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RESEARCH ARTICLE

LAPAROSCOPIC MANAGEMENT OF PEDIATRIC GALL STONE DISEASE.

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Abstract

Objective: to describe our experience in evaluating the role of laparoscopic cholecystectomy (LC) in management of gallstone disease in children.

Methods: A prospective study carried out on 20 patients with calculercholecystitis who were admitted to the hospital between September 2015 and May 2017 for laparoscopic cholecystectomy using four ports.

Results: Twelve children (60%) were males and eight children (40%) were females. The mean age was 7 years (range 1 to 13 years). eighteen (90%) children had typical symptoms and two (10%) children had asymptomatic gallstones. Seventeen children underwent elective LC and three children were taken up for emergency LC. Postoperative complications occurred in two (10%) patients. one child had postoperative fever for two days, which resolved with intravenous antibiotics. The other One had serous discharge from the tube drain, which resolved spontaneously.

Conclusions: Laparoscopic cholecystectomy (LC) is confirmed to be a safe and efficacious treatment modality for pediatric gallstones especially when it is performed by an experienced surgeon. It is associated with less pain, fewer complications, and faster recovery than open procedures. There is increasing incidence of non-haemolyticcholelithiasis.

Introduction:-

Although gallstones have traditionally been considered to be much less common in children than in adults, gallstone disease has increasingly been diagnosed in the pediatric population, mainly owing to the widespread use of ultrasonography [1]. In a population-based study prevalence of gallstones in children was 1.9% [2].

Pediatric cholelithiasis was viewed as a disease of prematurity,usually related to total parenteral nutrition. Various risk factors for cholelithiasis in children include haemolytic disorders, obesity, family history of gallstones, abdominal surgery, IgA deficiency, cystic fibrosis, therapy with ceftriaxone and Gilbert's disease [3].

However, the cholecystectomy rate inchildren without the diagnosis of hemolytic anemia has increased in recent years [4]. Childhood obesity is another known risk factor for gallbladder disease [5].

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Gallstones are usually classified into one of three types: cholesterol stones, pigment stones, or mixed-type. Cholesterol stones are radiolucent and associated with Obesity.

Pigmented stones are radiopaque and associated with hemolytic disease. Brown stones are associated with bacterialcholangitis and can form within the ductal system [2].

In adults the majority of gallstone (80.0%) remainasymptomatic on long-term follow-up. However, if adultpatients develop complications (eg, pancreatitis, acute cholecystitis, or choledocolithiasis), these complications are usually preceded by biliary colic pain [6].

The child may presented with biliary colic typically complains of intermittent right upper quadrant pain of variable intensity Or acute cholecystitis with diffuse pain radiate around to the scapula or to the epigastrium. Younger children may have nonspecific abdominal pain, irritability, jaundice or acholic stools. The clinical presentation depends on the location and degree of obstruction caused by the offending stone [7].

In this study, we aimed to evaluate the role of laparoscopic cholecystectomy in management of gallstone disease in children.

Materials And Methods:-

A prospective study of our experience with LC for pediatric cholelithiasis at our institution, between September 2015 and May 2017 was done. Twenty patients aged between 1 to 13 years old with calculercholecystitis either acute or chronic were included in the study. In patient, we admitted patients neither asthmatic nor with history of jaundice.

Routine preoperative investigations including Liver function tests and hematological investigations were performed. Abdominal ultrasonography was performed for all patients.

Ultrasonography findings of cholecystitis include gallbladder wall thickening (greater than 3.5 mm), pericholecystic fluid, and gallbladder sludge. Gallstones are seen as discrete echodensities with acoustic shadowing. Ultrasonography also provides information about the common bile duct, revealing stones or duct dilation.

Informed consent was obtaine. Npo for 4-6 hours and Antibiotic prophylaxis was administered by a single dose of 50 mg/kg cefazoline.

Operative techniques

The patient is placed in a supine position. Following induction of general anesthesia, the trachea is intubated and an orogastric 10 F Levine tube is passed into the stomach.

First, the trocar placement is determined by patient size and position of the gallbladder and the liver.

A "smiling" 5-mm incision is made inside the lower margin of the umbilicus. A Veress insufflation needle, oriented toward the pelvis, is gently inserted into the peritoneal cavity with the infant in strong Trendelenburg inclination. The proper intraperitoneal position of the Veress needle is verified by aspiration, free injection, and finally dripping of saline solution. In the presence of a congenital umbilical hernia, the trocar sleeve should be placed under direct vision and then secured with a pursestring suture in the fascia and a cardiovascular tourniquet.

Warmed CO2 gas is insufflated to a pressure of 7-12 mm Hg, which is generally provided by the elasticity of the infant's abdominal wall and the elevation of the diaphragm are guides to the optimal peritoneal insufflations pressure.

A 5-mm trocar is inserted via the umbilical incision and the operating camera introduced, checking the adjacent bowel loops immediately for possible injury.

A 10-mm trocar port for the surgeon were placed in the epigastrium which was also used for retrieval of the gall bladder specimen and A 5-mm trocar is inserted in right mid clavicular line in the hypochondrium or the lumbar

region. Another 5 mm port was inserted in theright anterior axillary line, to grasp the fundus of the gall bladder for retraction.

The operating table is shifted to 30° anti-Trendelenburg inclination.Adequate exposure of Calot's triangle is achieved by retraction of the gallbladder fundus and neck through the right-sided 5-mm trocars. Any pericholecystic adhesions are bluntly dissected. The cystic duct and artery are freed by blunt-grasper dissection, which begins as a rule at the gallbladder neck and proceeds toward the junction with the common bile duct.In a pediatric population the dissection around the Calot'striangle is easier and faster compared to adults, as the fat deposit is very minimal and the peritoneal covering layer is thin, allowing clear visualization of the anatomy.

The cystic duct and artery are both clipped twice, and then divided with scissors. The gallbladder is freed from its bed by means of hook-cautery and a spatula. The peritoneum is divided proceeding from the neck toward the gallbladder fundus.

Intraoperative cholangiography was not deemed to be necessary in any of our patients.

The small gallbladder is removed through the 10-mm sleeve. The large fascial incision is closed with 3-0 Vicryl sutures. All skin incisions are cleansed and closed with inverted intradermal 5-0 Vicryl- rapide sutures.

The patients were discharged when they wereable to tolerate a regular diet and were ambulatory. They were followed up in the outpatient clinic at least once after the discharge.

Results:-

During the study period, 20 patients underwent LC for cholelithiasis. The mean age was 7 years (ranging from 1 to 13 years). Five children were less than five years, 15 were aged between five and 13 years. Twelve children (60%) were males and eight children (40%) were females.

Fifteen (75%) children had typical symptoms of biliary tract disease (right upperquadrant or epigastric pain, nausea, vomiting and food intolerance), three (15%) had fever in addition to the above-mentioned symptoms (calculouscholecystitis), and two (10%) children had asymptomatic gallstones, which were diagnosed incidentally on ultrasound examination of the abdomen, done for an unrelated cause. Duration of symptoms at diagnosis varied from one month to 8 months (mean-2.7 months) **Table (1)**.

Risk factors for development of gallstones were present in six (30%) children only. Three had a family history of gallstones, two were obese (BMI _ 30) and one child had undergone previous abdominal surgery and had received an injection of Ceftriaxone for 14 days **Table (2)**.

After a complete workup, it was found that none of our patients were detected with having haemolytic disorders such as sickle cell disease, thalassemia or hereditary spherocytosis. A complete haemogram, peripheral blood smear and liver function tests were within normal limits in all the patients. All patients underwent an abdominal ultrasound and were detected to have single or multiple gallstones. Seventeen children underwent elective LC and three children were taken up for emergency LC after treating acute cholecystitis with intravenous antibiotics for two days. In addition, eight (40%) children had inflammatory features around the gall bladder.

Operative findings included omental or small bowel adhesions around the gall bladder (with or without edematous gallbladder) in 10 (50%) patients. One child who underwent emergency LC had empyema along with the above-mentioned inflammatory features. Theother 2 children had marked omental adhesion and edema. The mean operative duration was 72.4 minutes (range60-85 minutes).

Tube drains were placed in four (20%) cases, due to intraoperative bile spillage or gallbladder bed ooze was present. Three drains were removed within 24 hours; the remaining one was kept for 72 hours, as mild serous fluid discharge was present during the first two postoperative days.

The average duration of hospital stay was 2 day (range 1-3 days). .

Postoperative complications occurred in two (10%) patients. One child had serous discharge from the tube drain, which resolved spontaneously. The other one who underwent emergency LC had postoperative fever for two days, which resolved with intravenous antibiotics.

Histopathological analysis of the cholecystectomy specimen revealed chronic inflammation in 16 cases and acute inflammation in four cases.

Follow-up duration ranged from 4 months to 25 months (average 13 months) and there were no cases of retained common bile duct stones in our study.

Discussion:-

Gallstones are increasingly found in childhood, not only because of the use of ultrasonography in the workup of abdominal pain but also because of the increase of incidence in obesity worldwide [6].

In the present study, the age of the patients ranging from 1-13 years old with mean age 7.0±2.4years and most of patients are males (60%).

Nesrin*et al*. [8] study included 68 patients. They found that the average age of the patients was 7.5 ± 5 years (range: 1 month - 18 years), and 54.4% were males. Deepak*et al*. [2] study included 22 children (10 males and 12 females) with cholelithiasis. The mean age was 9.4 years (range 3 to 18 years). Esposito *et al*. [9] study included 110 patients (69 girls and 41 boys), their ages ranged from 1 to 16 years (median, 8.5).

The incidence of gallstones among boys and girls is almostequal, with a slightly high incidence among boys [9, 10, 11].

In our study, 70% the patients had idiopathic cholelithiasis and the remaining 30% of the patients had the risk factors (+ ve family history, obesity, and Ceftriaxone injection). The trend of the increasing incidence of non-haemolyticcholelithiasis is also reflected in our study, with all of them belonging to the non-haemolyticcholelithiasis category.

Deepak*et al*. [2] found that only five (22.7%) children had definitive etiological risk factors for cholelithiasis and the remaining 13 (77.3%) cases were idiopathic.

Esposito *et al*.[9] found that an associated pathology was present in 27(24.5%) patients (sickle cell disease in 17 cases, hereditary spherocytosis in seven cases, thalassemia in three); the other 83(75.5%) infants were affected by idiopathic cholelithiasis. Nesrin*et al*.[8] found that 8.8% of patients had used ceftriaxone. Hemolytic disease was found in 1 patient (1.5%). A family history existed in 4.4% of the patients.

The incidence of idiopathic cholelithiasis in other reported series varies from 23 to 52.5% [11, 12].

The mechanism of gallstone formation in these children is probably due to a combination of interacting processes, including; dehydration, transient hepatic dysfunction, dietary, inflammatory, hereditary, and endocrine influences, which affect the composition of bile [13].

Approximately 80% of the adults with gallstone are asymptomatic [14, 15]. However, in children, asymptomatic gallstones are less frequent. In our study10% children had asymptomatic gallstones.

Esposito *et al*. [9] found that all of the 110 children had symptomatic cholelithiasis. Ana Cristina *et al*. [6] found that symptomatic gallstones were present in 134 patients (60.0%). Symptomatic gallstones in children are more often (60%) than in adults (20%) [14].

LC in children differs from that in adults in dissection at the Calot's triangle is relatively easier and faster in children, as the fat deposit is less and the peritoneal covering layer is thinner in children.

In our study, as there was no evidence of common bile duct stones or altered liver function tests preoperatively in any of the patients, therefore an intraoperative cholangiogram was no in needed to be performed. None of the

patients had any evidenceof residual ductal stones during the follow up period. Hence, a routine intraoperative cholangiogram is not recommended for the children.

Routine IOC, even in suspected cases of choledocolithiasis, is often associated with negative results [15].

Ana Cristina *et al*.[6] identified only one case of choledocolithiasis among the 15 patients studied. Although we believe that IOC may also be indicated for a better definition of the biliary anatomy and that it is a useful tool in liver and biliary tract surgeries, it is not necessary during an LC because all of the dissection procedures areperformed very close to the gallbladder. In addition, preoperative ultrasound examinations permit the precise evaluation of the biliary tract anatomy.

Endoscopic retrograde cholangiopancreatography can be safely and effectively performed in suspected children by experienced endoscopists, during both the postoperative and
preoperative periods [16].

Mattioli et *al*. [17] have reported that the incidence of sub clinical common bile duct stones is low in children. This finding has also been described in a small prospective pediatric study [18].

As the natural history of gallstones in the children was notknown and histological evidence of inflammation waspresent in all the cases of cholelithiasis in our series,we suggested an LC for all children with cholelithiasis [2].

The expectancy of long life for children, expectant management of cholelithiasis may not be safe. However, in adults where the natural historyis well-documented, only 1 to 4% per year developsymptoms or complications of gallstone disease, only10% develop symptoms in the first five years afterdiagnosis and approximately 20% by 20 years [19-21].

In our study the mean operative duration for LC was 72.4 minutes. The average duration of hospital stay was 2 day (range 1-3 days).

In Ana Cristina et *al*. [6] study, the average duration of the procedure was 80.8 minutes (range, 40-240 minutes), and the average hospital stay was 1.1 days (range, 1-3 days). In Esposito et al. [9] study, the operative duration ranged from 25 to 75 min (median=45).This duration was between 70 and 80 minutes in other reported series [11,18].

The comparison of various parameters between LC and open cholecystectomyin one study reported significantly less duration ofhospital stay and decreased overall cost in patientsundergoing LC [11]. The other advantages of LC, such as, decreased pain, avoidance of upper abdominal muscle cutting incision, faster return to activity and cosmetically better scar, are well-documented [22-24].

Conclusions:-

Laparoscopic cholecystectomy (LC) is confirmed to be a safe and efficacious treatment modality for pediatric gall stones especially when it is performed by an experienced surgeon. It is associated with less pain, fewer complications, and rapid recovery than open procedures. There is increasing incidence of non-haemolyticcholelithiasis.

Table (1):-symptoms distribution in studied group

symptoms	Count	%
Typical Symptoms	15	75.0%
Fever	3	15.0%
Asymptomatic Gallstones	2	10.0%
Total	20	100.0%
Duration of symptoms	Mean ±SD	8.0±2.7

Table (2):-Risk factors of gallstones development in studied group

Risk factors	Count	%
+ ve family history	3	15.0%
Obesity	2	10.0%
Ceftriaxone injection	1	5.0%
Idiopathic cholelithiasis	14	70.0%
Total	20	100.0%

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