Results and complications of laparoscopic cholecystectomy in childhood

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Abstract

Background: The purpose of our study was to evaluate the results and complications of laparoscopic cholecystectomy in a case series of 110 infants.

Methods: Over a 5-year period (1993–98), we performed laparoscopic cholecystectomy in 110 pediatric patients. Surgery was performed at three different institutions by three different surgeons. The patient population was composed of 69 girls and 41 boys; their ages ranged from 1 to 16 years (median, 8.5). All of the 110 children had symptomatic cholelithiasis, which was confirmed at ultrasound examination. An associated pathology was present in 27 patients (sickle cell disease in 17 cases, hereditary spherocytosis in seven cases, thalassemia in three); the other 83 infants were affected by idiopathic cholelithiasis. In 107 patients, the operation was performed using four ports; in three patients, it was done using five ports. In three patients, we also performed a concomitant splenectomy.

Results: Median duration of simple cholecystectomy was 45 min (range, 25–75) and hospital stay ranged from 1 to 10 days (median, 2). Only 15 children required drainage. We had 17 complications in our series (15.5%), including a gallbladder perforation during dissection in 11 patients, a fall of stones into the abdominal cavity during extraction in one patient, and a trocar orifice infection in the postoperative period in five patients. At a maximum follow-up of five years (range, 1–5), all patients were doing well.

Conclusion: Laparoscopic cholecystectomy in children seems to be as effective as open surgery in cases of symptomatic cholelithiasis. In pediatric patients more than in adults, an accurate and precise dissection and a sound knowledge of possible congenital biliary abnormalities are essential to avoid any kind of complication.

Key words: Children — Cholecystectomy — Gallbladder — Laparoscopy

Cholecystectomy is one of the most common laparoscopic operations in adults, but cholelithiasis is a rare event in infants [8]. For this reason, laparoscopic cholecystectomy is rarely reported in the pediatric literature. However, in some countries, cholelithiasis is a diffuse pathology even at younger ages; therefore, a large number of laparoscopic cholecystectomies are also performed in infants [2, 4, 19, 23].

This finding has prompted us to analyze our wide experience with laparoscopic cholecystectomies in pediatric patients. Our aim was to evaluate the results and possible complications of the laparoscopic approach in children.

Patients and methods

Between June 1993 and June 1998, we performed 110 laparoscopic cholecystectomies at three different pediatric surgical centers (72 cases in one center, 30 in another, and 8 in the third) on infants affected by symptomatic cholelithiasis.

All the operations were performed by three surgeons using the same operating technique. The group was composed of 69 girls and 41 boys. Their ages ranged between 1 and 16 years (median, 8.5), and their body weight ranged from 9 to 55 kg (median, 24 kg). Eighty-three patients (75.4%) had idiopathic cholelithiasis.

In 27 patients, we identified an associated pathology (sickle cell disease in 21 cases, hereditary spherocytosis in seven cases, and thalassemia in three cases).

The indication for surgery was always symptomatic gallstone disease. The patients underwent preoperative laboratory tests and abdominal sonography to confirm the presence of gallstones. We performed a perioperative cholangiography in only one case, a seven-year-old boy affected by moderate jaundice; intraoperative cholangiography showed no sign of stones in the main bile duct. Each patient was evaluated carefully to detect the possible coexistence of hematological disease. The patients also underwent short-term antibiotic prophylaxis, receiving a single dose before surgery.
The children were placed in a supine decubitus position on the operating table in reverse Trendelenburg position and underwent surgery under general anesthesia with orotracheal intubation and a nasogastric tube into the stomach.

For 107 patients we used four trocars. In three children who required a concomitant splenectomy, we used a fifth trocar. In the first 30 cases of our series, who represented the beginning of our experience, we used a Veress needle to obtain the pneumoperitoneum; in the last 80 cases, we used open laparoscopy. A 0° optics (5- or 10-mm) was always positioned intraperitoneally. The other three ports were positioned as follows: the first was placed in the upper midline just below the xiphoid appendix for the second operative instrument; the other two ports were placed along the right costal margin for the first operative instrument and for the grasper, which was used to retract the gallbladder fundus. We always tried to keep pneumoperitoneum pressure between 8 and 12 mmHg.

The first step in the surgical technique, was to expose Calot’s triangle and isolate the cystic duct with a blunt dissection. Congenital biliary tree abnormalities, which are sometimes found in children, were searched for carefully. In fact, we identified abnormalities in three cases (2.7%). One patient had a duplication of the gallbladder, ending with a common cystic duct at the level of the mail bile duct; another had an accessory cystic duct ending at 0.5 cm distal to the hepatic duct junction; the third had a longer accessory cystic artery extending toward the fundus of the gallbladder.

After we identified the cystic duct—common bile duct junction, the cystic artery was bluntly dissected. The cystic duct and artery were sectioned between clips. The gallbladder was then removed from its bed using a coagulated hook or, in our last patients, with the aid of a harmonic hook. The gallbladder was always removed through the umbilical orifice.

In the three children who underwent a concomitant splenectomy, the spleen was drawn into a plastic bag and finger-fragmented; the pieces were extracted through the umbilical orifice. In these three patients, spleen volume was measured preoperatively via ultrasonography to evaluate the feasibility of a laparoscopic procedure.

**Results**

In cases of simple cholecystectomy, the surgery lasted from 25–75 min (median, 45). Operating time in the three patients who required a concomitant splenectomy ranged from 100 to 170 min. Hospital stay ranged from 1 to 10 days; in cases of simple cholecystectomy, the median hospital stay was 2 days, whereas in cases of concomitant splenectomy it was 4 days.

Fifteen patients series required drainage: the three patients who underwent a concomitant splenectomy and 12 others who incurred slight bleeding from the gallbladder bed during dissection. There were 17 complications in this series (15.5%), including 11 gallbladder perforations, one fall of stones into the abdominal cavity, and five trocar orifice infections.

The postoperative course was uneventful in all patients. At a maximum follow-up of 5 years (range, 1–5), all patients were doing well.

**Discussion**

Laparoscopic cholecystectomy is the procedure of choice for the treatment of adults with gallbladder stone disease [9]. However, cholelithiasis is rare in children; for this reason, it is difficult to evaluate the validity of this procedure in a large case series of pediatric patients [9, 16].

As was confirmed by our series, the presence of gallbladder stones is generally idiopathic, and their discovery is sometime incidental during a sonographic exam performed to search for other abdominal pathologies. However, there are well-known predisposing factors to the development gallbladder stones in children [3]. Among infants affected by hemolytic disease—hemolytic anemia, for instance—the incidence of gallbladder stones is much higher than the normal population; its reported incidence ranges from 10% to 40% in various series [1, 14, 21].

The management of children with cholelithiasis requires great caution; an accurate hematological study is always necessary to detect a possible underlying hematological disease, as was the case in 27 of the 110 patients in our series. In cases of gallstones discovered incidentally, an accurate follow-up is suggested, since a spontaneous resolution of the pathology is possible. Generally, noncalcified gallbladder stones in children disappear within 3–6 months. By contrast, surgery is needed for calcified stones in both non-symptomatic and symptomatic children [12].

We believe, on the basis of our experience, that laparoscopic cholecystectomy rather than open cholecystectomy is the procedure of choice in symptomatic infants [17, 22]. It is important to remember that in pediatric patients, given the small size of the abdominal cavity, it is preferable to place the first trocar using the open laparoscopy technique. Moreover, for the same reason, laparoscopy in infants should be performed using very small instruments (3 or 5 mm in diameter). Technically, this approach is similar to the one employed for adults, although careful consideration of a child’s anatomical difference is essential to avoid complications [5, 7, 8, 11].

An interesting finding observed in our series is that the gallbladder wall of infants is thinner than that of adults. In our opinion, the 11 perforations of the gallbladder wall during dissection reported in our series were due primarily to the thinner gallbladder wall in children, although our own lack of experience was probably a factor in the first cases.

It is important to keep in mind that in pediatric patients there may be biliary tree anomalies, such as gallbladder duplication, ductal abnormalities, accessory bile duct, or accessory cystic artery, as was the case with three patients in our series. These findings do not represent a contraindication to the laparoscopic procedure if the surgeon is able to perform a delicate and accurate dissection of the elements at the level of Calot’s triangle.

We believe that bile duct injuries, which are often reported in adults, are very rare in children. We were also able to observe that the junction between the cystic duct and the common bile duct is much more visible in children, due to the scarcity of fatty tissue and adhesions at the level of Calot’s triangle at this age [6, 15, 18, 20]. This improved visualization makes the dissection of the cystic duct easier and less dangerous than in adult patients.

The presence of common bile duct stones in children is an extremely rare event in the pediatric population; indeed, we did not come across any such cases in our series. At any rate, the presence of jaundice, dilatation of the biliary tree at ultrasonography, alkaline phosphatase and total bilirubin above the normal range by >5 mg/dl, and/or a history of pancreatitis are indications for a cholangiography or an ERCP (endoscopic retrograde cholangiopancreatogram) [1, 10, 13]. In addition, we believe that intraoperative cholangiograms can also be performed in infants, as was done with one patient in our series.

With respect to the ERCP, the sequential approach of endoscopic sphincterectomy and stone extraction followed by laparoscopic cholecystectomy is a safe and effective
method in children as well as adults, although we had no experience with this procedure in our series [1, 13]. One important advantage is that laparoscopic cholecystectomy in children can be associated, if necessary, with other technical procedures, such as the closure of a peritoneal vaginal duct in cases of inguinal hernia; thus, a second operation or another incision can be avoided. However, if another procedure is required, laparoscopic expertise on the part of the surgeon is fundamental to avoid additional morbidity. In this case series, we performed a concomitant splenectomy in two infants affected by spherocytosis and one with thalassemia [14].

Based on our experience, laparoscopic cholecystectomy is as valid and effective a procedure in pediatric patients as it is in adults. In children, it is important to perform a complete preoperative evaluation to search for the possible coexistence of hematological diseases. To reduce the occurrence of complications, it is essential to adopt the open laparoscopic technique to introduce the first trocar and to make an accurate and precise dissection of the biliary structures, in the event of possible biliary tree abnormalities.

References