred from other hospital due to the persistent abdominal pain and jaundice appearance. Ultrasound revealed multiple gallstones with gallbladder inflammation. The patient underwent laparoscopic cholecystectomy in our hospital. During surgery we found edematous gallbladder associated with adhesion to intestine. Adhesiolisis was performed and the gallbladder was extracted then we found 3 gallstones sized 1.5-2cm in the gallbladder. The patient was discharged after 3rd day postoperative in good condition (Figure 1a).

Case 2

A 17 years old male with 6-months history complained intermittent abdominal pain in the right upper quadrant with . The pain was aggravated by fatty food intake, without fever, jaundice, or gastrointestinal complaints

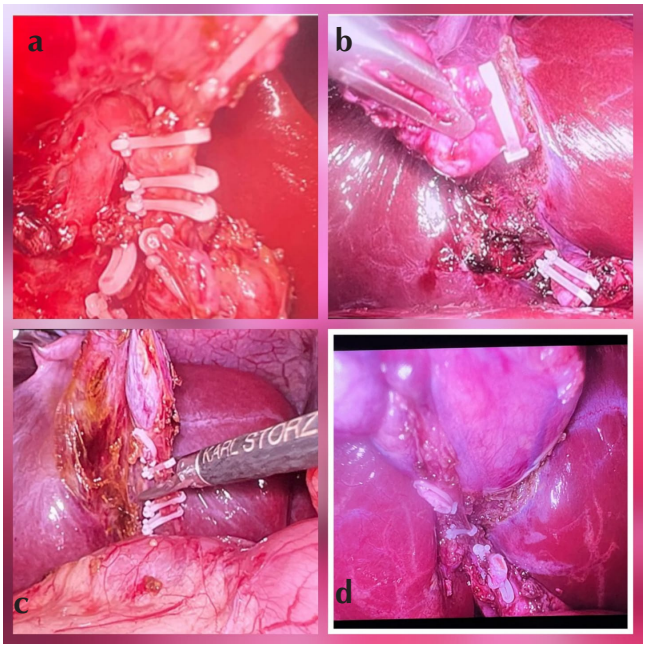

Figure 1: Intraoperative laparoscopic views demonstrating gallbladder dissection, clipping of cystic duct and artery, and gallbladder extraction in pediatric cholelithiasis. a) Case 1, b) Case 2, c) Case 3, d) Case 4

He was admitted in previous hospital due to this abdominal pain. A month after he was discharged, the abdominal pain persisted then he was referred to Paediatric Department in our hospital. Ultrasound showed cholelithiasis furthermore, the patient was consulted to our Paediatric Surgery Division. The patient underwent laparoscopic cholecystectomy. During surgery we found oedematous gallbladder then extracted it. The gallbladder contained bile and sludge. The patient was discharged on 3rd day postoperative in good condition (Figure 1b).

Case 3

A 10 years old male with a 7-months history of episodic abdominal pain. In the first 3 months the patient was diagnosed with gastritis and was admitted in a hospital. The pain was persisted for 3 months and aggravated by fatty dietary intake. Due to the pain, he was admitted in other hospital. There ultrasound was performed and cholelithiasis was found. The patient then was referred to our Paediatric Surgery outpatient for further management. We performed laparoscopic cholecystectomy. During surgery we found normal sized gallbladder. There were 4 gallstones 0.1-0.3cm in size. The patient was discharged on 2nd day postoperative in good condition (Figure 1c).

Case 4

A 16 years old male was consulted from Paediatric Department due to persistent abdominal pain to our Paediatric Surgery Division. The pain was complained on the right upper quadrant of the abdomen for 1 year. Ultrasound from referrer hospital was inconclusive thus, MRCP was performed. It confirmed the diagnosis

of cholelithiasis. We performed laparoscopic cholecystectomy. During surgery we found enlarged and oedematous gallbladder. The gallbladder was extracted. It contained bile fluid and sludge. The patient was discharged on 3rd day postoperative in good condition. (Figure 1d), The clinical presentation of all the cases is shown in Table I.

DISCUSSION

Diseases of gallbladder in children has markedly increased over the last several decades. Gallbladder disease previously known occurred due to cholelithiasis, which, in turn, was usually secondary to hemolytic disease. However, over the past 20 years, there is a markedly rising incidence of nonhemolytic cholelithiasis. Traditionally, pediatric cholelithiasis has been closely associated with hemolytic conditions; however, all patients in this series developed gallstone disease in the absence of such risk factors, suggesting an increasing contribution of non-hemolytic and lifestyle-related etiologies.as biliary dyskinesia has commonly recognized as common condition in children. The increasing incidence of gallbladder diseases was likely due to dietary changes [5].

Compared with previously published reports, our case series shares similarties in age distribution and favorable surgical outcomes but differs in several clinically relevant aspects. Similar to studies by Todesco et al. and Zdanowicz et al., our patients were predominantly adolescents and had no underlying hemolytic disorders, supporting the reported shift toward non-hemolytic pediatric cholelithiasis [1,3]. However, unlike many published series that include asymptomatic patients or gallstones detected incidentally during imaging for unrelated conditions [2,4], all patients in our series were symptomatic and presented with prolonged right upper quadrant abdominal pain.

Dietary changes in children have increasingly contributed to the rising incidence of cholelithiasis. Modern diets, often high in fats, refined sugars, and low in fiber, are associated with higher cholesterol levels in the bile, a key factor in the formation of cholesterol gallstones. Childhood obesity, driven by excessive calorie intake and low physical activity might play a role in this disease. As these dietary patterns become more prevalent in childhood, they are a growing concern in the etiology of pediatric cholelithiasis.

We noticed that all four patients had their complaints months before they were referred to Pediatric Surgery Division. It is most likely because cholecystitis or cholelithiasis had similar symptoms as other abdominal diseases. Our patients had the classic symptom of right upper quadrant abdominal pain. While nausea and vomiting are more common in younger children. Thus, it is getting more important recognize this disease in this period of time.

In contrast to the report by Pelizzo et al., which included both symptomatic and asymptomatic pediatric patients and emphasized early surgical intervention based on symptom severity and risk stratification [2], all patients in our series were symptomatic at presentation and experienced prolonged diagnostic delays before referral. Similarly, Karavdić reported that many pediatric cases are detected incidentally or present with vague gastrointestinal symptoms that do not necessarily require immediate surgery [4]

Laparoscopic cholecystectomy is the treatment of choice for symptomatic pediatric cholelithiasis, offering low morbidity, shorter hospitalization, and faster recovery compared with open surgery [1,2,5]. Despite anatomical and inflammatory challenges, appropriate preoperative imaging enables safe laparoscopic management, as demonstrated in our cases and supported by previous studies [1,3].

Consistent with recent studies, our findings support the emerging shift of pediatric cholelithiasis toward non-hemolytic etiologies in adolescents, as reported by Todesco et al. and Zdanowicz et al. [1,3]. However, unlike several published series that include asymptomatic or incidentally diagnosed patients [2,4], all cases in our study were symptom

CONCLUSION

Pediatric cholelithiasis is increasingly becoming more common. Laparoscopic cholecystectomy remains the gold standard for treatment for this disease.

Table I: Summary of Pediatric Cholelithiasis Cases

No	Age (Year/ Sex)	Duration of Symptom	Main Clinical Presentation	Intraoperative Findings	Management
1	14 / F	6 months	Recurrent right upper quadrant pain, intermittent fever, jaundice	Edematous gallbladder with intestinal adhesions; 3 stones (1.5–2 cm)	Laparoscopic cholecystectomy + adhesiolysis
2	17 / M	6 months	Intermittent right upper quadrant pain, aggravated by fatty food	Edematous gallbladder containing bile and sludge	Laparoscopic cholecystectomy
3	10 / M	7 months	Episodic abdominal pain, worsened by fatty food	Normal-sized gallbladder; 4 stones (0.1–0.3 cm)	Laparoscopic cholecystectomy
4	16 / M	1 year	Persistent right upper quadrant abdominal pain	Enlarged, edematous gallbladder with bile and sludge	Laparoscopic cholecystectomy

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