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Laparoscopic Cholecystectomy in Patients with Previous Abdominal Surgery

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1. Abstract

1.1. Background

Laparoscopic cholecystectomy (LC) is the gold standard surgical treatment for symptomatic gallstone disease. Although previous abdominal surgery was traditionally considered a contraindication to laparoscopic procedures, advances in surgical techniques and instrumentation have made LC feasible in patients with a history of abdominal operations. However, postoperative adhesions may increase technical difficulties, operative time, and the risk of complications.

1.2. Objective

To evaluate the impact of previous upper and lower abdominal surgeries on the outcomes of laparoscopic cholecystectomy, particularly operative time, conversion to open surgery, postoperative pain, length of hospital stay, and early postoperative complications.

1.3. Patients and Methods

This prospective study included 360 patients who underwent laparoscopic cholecystectomy at Basrah Teaching Hospital, Basrah, Iraq, between January 2016 and July 2018. Patients were divided into three groups according to their surgical history: Group A included 241 patients without previous abdominal surgery, Group B included 22 patients with previous upper abdominal surgery, and Group C included 97 patients with previous lower abdominal surgery. Demographic characteristics, operative time, conversion rate, postoperative pain assessed using the Visual Analog Scale (VAS), length of hospital stay, and early postoperative complications were compared among the groups. Statistical analysis was performed using SPSS version 20, with a p-value of less than 0.05 considered statistically significant.

1.4. Results

The mean operative time was significantly longer in Group B (73.1 ± 34.4 minutes) compared with Group A (57.6 ± 26.1 minutes) and Group C (53.2 ± 23.1 minutes) ($p = 0.031$). Postoperative pain scores were also significantly higher in Group B (4.2 ± 2.1) compared with Group A (2.7 ± 2.5) and Group C (2.6 ± 2.1) ($p = 0.01$). Early postoperative complications occurred in 22.7% of patients in Group B, compared with 4.2% in Group A and 3.1% in Group C ($p = 0.004$). All reported complications were minor, including wound seroma, hematoma, and infection. Only one patient (4.55%) in Group B required conversion to open cholecystectomy because of extensive intra-abdominal adhesions. Although the mean hospital stay was longer in Group B (3.2 ± 1.4 days) compared with Group A (1.4 ± 1.02 days) and Group C (1.32 ± 1.22 days), the difference was not statistically significant ($p = 0.064$). No mortality was reported.

1.5. Conclusion

Previous abdominal surgery is not an absolute contraindication to laparoscopic cholecystectomy. A history of upper abdominal surgery is associated with significantly longer operative time, increased postoperative pain, and a higher incidence of minor postoperative complications. In contrast, previous lower abdominal surgery does not appear to significantly affect surgical outcomes. With appropriate surgical expertise, careful trocar placement, and meticulous adhesiolysis, laparoscopic cholecystectomy can be performed safely in patients with previous abdominal operations.

2. Introduction

Laparoscopic cholecystectomy (LC) is the gold standard approach in the treatment of cholelithiasis, as it has a lot of advantages over the open procedure, such as a short hospital stay, fast return to daily activity, better cosmetic results and lower rate of morbidity and mortality [1,2].

The revolution of laparoscopic surgery began when laparoscopic cholecystectomy was introduced about three decades ago. In 1987 laparoscopic cholecystectomy introduced by Phillippe Mouret in France, it did not take a long time for consensus to develop and for

the national institutes of health to pronounce laparoscopic cholecystectomy (LC) as the treatment of choice for many patients with symptomatic cholelithiasis [3].

Initially, pregnancy, previous abdominal surgery, obesity, acute cholecystitis, and liver cirrhosis were considered as absolute contraindications for the laparoscopic surgery [4,5].

As a result of new developments in laparoscopic instrument technology and improved laparoscopic experience of the surgeons, all of these contraindications were accepted as relative contraindication for (LC) [5].

Previous abdominal surgery particularly is associated with difficulty in placing the first trocar and obtaining adequate exposure of the gall bladder [4]. The potential risk for injury of organs adherent to the abdominal wall during Veress needle or trocar insertion and the need for adhesiolysis and its related complication are the two major problems that prevent surgeons from performing laparoscopic cholecystectomy for patients with previous abdominal surgery [4].

With improving of the surgeon experience, and the development of new surgical laparoscopic instrument technology, many surgeons observe that laparoscopic cholecystectomy is applicable for those patients [6,7].

Peritoneal adhesions describe a condition in which pathological bonds form between the omentum, the small and large bowels, the abdominal wall, and other intra-abdominal organs.

Different classification systems have been proposed, but they do not resolve the underlying problem of ambiguity in the quantification and definition of adhesions [2].

Peritoneal adhesions can be classified into three categories congenital, inflammatory (e.g., post-infectious or due to endometriosis), and post-operative. Post-operative adhesions occur secondary to surgery, and they represent the most frequent complication of abdominal and pelvic operations [9].

The weighted mean formation rate of adhesions after abdominal surgery was 54 %, and was 66 % after gastrointestinal surgery, 51 % after obstetric and gynaecological surgery and 22 % after urological surgery. The mean overall severity score was 1.11 ± 0.98 according to the Operative Laparoscopy Study Group classification. Laparoscopic surgery reduced the adhesion formation rate by 25 % and decreased the adhesion severity score (laparoscopic. 0.36 ± 0.69 vs. open; 2.14 ± 0.84) for gastrointestinal surgery [10].

There is a limited report on the effect of previous intra-abdominal surgery on the safety of LC, so we collected our database specifically to investigate the effect of previous abdominal surgery on laparoscopic cholecystectomy.

3. Aim and Objective

In this work we try to evaluate the effect of previous upper and lower abdominal surgeries on laparoscopic cholecystectomy in terms of conversion rate, length of hospital stays, postoperative pain, and post-operative complications.

4. Patient and Method

Prospective study was conducted at surgical ward I at department of Surgery, Basrah Teaching Hospital, Basrah, Iraq.

Patients who laparoscopic cholecystectomy done for them between January 2016 and July 2018 were included into this study .patients of both sex and all ages were included in the study , all patients were admitted day before surgery ,after taken a medical history and through physical examination, laboratory investigation done both hematological and biochemical laboratory tests include CBC , Bleeding profile, Viral profile, RBS, BUN, LFT, were taken, Chest x-ray and ECG also done in day before surgery.

Patients with symptomatic cholelithiasis, chronic calculus cholecystitis, Acute cholecystitis in Golden period ((less than 10 days)) and patients who planned for interval laparoscopic cholecystectomy after acute calculus cholecystitis (after 6 weeks interval) and patients who develop acute calculus cholecystitis during the interval period were included in the study.

The patient who operated on and found with delayed Acute Calculus Cholecystitis was excluded from the study.

All the laparoscopic surgeries were performed by the same expert surgeon.

We divided the included patients into three groups as: patients who did not have history of previous intra-abdominal surgery (group A), patients with history of previous upper abdominal surgery as (group B), and patients with previous lower abdominal surgery as (group C). patients with previous surgery with extended midline incision were also included in group B.

The three groups are compared regarding their demographic distribution, BMI(body mass index, ASA(American society of anesthesia) criteria, operative time that divided into :time for access, time need to reach the target ‘’calot triangle ‘and time required to dissect calot triangle and dissect gall bladder from liver bed and retrieval of gall bladder and closure of port site ‘’ operative time” , indication of surgery, post-operative pain and early (less than 30 days) complication. The post-operative pain grade was measured by the (VAS) Visual Analog Scale on (day one) post-operatively.

All the patients receive prophylactic doses of antibiotics and anticoagulant with the induction of anesthesia.

The laparoscopic cholecystectomy was done by using standard four trocar techniques:

Under general anesthesia, the patient is placed supine on the operating table with the surgeon standing at the patient’s left side. The initial access to the abdominal cavity (scope port) 10 mm inserted at the supra-umbilical area slightly right to the midline by closed method. If the patient had previous lower abdominal surgery the first trocar or Veress needle were inserted at the supra-umbilical area and when an upper abdominal scar was present, the needle or trocar were inserted at infra-umbilical area. The laparoscope with the attached video camera is passed through the umbilical port and the abdomen inspected. Three additional ports are placed under

direct vision. A 10-mm port is placed in the epigastrium, a 5-mm port in the mid-clavicular line, and a 5-mm port in the right flank, in line with the gallbladder fundus.

Once the surgeon had entered the peritoneal cavity, only adhesion that prevent adequate visualization and insertion of the other working trocars or those interfere with adequate access to the operative field and the performance of laparoscopic cholecystectomy were dissected. Introduce the laparoscope through a window of adherent omentum, blunt dissection using the cannula or the camera, and sharp dissection using Maryland dissector, hook diathermy, Harmonic scalpel forceps or scissor were used for division of adhesion when necessary.

Some time we used more than four ports (five, six or more) especially in previous upper abdominal surgery &difficult to perform 1st access, so we start with palmer point, left flank or any site in abdomen away from the previous scar to perform safe adhesiolysis.

In thirteen cases pneumoperitoneum was established with Veress needle at the palmer's point (at the left. hypochondrium, just below the costal margin in the midclavicular line), and after water test for positioning and gentle induction of pneumoperitoneum, blind introduction of the initial trocar, then umbilical and epigastric trocar were introduce under direct vision, following the division of all obstructing adhesion usually through epigastric and umbilical trocar, the laparoscope was then moved to the umbilical port and routine laparoscopic cholecystectomy were performed.

{Adhesion means the formation of band of fibrous tissue between bowel loops and inner lining of abdominal wall (peritoneal lining) or with other organs within the abdominal cavity (liver, gall bladder, uterus), adhesion can also form between loops of small and large intestine.

The operating surgeon determined conversion to an open cholecystectomy without any strict criteria other than safe adhesiolysis, and exposure of the operative field.

All patients admitted to surgical ward postoperatively, single dose of antibiotic is given with intravenous fluid and pain killer. Patient's vital signs were checked every four hours in the word. And most of the patients are discharged on the first post-operative day.

5. Statistical Analysis

The statistical analysis for group comparison was done using SPSS version 20, the p value of less than 0.05 by statistical analysis comparative by one way ANOVA (Analysis of variance, is a collection of statistical models and their associated estimation procedures).

6. Result

A total of 360 patients that met the criteria of our study were included. (241) patients in Group A, (22) patients in group B, and group C (97) patients. Patient's demographics data are shown in Table 1.

The overall mean age was 49.3±14 range (19-80) years, the body mass index (BMI) was 28.5±6.2 (range 18-50) kg/ m2. Group C has higher percentage of female (88.65) patients than group A (51.6%) and group B (36.3%). Operative time was 58 ±26 (range 20-110) min. The VAS score was 2.7±2.4 (range0-10), and length of hospital stay LOS was 1.5 ±1.7 (range, 0-28) days.

The incidence of cholecystitis and length of hospital stay were compared between the groups.

The mean operative time is significantly higher in group B (73.1±34), 24-155min) compared to Group A (57.6± 26.1, 24-230 min) and Group C (53.2±22.1, 25-110 min) (P=0.032). There is similar operative time between Group A and C. [the time of entrance and the time required to reach the target (calot triangle) higher in group B compared to group A and C], this difference due to the presence of adhesion in patients with previous upper abdominal surgery.

Group B has a statistically high VAS score (4.2±2.1, 0-10) than Group A (2.7± 2.5, 0-10) & Group C (2.6 2.1, 0-10).

There is only one patient that has an open cholecystectomy done for him. This patient in Group B was operated on for perforated duodenal ulcer and extensive adhesion was found during laparoscopic surgery.

There is no mortality and the short-term complication (< 30 days) in Group B were statistically higher (n=5, 22.7) (P=0.004). All were minor complications including wound seroma, hematoma, and infection.

Table 1: Demographic distribution.

	Patients without any previous abdominal operations	Patients with previous upper abdominal operations	Patients with previous lower abdominal operations	P value
	(Group A, n=241	(Group B, n=22	(Group C, n=97	
Female	133	8	86	
Male	108	14	11	0.001
Age (years)	49.55±12.5	50.76±15.3	45.36±17.8	0.06
BMI (Kg/m2)	29.48±6.07	28.6±4.23	27.54±3.7	0.3
ASA				
I	181(75.1)	15(86.1)	85(87.6)	
0.06				
II	51(20.9)	7(31.8)	10(10.3)	
III	9(3.7)	0	2(2.1)	

Table 2: Type of previous surgery.

Type of surgery	No.
Upper abdominal surgery	22
Highly Selective Vagotomy (HSV)	1
Hydatid Endo cystectomy	3
Explorative laparotomy (penetrating abdominal inj.)	3
Perforated DU	4
Splenectomy	2
Drainage of necrotizing pancreatitis	1
RHC (right hemicolectomy). (Extended midline)	1
Epigastric hernia	5
Anti-reflux surgery (fundus fundoplication)	2
Lower abdominal surgery	97
C.S caesarean section	65
Appendectomy	17
TAH hysterectomy	8
Ovarian cystectomy	4
Oophorectomy	3

Table 3: comparison of operation indication, operative time, conversion rate, LOS, VAS score and early complication between the three groups.

	Patients without any previous abdominal operations	Patients with previous upper abdominal operations	Patients with previous lower abdominal operations	P value
	(Group A, n=241	(Group B, n=22	(Group C, n=97	
Operation indication	80(33.2) 161(66.8)			
Acute cholecystectomy		5(22.77)	34(35.1) 63(64.9)	
Elective cholecystectomy		17(77.23)		0.561
Operation time (minutes)	57.6±26.1	73.1±34.4	53.2±23.1 10.1± 4.3	
Time of entrance	9.7± 3.1	17.2± 5.1	18.77± 7.2	0.031
Time required to reach target	19.7± 6.4	32.3± 10.22		
Conversion	0	1	0	
Length of hospital stay (day)	1.4±1.02	3.2±1.4	1.32±1.22	0.064
Postoperative VAS score 2.7±2.5 4.2±2.1 2.6±2.1 0.01				
	Early complication			
	No	231(95.8)	17(77.28)	94(96.9)
0.004	Yes	10(4.2)	5(22.72)	3(3.1)

7. Discussion

According to the results of our study, in patients who had previous upper abdominal surgery, there was longer operation time, and the complication rates and VAS score were higher comparing with those who did not have any abdominal surgeries and those who had previous lower abdominal surgery.

In our study the conversion rate in 241 patients without prior abdominal surgery was nil.

In group B was 4.55% (n=1).

If both group upper and lower abdominal surgery were combined [Group B&C], the conversion rate was 0.84% (n=1).

In the study performed by Karayiannakis et al, in 2003 [4],a total of 1,638 patients were divided into three groups ,when conversion rate were compared (19%) of patients with previous upper abdominal surgery ,(n=58),and (3.3%) of patients with previous lower abdominal surgery (n=153),and (7.5%)of patients with both upper and lower abdominal surgery(n=16)were converted to open cholecystectomy. In a similar study, Akyürek et al. [5], showed that in 192 patients with prior abdominal surgery the total conversion rate was 2%. This difference may be due to improvement of laparoscopic surgical tools and due to wider experience of laparoscopic surgery and defined safe methods of cholecystectomy.

However, studies in patients with prior abdominal surgery vary in terms of complications, length of hospital stay, and conversion rate.

Unal et al. [11], showed that previous upper abdominal surgery was not a risk factor for conversion. On the other hand, Karayiannakis et al. (4) also reported higher complication and longer length of hospital stay (3.4±2.1 days) for patients with previous upper abdominal surgery than without previous upper abdominal surgery. In contrast to this study, our increased operative time and rate of complication did not result in a prolonged hospital stay (3.2±4.1 days, p=0.065) for patients with previous upper abdominal surgery.

In our study, although a trend toward an increased length of hospital stay in those with previous upper abdominal surgery was reported, the difference was not statistically significant (p=0.065). When rates of complication are compared, those with upper abdominal surgery showed a significantly higher rates of complication (p=0.004). However, this difference did not affect the length of the hospital stay. In our opinion, the reason may be due to the fact that all complications were minor.

It is proposed that previous abdominal surgery increases the risk of iatrogenic bowel injury by causing adhesions or obstructing the visualization of hepatobiliary structures and limiting the working area [12].

Adhesions and scar tissue were shown to restrict safe entrance into the abdomen and cause intestinal and other intra-abdominal organ damage (12). It has been reported that the possibility of intestinal injury is higher during the first trocar entry in patients with previous abdominal surgery, and these injuries are noticed later because of limited visualization due to adhesions. Despite the accepted superiorities of laparoscopic cholecystectomy compared with its open equivalent, conversion to open surgery can be necessary in difficult cases to prevent inadvertent injuries. It should be noted that meticulous adhesiolysis is necessary to prevent iatrogenic injury.

The mean operation time was statistically significantly longer in those with previous upper abdominal surgery [Group B] compared with [Groups A] and [Group C] (p=0.031). The time spent for trocar entrance and time for adhesiolysis around the gallbladder could be the reasons for this statistically longer operative time in Group B. There was a significantly greater number of females in those with history of previous lower abdominal surgery [Group C] (88.65%). This was because lower abdominal surgeries including Cesarean section, hysterectomy, and oophorectomy were specific for females. However, adhesions in this region did not adversely influence the operation time. Akyurek et al. (5) demonstrated that adhesions were the most common cause for conversion to open surgery. In the same study, however, it was documented that adhesiolysis itself did not result in complications. Adhesiolysis may increase postoperative pain, and hospital stay [4,12]. In our study, the mean VAS score was statistically significantly greater in [Group B] compared with that in [Groups A] and [Group C] (p=0.01). This difference could be related to the increased amount of adhesions and subsequent need for adhesiolysis in [Group B]. However, an increased VAS score did not lead to an increase in length of hospital stay LOS.

8. Conclusion

Previous abdominal operations, even in the upper abdomen, are not a contraindication to safe laparoscopic cholecystectomy. Previous upper abdominal surgery results in a longer operation time, higher postoperative pain, and greater rates of (minor) port site complication after Laparoscopic Cholecystectomy compared to patients without previous abdominal surgery and with prior lower abdominal surgery. However, in this study, prior abdominal surgeries did not increase the conversion rate and length of hospital stay after Laparoscopic cholecystectomy. Further studies that would include patients with a higher number of previous abdominal surgeries are required.

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