LAPAROSCOPIC CHOLECYSTECTOMY: THE TREATMENT OF CHOICE FOR CHOLELITHIASIS IN INFANCY AND CHILDHOOD

Akram J. Jawad, FRCS(Ed), FACS; K. Kurban, MBBS, CABP; Abdulkarim El-Bakry, FRCS(Ed); Abdullah Al-Sanie, MBBS, MRCP; Ibrahim Al Fawaz, FRCPC; Hassan Bakhamees, MBBS, KSFU, DA(London); Hassan Bahakim, MD

Twelve consecutive laparoscopic cholecystectomies (LC) were performed between January 1994 and October 1996 at King Khalid University Hospital. In all patients the indication for cholecystectomy was symptomatic gallstones. Among the 12 children, six had sickle cell disease. The operating time ranged between 65 and 135 minutes (mean=89±21.06). There was no major morbidity or mortality. The average duration of postoperative parenteral analgesia (pethidine hydrochloride) required was 0.47±0.19 day (ranged between 0.3 and one day). The average postoperative stay was 1.67±0.44 days (ranged between 1 and 2.5 days). In conclusion, LC is safe, effective and the preferred approach for cholelithiasis in children, with the advantages of short postoperative analgesia requirement, shorter hospitalization, and therefore, an early return to normal daily activities. *Ann Saudi Med 1997;17(4):410-412.*

Gallbladder diseases have been relatively uncommon in infants and children, but it is now being recognized with increasing frequency that gallstones should be considered in the differential diagnosis of every child or adolescent with vague or colicky upper abdominal pain.[1] Minimal invasive surgery is gaining rapid popularity among pediatric surgeons. Until recently, only a few case reports and small series of laparoscopic cholecystectomies (LC) in infants and children had been documented in the literature.[2-7] We believe this is the first series of LC in the pediatric age group in the Middle East.

Patients and Methods

Between January 1994 and October 1996, a total of 12 LCs were performed at the King Khalid University Hospital in the pediatric age group. Six of these had sickle cell disease. The other six had idiopathic mixed gallstones. In all cases, the indication was symptomatic gallstones.

The records of the patients were reviewed for age, sex, clinical presentation, disease duration, postoperative analgesia requirements, duration of postoperative hospital stay and follow-up period (Table 1). The parents consented to LC, and to the possibility of conversion to open cholecystectomy. All patients received preoperative prophylactic antibiotic cefuroxime (30 mg/kg/dose). All sickle cell patients were preoperatively investigated and prepared in the pediatric medical day care unit.

Our criteria for choosing a sickle cell disease child for LC were: 1) a hemoglobin level above 10 g/L; 2) hemoglobin S fraction percentage of less than 40%; and 3) a reticulocyte value of less than 2%.

All procedures were performed with the use of adult laparoscopy instruments. Under general endotracheal anesthesia, a nasogastric tube was introduced, and the urinary bladder emptied by manual compression Credé's maneuver or by bladder catheterization. The abdomen was prepared and draped in a similar way for open cholecystectomy. A Veress needle was inserted through an umbilical incision in all cases except the infant patient, where it was inserted below and to the left of the umbilicus. This was due to the limitation of the abdominal size. The needle was then filled with normal saline, the valve was opened with a free flow, and no return was obtained on aspiration. CO_2 was insufflated slowly to a maximum pressure of 6-12 mm Hg, depending on the size of the patient. The Veress needle was replaced with a 10-mm port for video camera, followed by the insertion of two other 5-mm ports on the right side of the abdomen. Another 10-mm working port was inserted in the left epigastrium. Routine abdominal and pelvic inspections were carried out to exclude other pathology.

A non-toothed endograsper was introduced through the port (P2) to grasp the fundus of the gallbladder firmly. The gallbladder was pushed upwards and laterally to visualize the Hartmann's pouch. At this stage, the operating table was tilted to the left and the head side was tilted upwards by 20° to obtain a comfortable operating field. A second non-toothed endograsper was used through the port (P3) to hold the Hartmann's pouch, then pulled anteriorly to the

From the Departments of Surgery (Drs. Jawad and El-Bakry), Pediatric Medicine (Drs. Kurban, Al-Sanie, Al-Fawaz and Bahakim), and Anesthesia (Dr. Bakhamees), King Khalid University Hospital, Riyadh, Saudi Arabia.

Address reprint requests and correspondence to Dr. Jawad: Department of Surgery, King Khalid University Hospital, P.O. Box 7805, Riyadh 11472, Saudi Arabia.

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patient's right, stretching the cystic duct and its peritoneal attachments. A dissecting forcep was inserted through the the working port (P4), and blunt dissection was used to separate the cystic duct from the cystic artery and common bile duct.

Having completely assessed the anatomy of the cystic and common bile duct, the cystic bile was clipped and the cystic artery identified. This was doubly clipped and cut with scissors. The cystic duct was then divided to avoid possible avulsion of the thin cystic artery by the traction on the gallbladder.[3] A retrograde cholecystectomy was carried out by cutting the peritoneal attachment with the hook dissection diathermy technique.

The gallbladder was delivered via the 10-mm port (P4) under vision. The gallbladder bed was inspected for any bleeders or bile leakage. The abdominal cavity was washed out with normal saline, deflated, and all the ports removed under vision. No drains were used. The ports were then closed in two layers.

Results

The mean age of the patients was 8.9 years (range 11 months to 13 years). The male to female ratio was 4:8. There were no mortalities or major complications, apart from a minor shoulder pain documented in two of the patients, which responded to oral analgesia.

The mean length of parenteral analgesia required was 0.47±0.19 (range 0.3 to 1 day). The mean postoperative hospital stay was 1.67±0.44 days (range 1 to 2.5 days).

The mean follow-up period was 10.25 months ±7.65 (range 2 to 26 months). A learning curve was reflected by the reduction in operating time as the operative experience advanced. The mean operative time was 89 ±21.06 minutes (range 65 to 135 minutes), which is comparable to other series in the literature.[6]

Discussion

Laparoscopic cholecystectomy is an innovative technique that has been accepted as the standard treatment for chronic cholecystytis and cholelithiasis in adults. Until recently this technique had not been used in pediatric patients due to concern about their small size. Now it is evident that the technique can be applicable to children and infants without significant complications.[3,6,7]

Reports of cholelithiasis in children have been increasing during the past two decades. This may be attributable to the extensive use of ultrasonography (US) in the evaluation of abdominal problems. Another reason may be the emergence of a group of neonates who were not previously known to be at risk for gallbladder diseases, such as severely ill neonates with necrotizing enterocolitis, neonates with ileal resection, and premature infants who received prolonged total parenteral nutrition.

Hemolytic diseases such as sickle cell anemia, hereditary spherocytosis, and thalassemia major are all associated with cholelithiasis in children. The incidence of gallstones in sickle cell patients varies from 10% to 37% and increases with age.[8-10] Our previous diagnostic laparoscopic experience encouraged us to successfully perform the first two LCs in the presence of an experienced adult surgeon. It is of value for two surgeons to work as a team while the procedure is learned so that consultation, support and increased vigilance are readily available.

There is a definite learning curve for the procedure, as was reflected by the operating time (Table 1). Performing a large number of procedures, preferably with the help of an experienced laparoscopic surgeon, is necessary in order to master the technique. A casual approach is what has caused many problems in laparoscopic surgery up to now, and this should be discouraged. In developing countries where technical resources might be limited, consideration should be given to limiting the number of surgeons carrying out this procedure in order to allow a few to develop the required expertise.

As in any other new technique, safety should be of paramount concern. Appropriate instrumentation, particularly for infants, is safer than adult-sized instruments where the margin of error is much smaller. In spite of this, the majority of laparoscopic cholecystectomies performed in children were done with adult instruments. The two critical periods during LC are the time of the Veress needle being inserted and the initial trocar (both

TABLE 1. *Laparoscopic cholecystectomy group (demographic and clinical data).*

Age (years)	Sex	Hosp. stay (days)	Op. time (mins)	DPA	FU (months)	Remarks
11 mo.	F	2	120	0.3 D	14	MGS
7	F	2	135	0.5 D	12	MGS
9	M	1	90	0.5 D	26	MGS
12	F	1.5	105	0.5 D	20	SCD + MGS; post-op. mild right shoulder pain
12	F	2	75	1 D	16	SCD + MGS
9	F	1	85	0.3 D	10	MGS
10	F	2.5	78	0.5 D	8	SCD + MGS
8	M	1.5	90	0.5 D	4	MGS
11	F	1.5	75	0.5 D	6	SCD + MGS
11	M	2	70	0.5 D	2	SCD + MGS
5	F	1.5	65	0.3 D	3	MGS
3	F	1.5	80	0.3 D	2	SCD + MGS; post-op. mild
8.99± 3.34*		1.67± 0.44	8.9± 21.066	0.475± 0.19	10.25± 7.54	

*Mean±SD; DPA=duration of parenteral analgesia in days; FU=follow-up; SCD=sickle-cell disease; MGS=multiple gallstones.

blind procedures), and the time of isolation and division of the cystic artery and cystic duct. The Veress needle insertion risk might be avoided by the saline injection aspiration technique, or the use of an umbilical incision where the introduction of the first port can be achieved under vision.

The insertion of the ports in infants and children should be in an accurately planned site, and under camera control to avoid the risk of visceral injury, and/or overcrowding of the instruments.

Intraoperative cholangiogram (IOC) was not considered necessary in any of our patients, since their ultrasound examinations of the gallbladder and biliary tree had all been normal.

The indications for IOC are still controversial. Most authors advise the performance of selective IOC in the presence of risk factors for choledolithiasis, such as jaundice, abnormal liver function test or dilated common duct.[5]

In this study, 50% of the patients had sickle cell disease with multiple gallstones. Though the management of sickle cell disease patients with asymptomatic gallstones has been controversial,[5] the decision to perform elective cholecystectomy in them was based on the clinical sequelae that may result from surgical delay. Ascending cholangitis, choledolithiasis, acute cholecystitis and the possibility of emergency surgery[11] in unprepared fragile patients makes LC an attractive procedure, since it has been associated with remarkable reductions in perioperative morbidity. In our series, there was no major morbidity or mortality. However, mild right postoperative shoulder pain was documented in two patients (Cases No. 4 and 12), both of whom responded to oral analgesia. In both cases, there was an accidental perforation of the gallbladder and a consequent bile leakage.

The benefits of LC when compared to traditional open approach are numerous. Decreased pain after surgery, improved pulmonary function[8] and reduction of postoperative ileus allow rapid recovery, early return of patients' appetite and a reduction in the chances of infection, or serious vaso-occlusive events after surgery in sickler patients. This is in addition to a marked reduction in total hospitalization cost.[6] It appears as well that there is a faster return to routine activities such as school, study and sports.

In conclusion, the performance of LC by an experienced laparoscopic surgeon with the most appropriate instruments is clearly safe, efficacious and economic, with excellent cosmetic results, and should be the treatment of choice for the removal of gallbladder in the pediatric population.

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