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SAFETY AND EFFECTIVENESS OF THREE-PORT LAPAROSCOPIC CHOLECYSTECTOMY

Surgery

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ABSTRACT

Most commonly performed laparoscopic surgery is laparoscopic cholecystectomy. Although cholecystectomy through three port is not commonly preferred, researches have shown that it is a safe and feasible way of surgery. **Material and Methods.** We evaluate 100 patient that have undergone elective laparoscopic cholecystectomy through three port (group one). These patients were compared with 50 patients that have undergone laparoscopic cholecystectomy through four port (group two). Complications, lenght of stay in hospital, operation time, conversion to open surgery rate were compared in two group. **Results:** In group one, fourth port was necessary for nine (9%) patients. Duration of operation in group one was in average 31 min and in group two, 31, 3 min. Operation time, lenght of stay in hospital, complication rate, conversion to open surgery rate was similar in both groups. **Conclusion:** Three port laparoscopic cholecystectomy is a safer method when performed by experienced surgeons. Laparoscopic cholecyctectomy can be tried through three ports firstly and can be continued with addition of fourth port if necessary.

KEYWORDS

Laparoscopic cholecyctectomy, three port cholecyctectomy, cholelithiasis, minimal invazive surgery

INTRODUCTION

Laparoscopic cholecystectomy (LC) was first performed in 1987 by Philip Mouret. It is a standard approach for the surgical treatment of symptomatic cholelithiasis and gallbladder polyps [1]. LC is traditionally performed through four ports [2], but recently to reduce analgesic need and obtain a better cosmetic result one- two-, and three-port LC has been performed [3,4]. Although three-port cholecystectomy is not common, research has demonstrated that it is a safe and feasible surgical technique [5,6]. In this study, the results of patients that underwent three-and four-port LC were compared.

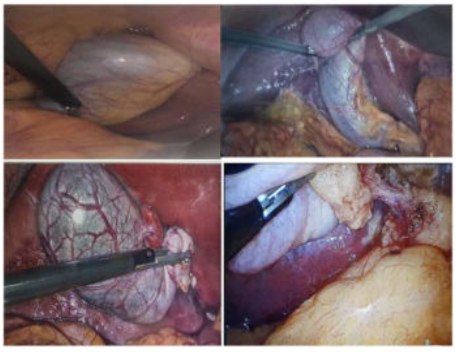

Figure:1 Laparoscopic viwes of three-port laparoscopic cholecystectomy.

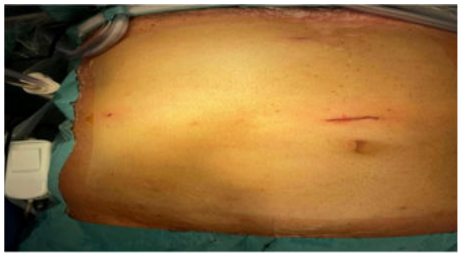

Figure 2: Ports position in three-port laparoscopic cholecystectomy.

Three- port laparoscopic -a 10-mm supra- umbillical camera port, two 5-mm working ports in epigastric and right hypochondrium region.

MATERIALS AND METHODS

The current study was conducted at SN Medical College , Agra between March 2021 till march 2023. This retrospective study evaluated the records of 200 consecutive patients who underwent elective three- or four-port LC. Group 1 was composed of 100 patients that underwent three-port LC for cholelithiasis or gallbladder polyps. Group 2 contained 100 patients that underwent four-port LC. Patients with acute cholecystitis, right-upper abdominal sensitivity, a leukocytosis, gallbladder wall thickening detected during ultrasonographic examination, and those who underwent additional surgical intervention at the same time as LC were excluded from this study. Patients who underwent an elective LC for cholelithiasis and had signs of cholecystitis detected during the operation were included. All operations were performed by the same general surgeon with the assistance of one or two nurses.During three-port LC, a 10-mm trocar was first placed in the umbilicus under direct vision. A second 10-mm trocar was then placed inferior to the sternum at the midline, while the third 5-mm trocar was placed 4-5 cm inferior to the costa on the right midclavicular line. Patients were positioned on their left side with their heads turned upwards. Similar to four-port LC, the surgeon and the assistant operating the camera were on the left side of the patient and the monitor was on the right. A grasper was placed in the 5-mm port and onto the infundibulum of the gallbladder. Suture or any other material was not used to suspend the gallbladder. The cystic duct and artery were dissected. A clip was placed over the cystic duct and artery and then they were cut. The gallbladder was removed from the port inferior to the sternum. A drain was placed in the 5-mm port when necessary. Four-port LC was performed in the classical method as described previously.Data were analyzed with the Statistical Package for the Social Sciences (SPSS) version 17 (SPSS Inc., USA). Categorical values were analyzed with a chi-square test, parametric values with Student's t-test, and non-parametric values with the Mann-Whitney U test. A P-value less than 0.05 was considered to indicate statistical significance in all tests.

RESULTS

In Group 1, 77 of the 100 consecutive patients were female and 23 male. The Group 1 female to male ratio is 3.3/1. In Group 2, 82 of the 100 patients were female and 18 male with a female to male ratio of 4.6/1 (P=0.381). The average patient age in Group 1 was 53 years (range, 26 to 83) and 51.3 years in Group 2 (range, 23 to 84) (P=0.312). The preoperative diagnosis was similar in both groups (Table 1).

Table 1 Patient characteristics and diagnosis

Characteristic	Group 1 (n=100)	Group 2 (n=100)	P
Sex			0.381
Female	77	82	
Male	23	18	
Age (yr), mean ± SD (range)	53.0 ± 12.8 (26-83)	51.29 ± 12.9 (23-84)	0.312
Preoperative diagnosis			0.561
Symptomatic gallstone	99	98	
Gallbladder polyp	1	2	

In Group 1 the patients past medical history included: cholecystitis in 11 patients (11%), pancreatitis in four patients (4%), previous endoscopic retrograde cholangiopancreatography (ERCP) due to choledocholithiasis in six patients (6%), and upper abdominal surgery with a midline incision in six patients (6%). During the operation signs of cholecystitis were observed in four (4%) patients and hilar adhesions in 18 (18%) Group 1 patients. One patient's surgery was converted to an open procedure due to dense adhesions from a previous surgery for a traumatic liver injury. A fourth port was added during the LC of nine (9%) Group 1 patients: four for adhesions, one for perioperative bleeding, one for cholecystitis, one for clip displacement, one for advanced hydrops of the gallbladder, and one due to inability to visualize normal anatomy despite adequate dissection (Table 2). Drains were necessary in 20 (20%) Group 1 patients, and all drains were removed by the first postoperative day. All Group 1 patients were able to ambulate following the operation and resumed oral intake after six hours. The average hospital stay of Group 1 patients was 1.1 days (range, 1-2 day). Length of hospital stay was similar in Groups 1 and 2 (P=0.312). Group 1 patients did not experience any complications during their operation and subsequent hospitalization. A subcapsular hematoma was detected in the posterior segment of the right lobe of the liver in a patient hospitalized with abdominal pain on postoperative day 4. One patient was diagnosed with a pulmonary embolus on postoperative day five after developing dyspnea. Both of these patients were in Group 1 and were referred to an advanced clinic.

Table 2 Reason for need to use the 4th port during 3 port LC

Reason	n
Adhesions	4
Bleeding	1
Cholecystitis	1
Displacement of clip	1
Advanced hydrops of gallbladder	1
Inability to view normal anatomy	1

In Group 2 the patients' past medical history included: cholecystitis in 12 (12%) patients, pancreatitis in 3 (3%) patient, and a previous upper abdominal surgery with a midline incision in 3 (3%) patient. During LC signs of cholecystitis were observed in 3 (3%) Group 2 patient and hilar adhesions in 15 (15%) patients. In Group 2 none of the LCs was converted to open surgeries. The average hospital stay in Group 2 was 1.1 days (range, 1-2 day).

The average operative time in Group 1 was 31 min (range, 15-64) compared to 31.6 min (range, 19-70) in Group 2. Operative times were similar between the groups (P=0.630; Table 3). In Group 1, the operative time was significantly longer in patients with cholecystitis detected during the operation, a previous history of upper abdominal surgery, a long gallbladder, or intra-abdominal adhesions. The average operative time for the first 25 Group 1 patients was 33 min. Average operative times decreased for the second, third, and fourth groups of 25 patients to 31.4, 30.2, and 29.6 min, respectively.

Table 3 Clinical outcome of intraoperative parameters

Parameter	Group 1	Group 2	P
Operative Time (min), Mean ± SD (range)	31 ± 9.1 (15-64)	31.6 ± 7.6 (19-70)	0.630
Conversion rate %	1	0	0.480

DISCUSSION

The most commonly performed laparoscopic surgery is LC [7]. The aims of laparoscopy include decreased pain, improved cosmetic results, and a decreased duration of hospital stay compared to laparotomy. For this reason, LC is performed through fewer and smaller ports. In recent years multiple studies of single incision laparoscopic surgery (SILS) have been published. The only reported advantage of SILS over standard LC is an improved cosmetic result [8,9]. Four-port LC is mostly commonly used, as this method provides better anatomic views and is easier to learn.

Multiple studies report that three-port LC is safe [5,6,10]. In a meta-analysis of five studies comparing three- and four-port LC, the operative time, need for analgesics, success rates, and duration of hospital stay were similar [7].

In the present study, the operative time of three-port LC was significantly longer in patients with a longer gallbladder, past history of upper abdominal surgery, intra-abdominal adhesions, and edema of the gallbladder detected during the operation. A previous history of cholecystitis, pancreatitis, icterus, or ERCP did not affect operative times. A long gallbladder can be difficult to dissect through a narrow hilum. Kumar et al. found that a long gallbladder increased operative times [10], similar to the results of the present study. Dissection may also be difficult in patients with an edematous gallbladder wall since properly moving the gallbladder is difficult. While three-port LC operative times were longer in patients with a long or edematous gallbladder, the need for a fourth trocar was not increased in these patients.

In the present study operative times were similar in both groups. The average duration of three-port LC was approximately 31 min. The average operative time of the first 25 consecutive three-port LC patients 33 min, compared to 29.6 min in the last 25 patients. Although this difference was not statistically significant, operative times decreased as the number of patients increased.

In multiple studies similar operative times were reported for three- and four-port LC [5,7], similar to the present study. However, decreased operative times with three-port LC have been reported [10]. Three-port LC may have shorter operative times, because less time is spent inserting trocars and suturing. Additionally, all instruments except the camera are handled by the surgeon in three-port LC. In contrast, instruments used to manipulate the fundus are held by assistants in four-port LC, and the surgeon must spend additional time orienting the assistant and requesting the correct positioning.

Sun et al. reported a similar rate of conversion to an open surgery in three- and four-port LC [7]. In the present study laparotomy was needed in only one patient, who had a history of previous laparotomy due to liver trauma. An additional port was needed in nine patients, mostly due to adhesions.Research indicates that three-port LC is safe with the same rate of choledocal injury as four-port LC [5,6,11]. Al Azawi et al. found that three-port LC was safe even in patients with acute cholecystitis [12]. None of the patients in the present study experienced choledocal injuries. Three-port LC also costs less than four-port LC [13], since three-port LC can be performed with fewer assistants and instruments, reducing costs.

In conclusion, three-port LC is safe when performed by an experienced surgeon. LC can be initially attempted with three ports and converted to four ports if necessary.

Disclosure of conflict of interest

None.

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