LAPAROSCOPIC CHOLECYSTECTOMY: ATHREE-YEAR RETROSPECTIVE STUDY

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ABSTRACT

Background and Objectives: Laparoscopic cholecystectomy has made a revolution in the management of symptomatic gallstone diseases. It has been widely accepted as a surgical intervention for gallstone and cholecystitis. The spectrum of complications following the presentation of this new minimally invasive surgical technique has been changed.In the present retrospective study, immediate, early, and late laparoscopy-related complications of 242 patients underwent laparoscopic cholecystectomy for symptomatic gallstone diseases over three years were critically and clinically evaluated.

Subject and Method: In a retrospective study, the complications of 242 patients under went laparoscopic cholecystectomy were reviewed clinically and critically.

Results From January 2015 to January 2018, 242 patients underwentlaparoscopic cholecystectomy for the symptomatic gallstone disease. The mean age of the patients was 40.12 year. Six patients were found with immediate bleeding, two caseswith post-operative cholangitis due to passed stone, two patients with late port site hernia, and one case with sub-hepatic collection (abscess), and three cases developed port site infection. The conversion to open surgery was found in three patients (1.24%) only.

Conclusions: The surgeons need to select their patients carefully, equip themselves with the required knowledge of typical procedure-related complications, and chose the best treatment for a safe laparoscopic cholecystectomy.

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Keywords: Laparoscopic cholecystectomy; complication; conversion, injury, gallstone; cholecystitis.

Abdominal pain is one of the most causes for the presence of gallstones[1] and Cholecystectomy is the only effective medical intervention for the management of symptomatic gallstones, which 93% of the patients with gallstone disease issues are referred to surgeons[2].Laparoscopic cholecystectomy has made a revolution in the management of symptomatic gallstone diseases. It has been widely accepted as a surgical intervention for gallstone and cholecystitis[3].The laparoscopic cholecystectomy offers the patients benefits of minimally invasive surgery, which has been mentioned in by other investigators[4, 5] with a minimal hospital stay, a decrease in postoperative pain, an early postoperative recovery, a better cosmetic result, and a decrease in surgery costs.The safety of this procedure has been established in the literature[6].

The spectrum of complications following the presentation of this new minimally invasive surgical technique has been changed such as vascular and bowel injuries and procedure-related complications [7].

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In the present investigation, the spectrum of author' experiences, complications,and management of 242laparoscopic cholecystectomy surgeries waspresented and evaluated critically.

PATIENTS AND METHODS

Study design and patients' recruitment

In the current retrospective clinical trial, a total of 242 patients underwent laparoscopic cholecystectomiesunder general anesthesia at the author's institution in Duhok-Iraq between January2015 and January 2018 were included for the evaluation of their findings in terms of immediate, early, and late complications occurred during and after the surgical procedure. The patients' information was extracted from the local registry for the study aim following taking ethical clearance from the local corresponded department in 2018.

The patients underwent laparoscopic cholecystectomies by the study author met eligibility criteria if they were male or female; without age restriction; with any kinds of clinical complications whether early or late; and irrespective of their socio-demographic aspects. The patients included in the study were underwent laparoscopic cholecystectomies by the study surgeon for the symptomatic gallstones, including right hypochondrial pain/ biliary colic, cholecystitis, gallstone pancreatitis, empyema and gallbladder polyp at the Azadi Teaching Hospital in Duhok. The pregnant women and those underwent open cholecystectomy owing to any condition were not included for the analysis in the presents study. The surgeries were performed under standard medical conditions and their or parents' written consent was taken prior laparoscopy implementation.

Diagnostic and measurement criteria

In the present study, the clinical indications for cholecystectomy were right hypochondrial pain /biliary colic (121 cases); obstructive jaundice (13 cases); chronic cholecystitis (70 cases); acute cholecystitis (20 cases); empyema (6 cases); mucocele (6 cases); gallstone pancreatitis (3 cases); and gallbladder polyp (3 cases), Figure 1.

Figure 1: Multiple Gallstones (Mixed Stones)

The diagnosis of gallbladder stones was established according to trans-abdominal ultrasonography[8]; and magnetic-resonance-cholangiopancreatography (MRCP) [9].

The immediate, early, and latecomplications were defined as the complications occurred during, following 24 hrs, and three months, respectively. The drain was performed in 32 cases due to their difficulties, such as acute cholecystitis and pre-operative endoscopic retrograde cholangiopancreatography (ERCP), including sphincterotomy, stone extraction,and stenting was conducted for 13 cases of jaundice.

Procedures and follow-up

The four-port technique was used to perform the LC. The ports were: a 10 mm infraumbilical camera port. It was inserted direct by using the open technique and insufflating withCO2. The other three ports were inserted under direct monitoring of camera. The gallbladder was retracted up to theright axillary direction.The calot triangle was foundwith the lateral retraction of Hartman's pouch. Dissectionof the hepatoduodenal ligament above the cystic arteryand cystic duct was performed using an electrocautary orblunt laparoscopic traction.

Dissection of the gallbladder peritoneum above the cystic artery with the assistance of electrocautery hookwas an important step in the procedure. The right side of the gallbladder peritoneum was opened, and a hole above the cystic artery was created. Laparoscopic dissector was used in orderto isolate the cystic duct and artery. The cystic plate posterior to cystic artery was dissected, exposing the liver. After meticulous dissection, the cystic artery and duct were isolated (Figure 2)[10].

The patients were asked to attend the Surgical or private clinic for three month period for the follow-up process. The complications of the procedure were recorded during follow-up process through physical and clinical examinations, ultrasonography, and required biochemical investigations.

STATISTICAL ANALYSIS

The descriptive purposes of the study were examined through the frequency distribution. The SPSS version 24:00 was used for statistical calculations.

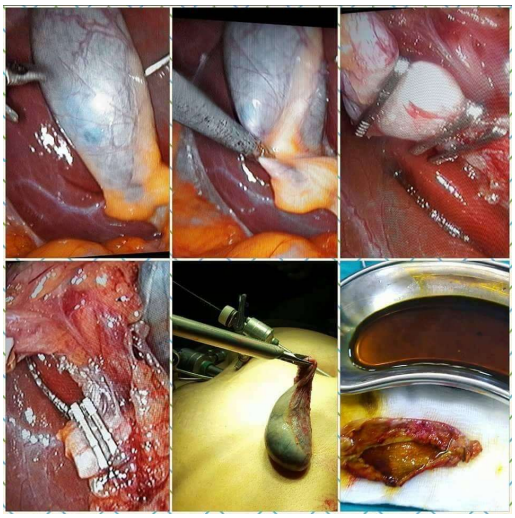

Figure 2: Cholecystectomy Procedure

RESULTS

The mean age of the patients underwent laparoscopic cholecystectomies in the present study was 40.12years (range: 14-80 years). Of the total patients, the majority of them were females (79.8%) and the remaining small percentage were males (20.2%), as shown in **Table 1.**

The immediate complications were seen in 22 patients (bleeding from gallbladder bed in 6 cases) and 16 gallstone spillages. Early complications were found in 3patients, including 1 post-operative bile leak due to liver injury and 2patients with post-operative cholangitis due to passed stone and late complications were seen in 6patients, including 2 patients with port site hernia, 1 patient with sub-hepatic abscess, and 3 cases with port site infection. The rate of conversion to open surgery technique was 1.24% owing to the severe inflammatory reaction and its difficulties in dissection and unclear anatomy of Calot's triangle. No mortality was seen following three months of follow-up at the institution. No patient

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with major bleeding or bile duct injury was found among the patients, as shown in **Table 2.**

One patient was diagnosed with liver parenchyma injury due to epigastric port insertion and developed bleeding and bile leak, which was diagnosed during surgery and controlled by endo-corporeal suture and the bile leak and was stopped spontaneously within 4 days. One case developed sub-hepatic abscess after 10 days from surgery, in which percutaneous drainage was performed for her with the cooperation of an interventional radiologist. One patient developed umbilical port hernia due to local wound infection and abscess, which was later repaired by elective surgery with mesh. One patient developed epigastric port site hernia owing to the big stone extraction (40mm stone) later was repaired by mesh.

No cases of bowel injuries were found in the current study. Severe abdominal pain and jaundice were developed in two cases following surgery. The cases werediagnosed timely as cholangitis due to passed small stone confirmed by a high bilirubin 4 mg/dl and 3.7mg/dl respectively, with normal ultrasound and MRCP and both were managed conservatively with good response. Re-exploration was performed for repairing hernias only.

Table 1: Baseline Characteristics of the Patients Underwent Laparoscopy

Characteristic (n=242)	Frequency Distribution	
	Mean	Standard Deviation
Age, year	40.12	13.37
	Frequency	**Percentage**
Gender		
Male	49	20.2
Female	193	79.8

Table 2: Complications Occurred During and After the Surgery Procedure

Complications Types (n=242)	Frequency Distribution		Complications
	Frequency	Percentage	
Immediate complications	22	9.09	Bleeding from gallbladder bed(6 cases) Gallstone spillage (16 cases)
Early complications	3	1.24	Post-operative bile leak due to liver injury (1 case) Post-operative cholangitis due to passed stone (2 cases)
Late complications	6	2.48	port site hernia (2 cases) sub-hepatic abscess (1 case) port site infection (3 cases)
Conversion to open technique	3	1.24	

DISCUSSION

The current study showed a low rate of complications, including six cases ofbleeding intra-operatively, two cases of postoperative cholangitis due to passed stone, two late port site hernia, and one case sub-hepatic abscess and three cases of port site infectionfollowing three months of follow-up incongruent with some studies[10].

Bleeding

In the present investigation, only 6patients (2.48%) developed minor bleeding during the surgical procedure and were controlled by electrocauteryand clipping during surgery.Although there is no a systematic classification of vascular injuries, the author defined the minor bleeding as a type that the patient did not need a blood transfusion. However, these kinds of vascular injuries occur due to trocar injuries and backs to the surgeon's experience. It seems that a high rate of these injuries is not reported by the investigators.

Different rates of vascular injuries were reported in Iraq. For example, bleeding (4.65%) [11].

Majority of the external bleedings are seen postoperatively following a decrease in the pneumoperitoneum and most of these incidents need surgical intervention as performed in the current study. The risk of bleeding as a complication during the laparoscopy can be reduced with diaphanoscopy during the trocars insertion and careful observation of the skin incision following trocar removing for at least 20 seconds[3].The incidence of minor bleeding injuries is 0.1%-1.2% for the epigastric vessels branches and mesenteric and omental vessels[12]. It is possible the risk of bleeding from the liver bed mainly due to a cirrhotic condition, hence they patients have been classified as laparoscopy contraindication. These kinds of patients were not subjected to laparoscopy.

Gallstone spillage

Gallstone spillage is s common issue during laparoscopy and its estimated rate is 10% - 30%,even is higher than open cholecystectomy [13]. The degree of inflammation and surgeon's experience in laparoscopy are two main predictors of gallstone spillage[14]. In the current study, 16 patients (6.61%) developed gallstone spillage during the surgery. The 10 years experienceof the surgeon in performing the laparoscopy makes this impossible incidence of gallstone spillage compared to above-mentioned studies. This point is important as most of the spilled stones do not cause the symptoms and the symptoms may appear immediately or 2-9 months postoperatively [15]. The current patients were followed up for three months, therefore, the author unable to make justification longer than this time.

The chemical composition of stones and presence of acute gallbladder inflammation or infected bile are risk factors for the symptoms occurrence following gallstone spillage[16]. The surgeon needs to pay the careful attention as the stone maybe lost in the abdominal cavity owing to gallbladder perforation at the time of dissection, or in the abdominal wall at the time of gallbladder extraction and lead to secondary complications[17]. It is important for the patient to be informedon this issue by the surgeon. The spilled stones must be removed and the abdominal cavity rinsed

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with saline solution for gallbladder perforation to prevent complications. However, it must be considered that sometimes the stones pass to common bile duct (CBD) prior performing surgery according to the author's experience.

Bile duct injury

Common bile duct injury (CBDI) is the most frequently reported complication. In comparison with open cholecystectomy (0.125%-0.25%)[18], the incidence of CBDI during laparoscopy surgery is higher, up to 0.5% [19]and 1.97% in acute cholecystitis[20]. The patients included in the study did not develop the bile duct injury. The study infers this absence from CBDI development to the surgeon's experience despite contradictory of the previous studies[21]. This point should be mentioned that majority of bile duct injuries are diagnosed postoperatively and later than open cholecystectomy [22] and between 29%-50% of bile injuries are diagnosed intra-operatively[23].However, this is a major issue in bile duct injuries' management for the surgeons.The surgeons need to diagnose these injuries earlier for results improvement.Alluaibi and Hassan et al [11]reported 4.65% of bile duct injury in Iraq.

Bowel injury

These kinds of injuries probably happen at the time of trocars insertion, and rarely during dissection or adhesiolysis and remain undetected intra-operatively. Its incidence is up to 0.87% during laparoscopic procedures [24].The present study did not find any case with bowel injury. These kinds of injuries can be avoided through the control on the isolation of the medical instruments, strict observation of the activities, and direct vision of trocar placement.

Conversion to open cholecystectomy

Laparoscopic cholecystectomy has been broadly practiced as a surrogate for open cholecystectomy.The literature reports that the rate of intraoperative conversion from laparoscopic cholecystectomy to open cholecystectomy is between 1% and 15%[25]. The conversion rate in the present study was 1.24% due to the severe inflammatory reaction and its difficulties in dissection and unclear anatomy of Calot' triangle. The conversion increases perioperative time, rates of complications, perioperative costs, and hospital stay[26]. Other studies conducted in Iraq found higher rate of conversion to open surgery. For example, Alluaibi and Hassan et al [11] reported that 43 patients of the total 621 patients (6.92%) underwent LC were converted to open cholecystectomies. The factors contributed to the conversion were adhesions of gallbladder and Calot's triangle (39.53%) and acute cholecystitis (34.88%).

Another study in Iraq found that 56 patients of the total 1600 cases (3.5%) were converted to open surgery [27]. The most common reasons was mentioned to be responsible for the conversion was difficult to define anatomy in patients with inflamed, contracted gall bladder in 42 cases.

The conversions have been shown to associate with some complications, including mortality, bile leakage, bile duct injury, bleeding, or need for reoperation[28].These kinds of complications were not followed and recorded in the

current study as it was outside the study scope. Several risk factors have been reported for conversion from laparoscopy to open cholecystectomy, including evaluated body mass index or weight; Gallbladder wall thickness (more than 4 mm as a thickness cut-off); previous history of abdominal surgery; choledocholithiasis; impacted stone at the neck of gallbladder; male gender; older age; emergency cases; acute cholecystitis; raised alkaline phosphatase (ALP); evaluatedtotal bilirubin; elevated white cell count; and etc[29].Difficult dissection of Calot's triangle during surgery[29] and tissue inflammation [30]are the most common risk factors of conversion as shown in the present study. The rate of conversion in the current study was so low; therefore, the author was unable to identify its predictors.

Limitations of the study

The author does not see any bias in the retrospective design of the study in terms of recall bias as the finding of all surgeries were recorded by the author in registry system. However, the study was not exempt from the weaknesses. The author was not able to determine the surgery difficulty grade owing to the high load of patients at this institution. In addition, it was not possible for the authors to follow-up the patients for longer than three months facing the study with the problem to make a between-study comparison.

The current investigation found a very low rate of complications, including 6 minor bleeding intra-operatively, 2 case with cholangitis, 1 case of port insertion liver injury, 1case of a subhepatic abscess, and 2 cases with port site hernia, and 3 patients with port site infection. The majority of the laparoscopy procedures could be avoided through the raising the knowledge on these kinds of complications and enhancing the surgeons' experience. The author backs the low rate of complications to the strict implementation of safety triangle[31] leading to a decrease in CBD and gallstone spillage. It is required to make a stable condition of the patient throughout the surgery and postoperatively.

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CONFLICT OF INTEREST

The study has only one author with no conflict of interest.

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پوختە

راکرنا کیسێ زراڤێ ب دویربینێ: ڤەکۆلینەکا سێ سالی

ئارمانج و پێشەکی: لاپاروسکوپی یان دویربین شورەشەک ل چارەسەریا نەخوشی یێن بەرکێن نیشاندار دروست کریە. لاپاروسکوپی وەکو تەکنیکەکا نەشتەرگەری بۆ بەرکێن زراڤی هاتیە پەسەند کرن. دیتنا ئاڵوزی یێن پشتی نەشتەرگەریا لاپاروسکوپی هاتیە گوهەرتن. ل ڤەکۆلینا بەردەست، ئاڵوزی یێن یەکسەر، زوو، و درەنگێن گرێدایی لاپاروسکوپی ل 242 نەخوشێن ب هەبونا بەرێ زراڤی هاتن دیار و راڤە کرن.

شێوە: ل ڤەکۆلینا بەردەست، ئاڵوزی یێن 242 نەخوشێن زراڤی کۆ لژێر نەشتەرگەریا لاپاروسکوپی هاتنە چارەسەر کرن، بشێوەیەکێ زانستی و کلینیکی هاتن راڤەکرن.

ئەنجام: ل بەروارێن ٢٠١٥ حەتا ٢٠١٨، 242 نەخوشێن ب بەرکێن زراڤی هاتن لێگەریان. تەمەنێ نەخوشان40.12 سال بو لناڤ نەخوشان، خوین بەربونەکا سڤک لناڤ شە ش نەخوشان، دوو ب چرکا زراڤی، دوو ب فتق، و ئیك ب کێم هاتنا لبن میلاکی و سی هاودانین برینیت دویربینی هاتن دیارکرن.

دەرئەنجام: نەشتەرگەر پێدڤی دکەت کۆ بهورکاتی کار بکەن و هەمو زانیاری یێن پێدڤی هەبن دا کۆ ئاڵوزی یێن پشتی نەشتەرگەریا لاپاروسکوپی کێم بکەن.

الخلاصة

استئصال المرارة بالمنظار: دراسة استعادية لمدة ثلاث سنوات

الخلفية والأهداف: استئصال المرارة بالمنظار قد أحدث ثورة في السيطرة على أمراض المرارة العرضية. لقد تم قبول استئصال المرارة بالمنظارعلى نطاق واسع كتدخل جراحي في حالات حصوات المرارة والتهاب المرارة. تم تغيير سلسلة المضاعفات بعد تقديم هذه التقنية الجراحية الجديدة الأقل اجتياحا.

في الدراسة الاستعادية الحالية، تم تقيم المضاعفات الأنية والمبكرة والمتأخره المتعلقه باستعمال المنظار في 242 مريض يعاني من حصوات المرارة العرضي تم تنظيريهم وخضعهم لأستصال المرارة على مدى ثلاث سنوات تم تقييمها بشكل نقدي وسريريا.

طرق البحث: في دراسة استعادية ، تم استعراض المضاعفات السريريا الخطيرة ل 242 مريض استئصلت مراراتهم بالمنظار لأمراض الحصوة المرارية.

النتائج: من يناير 2015 إلى يناير 2018 ، خضع 242 مريض لأستئصال المرارة بالمنظار لأمراض الحصوة المرارية. كان متوسط عمر المرضى 40,12 سنة.

تم العثور على ستة مرضى مع نزف طفيف على الفور، حالتين التهاب الأقنية الصفراوية بعد العملية بسبب الحجر الذي تم تمريره، واثنين من المرضى الذين يعانون من فتق متأخر في موقع القصطرة البوابية، وحالة واحدة تطورت الى خراج تحت الكبد و ثلاث حالات التهاب جروح فتحات الناظور.

الاستنتاجات: يحتاج الجراحون إلى اختيار مرضاهم بعناية، وتجهيز أنفسهم بالمعرفة المطلوبة لأجراء النموذجي المرتبط في المضاعفات ، واختيار أفضل و أمن طريقة لعلاج المرارة وأستئصالها بالمنظار.

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