CASE SERIES

# Laparoscopic Cholecystectomy in Pediatric Cholelithiasis: A Case Series

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## ABSTRACT

**Introduction:** Pediatric cholelithiasis is relatively uncommon; however, its incidence has been increasing worldwide, likely due to lifestyle changes and improved access to diagnostic imaging. Laparoscopic cholecystectomy (LC) is currently considered the preferred surgical approach for symptomatic gallbladder disease in children. This study aims to describe our institutional experience with LC in pediatric patients with cholelithiasis. **Case Series:** A retrospective review was conducted on pediatric patients who underwent LC for symptomatic cholelithiasis at our institution between January 2023 and August 2024. Data collected included demographic characteristics, clinical presentation, imaging findings, operative details, and short-term postoperative outcomes. Five patients (three males and two females), aged 4–17 years, were included. All patients presented with right upper quadrant abdominal pain. Ultrasonography demonstrated gallstones measuring 0.7–1.2 cm. LC was successfully performed in all cases, with operative times ranging from 45 to 75 minutes. Omental adhesions were noted in two patients. The median postoperative hospital stay was four days (range 3–5 days). No intraoperative or postoperative complications were observed, and no readmissions occurred within 30 days. **Conclusion:** This case series demonstrates that LC is a feasible and safe procedure for pediatric cholelithiasis, with favorable short-term outcomes. However, given the small sample size and descriptive design, further studies with larger cohorts and long-term follow-up are required to validate these findings.
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## INTRODUCTION

This case series demonstrates that laparoscopic cholecystectomy (LC) is feasible and safe in pediatric patients with cholelithiasis, with favorable short-term outcomes (1,2). In Western countries, prevalence rates of up to 4.0% have been reported, whereas lower rates are observed in Asian populations, including Japan (3). Predisposing factors for gallstone formation in children vary according to age. In infancy, risk factors include prematurity, total parenteral nutrition, abdominal surgery, and sepsis. In adolescents, hematologic disorders and obesity are more commonly implicated. Despite these known associations, the etiology remains idiopathic in approximately 30–54% of pediatric cases (2,3).

The incidence of pediatric cholelithiasis has increased over recent years, likely reflecting lifestyle changes, rising childhood obesity, and improved utilization of ultrasonography (4). Although there is no universal consensus regarding optimal medical management and follow-up strategies in children, the number of pediatric patients requiring cholecystectomy for symptomatic biliary disease continues to rise (5).

Over the past decade, LC has become the preferred surgical approach for gallbladder disease in children (6). Since its first application in pediatric patients in 1991, LC has demonstrated several advantages over open cholecystectomy, including reduced postoperative pain, shorter hospital stay, improved cosmetic outcomes, and faster recovery (7,8,9). Nevertheless, published data on pediatric LC remain limited, particularly in developing countries. In Indonesia, reports describing institutional experiences with pediatric laparoscopy are scarce. This case series aims to describe the clinical characteristics and outcomes of pediatric patients undergoing LC at our institution.

## CASE SERIES

Pediatric patients aged ≤18 years diagnosed with symptomatic cholelithiasis based on clinical presentation and ultrasonographic findings, who underwent laparoscopic cholecystectomy (LC) between January 2023 and August 2024, were included. Patients with asymptomatic gallstones or incomplete medical records were excluded. All patients underwent preoperative laboratory evaluation and abdominal ultrasonography, along with comprehensive assessment for potential hematologic and non-hematologic comorbidities. A single dose of prophylactic antibiotics was administered preoperatively.

All procedures were performed by pediatric surgeons using a standardized technique. LC was conducted using a conventional four-port approach, with one 10-mm umbilical port for a 0° laparoscope and three 5-mm working ports in the right upper quadrant. Surgery was performed under general anesthesia with orotracheal intubation, with patients positioned in a reverse Trendelenburg position. The cystic duct and artery were identified, clipped, and divided, and the gallbladder was retrieved via the umbilical port (Figure 1). A subhepatic drain was routinely placed and maintained for at least 24 hours postoperatively.

Five patients (three males and two females), aged 4–17 years, were included. Based on age classification, two patients were toddlers, one was in childhood, and two were adolescents. Body mass index-for-age percentiles indicated two patients were obese, one overweight, and two underweight. All patients presented with right upper quadrant abdominal pain, and ultrasonography confirmed gallstones measuring 0.7–1.2 cm (Figure 2). No associated comorbidities were identified. Two patients had previously received ursodeoxycholic acid therapy without clinical or radiological improvement.

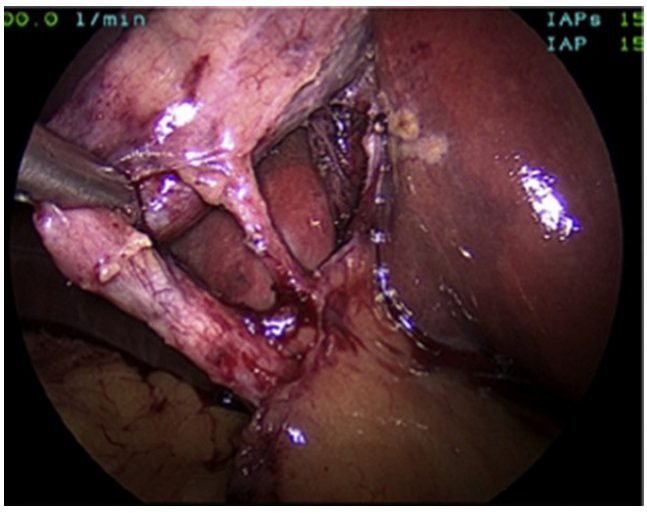


**Figure 1: Critical view of safety achieved during laparoscopic cholecystectomy**

**Figure 2: Gallstone retrieved following laparoscopic cholecystectomy**

LC was successfully completed in all cases, with operative times ranging from 45 to 75 minutes. Omental adhesions were observed in two patients, including one with severe adhesions associated with the longest operative time. No conversions to open surgery, bile duct injuries, or bile leaks occurred. The median postoperative hospital stay was four days (range 3–5 days). No postoperative complications, mortality, or readmissions within 30 days were recorded. The demographic characteristics and clinical outcomes are summarized in Table I.

## DISCUSSION

Pediatric cholelithiasis remains relatively uncommon; however, its prevalence has increased in recent years due to rising childhood obesity and improved diagnostic imaging (1,12). The age range and male predominance observed in this series are consistent with previous studies, although sex distribution remains variable (2,11).

Gallstone formation is primarily related to imbalance in bile composition, particularly cholesterol supersaturation (12). Although hemolytic disorders were historically the main cause, recent evidence shows a shift toward non-hemolytic and idiopathic etiologies, including obesity and metabolic factors (12,14). In our series, most patients were overweight or obese, supporting this association (1,12).

Right upper quadrant pain was the most common presenting symptom, consistent with previous reports (11). Due to nonspecific clinical features in children, ultrasonography remains the diagnostic modality of choice because of its high sensitivity and safety (15).

Medical therapy with ursodeoxycholic acid (UDCA) has limited effectiveness in symptomatic cases. In our series, patients receiving UDCA eventually required surgery, consistent with previous findings (14,16).

**Table I: Clinical characteristics and operative outcomes of pediatric patients undergoing laparoscopic cholecystectomy**

| Case | Age (years) | Sex | BMI (kg/m²) | BMI Category | Indication for Surgery | Operative Time (minutes) | Intra/Postoperative Complications | Length of Hospital Stay (days) |
|---|---|---|---|---|---|---|---|---|
| 1 | 4 | Male | 14.8 | Underweight | Symptomatic cholelithiasis | 45 | None | 3 |
| 2 | 6 | Female | 15.2 | Underweight | Symptomatic cholelithiasis | 50 | None | 3 |
| 3 | 10 | Male | 19.5 | Overweight | Symptomatic cholelithiasis | 55 | None | 4 |
| 4 | 15 | Female | 24.1 | Obese | Symptomatic cholelithiasis | 65 | None | 5 |
| 5 | 17 | Male | 26.3 | Obese | Symptomatic cholelithiasis | 75 | None | 4 |

BMI category based on CDC BMI-for-age percentile charts.

Laparoscopic cholecystectomy (LC) is currently the standard treatment for symptomatic pediatric cholelithiasis and is associated with reduced postoperative pain, shorter hospital stay, and faster recovery (4,9,18). In this series, LC was successfully performed in all patients without complications, supporting its safety and feasibility.

The median hospital stay in our study was four days, comparable to previous reports (5,15). Although adhesions were observed in two patients, no bile duct injuries or conversions occurred. The use of the critical view of safety likely contributed to these favorable outcomes (7).

Reported complication rates of LC in children remain low, with systematic reviews indicating rates of approximately 3–5% (9). In contrast, no intraoperative or postoperative complications were observed in our series.

This study is limited by its small sample size and retrospective design. Larger prospective studies with long-term follow-up are needed to better define optimal management strategies.

## CONCLUSION

This case series demonstrates that LC is a feasible and safe procedure for children with symptomatic cholelithiasis, with favorable short-term outcomes. Due to the small sample size and retrospective design, further prospective studies with larger populations and long-term follow-up are required to better define optimal management strategies in pediatric cholelithiasis.

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