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COMPARATIVE STUDY BETWEEN MINI-LAPAROSCOPIC CHOLECYSTECTOMY VERSUS STANDARD LAPAROSCOPIC CHOLECYSTECTOMY IN NINEVEH PROVINCE-IRAQ

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ABSTRACT

Background: Laparoscopic cholecystectomy is now the accepted treatment technique for cholelithiasis and cholecystitis symptoms of varying severity. Surgeons are concerned about using a smaller port in miniport laparoscopic cholecystectomy, which may result in complications, additional operations, and conversion to open surgery. **Objectives:** To compare the advantages and intraoperative complications of miniport laparoscopic cholecystectomy in comparison with standard port laparoscopic cholecystectomy in an Iraqi population in Nineveh province/Iraq. **Methods:** This is a prospective observational comparative study conducted at Mosul General Hospital and Shingal (Sinjar) General Hospital From the 1st of October 2022 to the end of December 2023. All patients diagnosed with symptomatic gallbladder stones who visited the emergency room and surgical consultation clinic were included in the two groups of the study. The miniport group had a four-port mini laparoscopic cholecystectomy, whereas the standard laparoscopic group received a four-port standard laparoscopic cholecystectomy. The study excluded patients with ASA grade III/IV, previous major abdominal operations, choledocholithiasis or acute cholecystitis, malignancy, pancreatitis on ultrasonography, and BMI > 30. The study included 213 patients, 100 of whom met all inclusion criteria. The questionnaire was consisted from 5 parts. Part one for sociodemographic information. Part two for operation condition. Part three for postoperative pain severity by using Wong-Baker Face Scale after 2, 6, and 12 hours. Part four for analgesic used and part five for cosmesis assess at 7 days after operation. **Results:** The study includes 100 patients with symptomatic gallstone. The mean age ± standard deviation of the study participants was 41.24 ± 7.51 years. Of them, 63 (63%) patients were females and 37 (37%) were males, with male to female ratio of 1:1.7. Statistically significant difference between the two groups regarding their operation time (mini laparoscopic operation) spend more time (P value < 0.001). Moreover, patients undergoing mini laparoscopic operation reported statistically significant less postoperative pain scores (P value < 0.001). Additionally, patients undergoing mini laparoscopic operation reported statistically significant higher cosmetic score (P value <0.001). Moreover, statistically significant difference between the two groups regarding their conversion rate (higher in mini laparoscopic group) (P value <0.001). On the other hand, patients undergoing standard laparoscopic surgery need statistically significant more postoperative analgesia. (P value = 0.014). No statistically significant difference found between the two groups regarding postoperative complications (P value = 0.472). **Conclusion:** Mini laparoscopic cholecystectomy can be done with 78% success rate. Skilled surgeons can perform mini laparoscopic cholecystectomy on patients with gallbladder diseases. However, longer follow-up trials are needed to determine the safety of this procedure. Finally, the reasons to choose this technique are lower pain scores and higher cosmetic scores. As a result, it is preferable to do so only in specific instances and leave the decision to the patient.

KEYWORDS: Comparison, Gallstone, Iraq, Miniport, Nineveh, Standard.

1. INTRODUCTION

Surgeons have to deal with gallbladder problems with less invasive and safer surgical techniques.[1] The patient's general health as well as the disease's local and systemic complications and effects should be taken into consideration when a surgeon chooses the appropriate surgical technique.[2] Laparoscopic cholecystectomy (LC), which was initially introduced in 1985, has significantly decreased the need for open cholecystectomy and its associated complications.[3] Laparoscopic cholecystectomy is now the accepted treatment technique for cholelithiasis and cholecystitis symptoms of varying severity.[4] Laparoscopic cholecystectomy reduced patients' complications, hospital stay, and expenses without increasing the need for conversion to open surgery.[5-6]

Standard laparoscopic cholecystectomy involves four ports, with two 10-mm and two 5-mm sizes. Miniport laparoscopic cholecystectomy, which uses smaller ports, has also been recorded. Although fewer adverse events have been observed in patients undergoing LC, it is believed that bile duct damage is more common with this surgery than open cholecystectomy, which can have serious consequences.[7] Surgeons are concerned about using a smaller port in miniport laparoscopic cholecystectomy, which may result in complications, additional operations, and conversion to open surgery. Further clinical trials are needed to make a decision on this procedure.[2, 8]

Since surgeons are under pressure to employ the newest surgical methods, it is especially crucial that the current study provide the most recent results regarding the safety and efficacy of the miniport LC.[9]

The study aimed to compare the advantages and intraoperative complications of miniport laparoscopic cholecystectomy in comparison with standard port laparoscopic cholecystectomy in an Iraqi population in Nineveh province/Iraq.

2. PATIENT AND METHOD

This is a prospective observational comparative study conducted at Mosul General Hospital and Shingal (Sinjar) General Hospital From the 1st of October 2022 to the end of December 2023. All patients diagnosed with symptomatic gallbladder stones who visited the emergency room and surgical consultation clinic were included in the two groups of the study. The miniport group had a four-port mini laparoscopic cholecystectomy, whereas the standard laparoscopic group received a four-port standard laparoscopic cholecystectomy.

All patients had comprehensive histories and examinations, including a complete blood count, renal function test, and liver function test. After evaluation of each patient, the patients were all put on an elective procedure, and in every instance, ultrasonography verified the cholelithiasis diagnosis. The study excluded patients with ASA grade III/IV, previous major abdominal operations, choledocholithiasis or acute cholecystitis, malignancy, pancreatitis on ultrasonography, and BMI > 30. The study included 213 patients, 100 of whom met all inclusion criteria. The remaining 113 patients were excluded for not meeting eligibility criteria (84), refusing to participate (11), or having other diseases (18). 50 patients were assigned to each group.

The Patients were randomly allocated to one of two study groups using a closed opaque envelope randomization method after completing the consent forms and providing required information about the study objectives. The operation was conducted by the study surgeon, assisted by a senior house officer and two nurses. Patients in two study groups stayed in the hospital for less than 24 hours, whereas those who converted into open surgery stayed for two days. To induce pneumoperitoneum, a veress needle and CO_2 gas were used, followed by the insertion of a 10-mm port through the trans-umbilical, sub-umbilical, or supraumbilical areas. The abdominal cavity pressure was maintained at 12 mm Hg, and the 10-mm laparoscope was inserted. Patients who failed with miniport LC were changed to either standard LC or open cholecystectomy.

Regarding the Standard Laparoscopic Cholecystectomy. The patient was put in a reverse Trendelenburg position and turned to the left throughout surgery, following standard procedures. A 10-mm trocar was placed in the epigastrium on the right side of the falciform ligament. Two additional 5-mm ports were placed on the right upper side of the abdomen, just two fingers width under the costal margin in the midclavicular and anterior/midaxillary lines, through or slightly under the umbilicus. The procedure involved dissecting the gallbladder by grabbing and raising the fundus, then dissecting the neck, and finally dissecting the cystic duct and artery using a Maryland dissector. After obtaining a 'critical view', these structures were trimmed and split. The gallbladder was removed using electrocautery and recovered through the epigastric port.

On the other hand, Miniport-laparoscopy cholecystectomy involved inserting a 5-mm epigastric port. Two specific 2.8 mm alligator graspers (2 Trocar with Grasping forceps, atrumatic, tk783-741 Tekno, Germany) were utilized transabdominally to retract and manipulate the gallbladder's fundus and Hartmann pouch. The cystic duct and artery were dissected with the standard Maryland laparoscopic tool, as described in the standard technique. The surgeon adjusts the position and size of the scope to 5-mm 300 via the epigastric port. The medium to large clips were then inserted through the 10-mm umbilical port with a clip applicator to clip the cystic duct and artery. To further dissect the structures, the laparoscope was inverted to an umbilical port. The gallbladder specimen was recovered with a 5-mm 300

scope through the epigastric port and 10-mm jaw forceps from the umbilical port.

In both procedures, the sheath around the umbilical ports was closed with 0 vicryl and the skin with 3/0 nylon.

The patients after that followed for 7 days after discharge. The questionnaire was consisted from 5 parts. Part one for sociodemographic information, such as patients' age, gender. Part two for operation condition such as time spend for operation complete, conversion to open laparotomy, injury to other organ and bleeding. Part three for postoperative pain severity by using Wong-Baker Face Scale after 2, 6, and 12 hours. The pain scale comprises six faces, each representing a distinct level of pain, from no pain to severe agony. This scale assigns a number to each face, ranging from 0 (not hurting at all) to 10 (very painful).[10] Part four for analgesic used and part five for cosmesis assess at 7 days after operation. Patients and nurses asked to rate cosmesis on a scale from 1 to 5. (e.g., 1 indicates all wounds were prominent; 2 indicates three wounds were prominent; 3 indicates two wounds were prominent; 4 indicates one wound was prominent; and 5 indicates no wounds were prominent). The final score was calculated by taking the mean of both the patient and nurse scores.

The collected data were coded, entered, and analyzed using the available data base software program statistical package of IBM SPSS-29 (IBM Statistical Packages for Social Sciences- version 29, Chicago, IL, USA). Data were presented in simple measures of percentage, mean, standard deviation, median and interquartile rang. Student's t-test was used to compare numerical variables between the two groups with application of chi square test for categorical variables. Fisher's exact was used when applicable. Statistical significance was considered whenever the P value was equal or less than 0.05.

3. RESULTS

The study includes 100 patients with symptomatic gallstone. The mean age ± standard deviation of the study participants was 41.24 ± 7.51 years. Of them, 63 (63%) patients were females and 37 (37%) were males, with male to female ratio of 1:1.7.

Table 1 shows comparison between the two groups regarding their demographic information. It's evident that no statistically significant difference between the two groups regarding their age and their gender (P value > 0.05).

Table 1: Comparison between the two groups regarding their demographic information. (number = 100)

Variable	Mini laparoscopic group = 50	Standard laparoscopic group = 50	P-value
Age (years), mean ± standard deviation:	41.37 ± 7.79	41.14 ± 7.28	0.789
Gender, number (%): - Male - Female	 19 (38%) 31 (62%)	 17 (34%) 33 (66%)	0.291

Table 2 shows comparison between the two groups regarding their operation time and postoperative pain scores. Statistically significant difference between the two groups regarding their operation time (mini laparoscopic operation) spend more time (P value < 0.001). Moreover, patients undergoing mini laparoscopic operation reported statistically significant less postoperative pain scores (P value < 0.001). Additionally, patients undergoing mini laparoscopic operation reported statistically significant higher cosmetic score (P value <0.001).

Table 2: Comparison between the two groups regarding their operation time and postoperative pain scores. (number = 100).

Variable	Mini laparoscopic group = 50	Standard laparoscopic group = 50	P-value
Operation time (minutes), mean ± standard deviation:	42.21 ± 9.21	30.37 ± 8.79	**<0.001**
Pain after 2 hours:	3.24 ± 1.47	5.39 ± 1.73	**<0.001**
Pain after 6 hours:	3.12 ± 1.26	4.93 ± 1.63	**<0.001**
Pain after 12 hours:	3.01 ± 1.36	4.71 ± 1.74	**<0.001**
Cosmetic score:	3.61 ± 0.77	2.78 ± 0.61	**<0.001**

Table 3 shows comparison between the two groups regarding their conversion rate and needed postoperative analgesia. Statistically significant difference between the two groups regarding their conversion rate (higher in mini laparoscopic group) (P value <0.001). On the other hand, patients undergoing standard laparoscopic surgery need statistically significant more postoperative analgesia. (P value = 0.014).

Table 3: Comparison between the two groups regarding their conversion rate and needed postoperative analgesia. (number = 100)

Variable	Mini laparoscopic group = 50	Standard laparoscopic group = 50	P-value
Conversion, number (%): -To open -To standard	 2 (4%) 9 (18%)	 1 (2%) ….	**<0.001**
Added analgesia post-operatively: -One dose -Two doses	 9 (18%) 3 (6%)	 15 (30%) 8 (16%)	**0.014**

Table 4 shows comparison between the two groups regarding their postoperative complication. No statistically significant difference found between the two groups regarding this issue (P value = 0.472).

Table 4: Comparison between the two groups regarding their postoperative complication. (number = 100)

Complications	Mini laparoscopic group = 50	Standard laparoscopic group = 50	P-value
- No complication	38 (76%)	40 (80%)	
-Bile spillage	4 (8%)	3 (6%)	
-Bleeding from gallbladder bed	4 (8%)	2 (4%)	0.472
- Wound infection	3 (6%)	4 (8%)	
- Bile duct injury	1 (2%)	1 (2%)	

4- DISCUSSION

The study found that the mean age for patients with gallstone was 41.2 years, which agrees with a study conducted in a rural hospital reported the mean age for patients with gallstones was 41.2 years[11], but this is a single study finding and not a universal average age for gallstone patients, as the age can vary significantly depending on the specific patient population and factors like risk factors and complications. While gallstones are associated with older age, particularly over 40, they can be found in people of any age and can even be present in children and teenagers. In another study conducted in central India found the mean age of gallstone patients to be (43.6) years[12] According to the study findings, women found to had more prevalence of gallstones than males. This is because hormones like progesterone which slow down the gallbladder's emptying and estrogen which raise the cholesterol in bile, making bile more saturated with cholesterol and as a result it can more likely to form stones. Furthermore, pregnancy and the usage of oral contraceptives increase a woman's chance of getting gallstones. Other research showed comparable results.[13-14]

The study found that miniport laparoscopic cholecystectomy requires longer operation duration (42.21 minutes) while the standard laparoscopic cholecystectomy need (30.37 minutes). Despite the statistically significant difference in operation length, the author does not believe that an additional 12 minutes can significantly increase the patient's risk of morbidity and post-operative problems (with the exception of patients with severe inflammation). The mini LC require 12 minutes longer to change the trocars and camera in the incisions only. Because the mini LC is a difficult technique to perform and a more expensive treatment option, it has failed to gain widespread favor among surgeons.[15] Gurusamy et al showed consistent results.[16]

On the other hand, the study found patients undergoing mini laparoscopic cholecystectomy report significant less postoperative pain and need less analgesia in the first few hours than standard laparoscopic cholecystectomy. The difference in postoperative pain is primarily attributed to the reduced surgical trauma associated with smaller incisions. Many studies showed comparable results.[17-19] While other studies showed no significant differences.[20-21] Discrepancies in findings can be influenced by study design, surgical experience, and the specific instruments used.

Regarding cosmetic score, the study found patient underwent mini laparoscopic cholecystectomy had more patients and nurse satisfaction than those underwent standard laparoscopic cholecystectomy. Similar findings were obtained by other studies.[20-21]

Furthermore, patients underwent mini laparoscopic cholecystectomy found to have more conversion to open cholecystectomy than patient with standard cholecystectomy. This increased conversion rate in the MLC group can be attributed to difficulties in accessing the gallbladder or significant adhesions, especially in cases of acute inflammation, which increases the risk of converting the procedure to an open one, which runs with other studies finding.[22-24]

The study found that both mini and standard laparoscopic cholecystectomy had comparable postoperative complications rates. However, the choice between them may depend on a surgeon's preference, the patient's needs, and a willingness to accept the potential

for benefits in cosmesis and reduced pain. This is similar to Arif study finding.[25]

5. CONCLUSION

The current study concluded that four-port LC with one 10-mm, one 5-mm, and two 2.8 mm may be done on patients with gallbladder problems with 78% success rate. Given the comparison of the results from the two surgical techniques, it can be concluded that skilled surgeons can perform miniport laparoscopic cholecystectomy on patients with gallbladder diseases. However, longer follow-up trials are needed to determine the safety of this procedure. Finally, the reasons to choose this technique are lower pain scores and higher cosmetic scores. As a result, it is preferable to do so only in specific instances and leave the decision to the patient.

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