



## Cholecystectomy in children: Why and how?

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### ABSTRACT

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We aimed to evaluate etiology and outcome of children with cholecystectomy. Between June 2006 and June 2015, sixty one patients with cholecystectomy were reviewed in order to age, sex, indication, procedures, length of stay and complications. There were 35 female, 26 male, total of 61 patients (2 days -18 years, median 8 years). The indications for surgery were idiopathic cholelithiasis in 38 (62.2%), hemolytic anemia in 14 (22.9%), bile duct cyst in 5 (8.1%), gallbladder polyps in 2 (3.2%) and pancreatitis and short bowel syndrome in one (1.6%). Although the patients with cholelithiasis received ursodeoxycholic acid preoperatively, all of them needed cholecystectomy. Fifty (81.9%) patients underwent laparoscopic surgery, 11 (18.1%) patients open surgery. In those with open surgery, four patients' indications were common bile duct cysts, only one patient needed the open surgery because of a previous surgery. The patients' length of stay was between two days to 110 days (median five days). Postoperatively, three (4.9%) patients developed bile leakage. We just put a drain in one of them. The other two patients required a Roux-en-Y choledocojejunostomy. The patient with short bowel syndrome died. Although the number of indications and variations for cholecystectomy are growing, many of them are still grouped under the name of "idiopathic or nonhemolytic cholelithiasis". Most of the cholecystectomies' outcome are excellent, however, it is not a complication-free operation.

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### 1. Introduction

Cholelithiasis in children has various causes related to predisposing factors. Hemolytic disease, hepatobiliary disease, obesity, parenteral nutrition, abdominal surgery, trauma, ileal resection, Crohn's disease and sepsis may lead to an increased incidence of gallstones in the pediatric population (Kaechele et al., 2006; Gökce et al., 2014). The incidence of cholelithiasis in children has increased over time. Increased use of ultrasonography, which is a non-invasive diagnostic method, and the increase in pathologies which require cholecystectomy during the last twenty years resulted in an elevation in the cholecystectomy experiences of pediatric surgeons. When childhood cholecystectomy

indications are evaluated, gallstones are found to be the leading cause (Dooki and Norouzi, 2013). The highest probability for the formation of gallstones is hemolytic diseases, but this group makes up only about 15% of the cases. Positive family history, obesity, parenteral feeding, prematurity, previous ceftriaxone use and sepsis can be listed among the causes of non-hemolytic gallstones (Bogue et al., 2010). While stoneless cholecystitis, hydropic gallbladder and gallbladder cysts are among the indications of cholecystectomy, the majority of patients with cholecystectomy has no obvious cause of gallstones (Kim et al., 2015). In this study, we evaluated the etiology and outcome of children with cholecystectomy.

## 2. Materials and methods

Sixty one patients who underwent cholecystectomy with a diagnosis of gallbladder disease between June 2006 and June 2015 were included in the study. The patients' ages, genders, surgical indications, surgical procedures, lengths of stay and complications were examined retrospectively.

## 3. Results

A total of 61 patients (35 F, 26 M) were enrolled (two days -18 years, median eight years). Diagnosis was performed with abdominal ultrasonography. Complicated patients and biliary leakage were evaluated by MR cholangiogram. Furthermore, complete peripheral blood examination was performed in all patients. The indications for surgery were idiopathic cholelithiasis in 38 (62.2%), hemolytic anemia in 14 (22.9%), bile duct cyst in five (8.1%), gallbladder polyps in two (3.2%) and pancreatitis and surgery because of jejunal atresia in each one (1.6%). In the patient with jejunal atresia, short bowel syndrome had developed after atresia repair. Therefore he underwent a prophylactic cholecystectomy in advance. Biliary polyps more than 10 mm are reported to be excised. In our case, the polyp was 13 mm, therefore we performed a cholecystectomy.

Although the patients with cholelithiasis received ursodeoxycholic acid (UDCA) preoperatively, all of them needed cholecystectomy. Fifty (81.9%) patients underwent laparoscopic surgery, 11 (18.1%) patients open surgery. In those with open surgery, four patients' indications were common bile duct cysts, only two patient needed the open surgery because of a previous surgery and porcelain (calcified) gallbladder (Fig. 1a, b). The patients' length of stay was between two days to 110 days (median five days). Postoperatively, 3 (4.9%) patients developed bile leakage. The cause of the postoperative biliary leakage was a common bile

duct injury in patients. We just put a drain in them. One of them was recovered without stricture. The other two also developed a stricture. We performed a Roux-en-Y choledocojejunostomy. The patient whose cholecystectomy was because of short bowel syndrome due to jejunal atresia was died. None of the other patients had any problems in their long term follow-ups.

## 4. Discussion

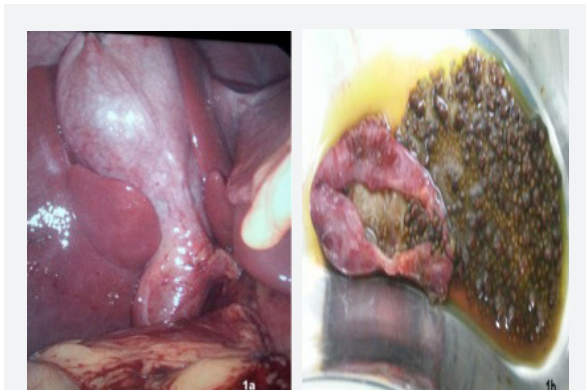
Gallbladder disease is one of the most common and costly digestive diseases that requires hospitalization. Gallbladder calculi are more common in the adult population and remain relatively uncommon in children; however, the incidence of cholelithiasis in children has increased. A population-based study estimated the prevalence of gallstones in children at 1.9% (Wesdrop et al., 2000; Dooki and Norouzi, 2013).

Pediatric gallbladder disease is most commonly associated with hemolytic disease such as hereditary spherocytosis, sickle cell anemia, thalassemia major. However, other risk factors are also reported. Obesity, prolonged total parenteral nutrition or previous extensive bowel resection (Short bowel syndrome), previous sepsis and long-term drugs (particularly ceftriaxone and furosemide) use increase the risk of gallbladder disease. As the survival rates of critically ill infants and neonates are continuing to be improved, the likelihood of having gallbladder stones are increased (Poddar and Hardikar, 2009). Mehta et al. (2012) have compared the past and present indications for cholecystectomy in children. In this large series, while hemolytic disease's rate was observed to be decreasing, biliary dyskinesias rate has been increased in recent years.

Porcelain gallbladder is defined as calcification of the gallbladder wall. It is a rare condition and is seen in 0.06% to 0.8% of cholecystectomies. Its etiology is still unknown (Palermo et al., 2011). Our patient was 14 years-old- male who has immune deficiency syndrome. The diagnosis was made by ultrasound. Initially, laparoscopic cholecystectomy was started, because of fragile and hundreds of stone-filled gallbladder were converted to open surgery.

In spite of above mentioned etiologic factor, unknown cause gallstones are considered "idiopathic" or nonhemolytic in the majority of children. Espinosa-Saavedra et al. (2014) reported cause of cholelithiasis in 93% as idiopathic. In our study, the indications were idiopathic cholelithiasis in 38 (62.2%), hemolytic anemia in 14 (22.9%), bile duct cyst in five (8.1%), gallbladder polyps in two (3.2%) and pancreatitis and surgery because of jejunal atresia in each one (1.6%).

Ultrasonography (US) of the right upper quadrant is the study of choice in patients with uncomplicated cholelithiasis. In the complicated cholelithiasis, US and



**Fig. 1a, b.** Laparoscopic view; Porcelain gallbladder swell, fibrotic and calcified (1a), Macroscopic view; hundreds of stone-filled in the gallbladder (1b).

MR Cholangiography should be performed (Poddar and Hardikar, 2009).

Since 1976, for the medical treatment of cholelithiasis, UDCA has been used as a litholytic agent. Medical therapy with UDCA does not lead to dissolution of gallstones but it had a positive effect on the symptoms. UDCA reduces the concentration of bile by inhibiting endogenous cholesterol synthesis in hepatocytes. Some authors prefer primarily medical treatment in the treatment of gallstones, others do not use this treatment because of stone recurrence after discontinuation of the drug and the high cost (Colecchia et al., 2006; Stawarski et al., 2006). We tried medical treatment all of our patients, but the stones did not resolve.

Laparoscopic cholecystectomy is a “gold standard” also for a treatment of cholelithiasis in childhood; it is an efficacy and safe treatment also for pediatric gallstones. Open cholecystectomy is reserved for patients who underwent failed laparoscopic cholecystectomy (Deepak et al., 2009). The most common causes for open surgery are bile duct anatomic variation or adhesive disease due to a prior operation. Surgeon cannot estimate many patients preoperative contraindications to laparoscopy. Estimated preoperative contraindications may include severe intestinal adhesion, severe cardiopulmonary compromise (Balaguer et al., 2006). In our study, 50 (81.9%) patients underwent laparoscopic surgery, 11 (18.1%) patients open surgery. In those with open surgery, four patients’ indications

were common bile duct cysts, only one patient needed the open surgery because of a previous surgery.

Prenatally diagnosed gallbladder stone has been mentioned in the literature. These stones can be resolved spontaneously within a few weeks (Triunfo et al., 2013; Jeanty et al., 2015). In our two-day jejunal atresia patient was identified prenatally stones in the gallbladder. Intraoperatively, short bowel was recognised related to jejunal atresia. Because of long-term TPN during jejunal atresia repair, also cholecystectomy was performed. This patient died after two months after surgery.

Pancreatitis, infection, papillary stenosis, jaundice, bile leakage, vascular injuries and hemobilia are major complications of cholecystectomy (Fletcher et al., 1999; Deepak et al., 2009; Kim et al., 2015). In our study, postoperatively, 3 (4.9%) patients developed bile leakage. We just put a drain in one of them. The other two patients required a Roux-en-Y choledocojejunostomy.

Although the number of indications and variations for cholecystectomy are growing, many of them are still grouped under the group of “idiopathic cholelithiasis”. We believe, further studies are needed to clarify this. Laparoscopic cholecystectomy is a “gold standard” for treatment of gallbladder removal. Bile leakage continues to be a major problem in those patients. Better equipment and increasing experience would help to overcome this problem. To prevent major hepatic complications, hepaticoenterostomies should be considered if needed.

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