Comparative Study between Mini Laparoscopic and Conventional Laparoscopic Cholecystectomy

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Abstract: Background: The use of laparoscopy has gained widespread popularity in surgical approaches to abdominal wall hernias and intestinal and solid organ resection. However, no other operation has been as profoundly affected by the advent of laparoscopy as cholecystectomy. **Objective:** Comparison between Mini Laparoscopic Cholecystectomy (MLC) and conventional laparoscopic cholecystectomy (CLC) as regard: Mean operative time, difficulty of operation, severity of postoperative pain, postoperative complications, cosmetic appearance and patient satisfaction for the operation. **Materials and Methods:** 100 patients; 50 of them subjected to Mini Laparoscopic Cholecystectomy. and 50 subjected to conventional laparoscopic cholecystectomy. **Results:** mini-laparoscopic cholecystectomy better than laparoscopic. Mini Laparoscopic Cholecystectomy patients reported significantly lower pain score 24 hours postoperatively and a shorter convalescence. **Conclusion:** Mini Laparoscopic and Conventional Laparoscopic Cholecystectomy are feasible and safe options for mini-invasive cholecystectomy.
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1. Introduction

Laparoscopic cholecystectomy (LC) is now the standard procedure for calculous gallbladder disease. This minimally invasive approach has dramatically reduced postoperative pain, length of hospital stay, and the patient's return to active life. The mortality rate is less than 0.2% and similar to that of open cholecystectomy. The morbidity rate at over 7% and bile duct injury rate at about 0% to 4% are higher than for open cholecystectomy **(Wevers et al., 2013).**

Minilaparoscopy has been gradually employed in the treatment of several pathologies, such as cholecystectomy. However, the feasibility and possible benefits of minilaparoscopy compared to conventional laparoscopy are still not completely clear and controversial. Some investigators have found it to be more expensive due to long operative time in their hands **(McCloy et al., 2008).**

Mini-laparoscopy, micro-laparoscopy, micro-endoscopic surgery, needle-scopic surgery and micro-invasive surgery are all synonyms often used. The general term mini-laparoscopic surgery was preferred for any procedure that uses endoscopic instruments and optics equal to or less than 5 mmin diameter. This definition of mini-laparoscopy surgery must be a strict definition: the equal to or less than 5 mm must be applied to the main trocars used and the total incision being no more than 25 mm **(Blinman, 2010).**

The present study was designed to compare between Mini Laparoscopic Cholecystectomy (MLC) and conventional laparoscopic cholecystectomy (CLC).

2. Patients and Methods

This prospective study was conducted at the department of surgery in Alazhar University Hospital In New Damietta from October 2014 to May 2017 and included one hundred patients with indication of cholecystectomy.

Patients had been classified randomly into two groups. **Group (I):** subjected to Mini Laparoscopic Cholecystectomy. **Group (II):** subjected to conventional laparoscopic cholecystectomy. Inclusion criteria include Patient indicated for cholecystectomy due to one of the following; Symptomatic cholelithiasis, biliary dyskinesia, symptomatic gall bladder polyp or malformations acute cholecystitis and complications related to common bile duct stones as pancreatitis. All patients with any of the following will be excluded unfit patients, patients with past history of upper abdominal open surgery and patients with contraindications for open cholecystectomy.

The following investigations were done for all cases at the time of admission: complete blood picture, the bleeding time, the clotting time, prothrombine time, total bilirubin, serum glutamate pyrvate transaminase, serum glutamate oxalate transaminase, serum creatinine, fasting blood sugar and urine examination.

Statistical analysis: Data input and analysis were done using Statistical Package for the Social Sciences (SPSS) version "24" computer program. All results were expressed as mean ± standard error. Mean values of the different groups were compared using one way analysis of variance. Least significant

difference (LSD) post hoc analysis was used to identify significantly different mean values. P value < 0.05 was accepted to denote a significant difference.

3. Results

The present study included 100 cases; there were 25 cases (50%) are male in group I but 28 cases (56%) in group II. There were non-significant differences between group I and group II regarding (age; 43.7 ± 0.64 Vs 45.1 ± 0.63 and BMI; 25.3 ± 0.08 Vs 25.6 ± 0.12 respectively). There were 39 cases (78%) in group I with history of biliary colic but 37 cases (74%) in group II.

Table (1): Demographic data of studied groups.

	Group I	Group II	P value
Age (years) **Mean ± SE**	**43.7 ± 0.64**	**45.1 ± 0.63**	**> 0.05**
Sex **Male** **female**	**25 (50%)** **25 (50%)**	**28 (56%)** **22 (44%)**	**> 0.05**
BMI (Kg/m2) **Mean ± SE**	**25.3 ± 0.08**	**25.6 ± 0.12**	**> 0.05**
History of biliary colic	**39 (78%)**	**37 (74%)**	**> 0.05**

Group I: mini- laparoscopic cholecystectomy **Group II:** laparoscopic cholecystectomy

There were non-significant differences in the biochemical parameters between group I and group II (hemoglobin level; 12.2 ± 0.11 Vs 12.5 ± 0.11, WBCs; 10.5 ± 0.09 Vs 10.7 ± 0.07, SGOT; 24.8 ± 0.09 Vs 25.01 ± 0.11, SGPT; 26.5 ± 0.32 Vs 26.04 ± 0.34, total bilirubin; 0.7 ± 0.02 Vs 0.74 ± 0.01, serum creatinine; 0.86 ± 0.01 Vs 0.84 ± 0.02 and fasting blood sugar; 101.3 ± 0.69 Vs 102.9 ± 0.76 respectively).

Table (2): Biochemical parameter of studied groups.

	Group I	Group II	P value
Hb (mg/dl) **Mean ± SE**	**12.2 ± 0.11**	**12.5 ± 0.11**	**> 0.05**
WBCs **Mean ± SE**	**10.5 ± 0.09**	**10.7 ± 0.07**	**> 0.05**
SGOT **Mean ± SE**	**24.8 ± 0.09**	**25.01 ± 0.11**	**> 0.05**
SGPT **Mean ± SE**	**26.5 ± 0.32**	**26.04 ± 0.34**	**> 0.05**
Total bilirubin **Mean ± SE**	**0.7 ± 0.02**	**0.74 ± 0.01**	**> 0.05**
Creatinine **Mean ± SE**	**0.86 ± 0.01**	**0.84 ± 0.02**	**> 0.05**
Fasting BS **Mean ± SE**	**101.3 ± 0.69**	**102.9 ± 0.76**	**> 0.05**

Group I: mini- laparoscopic cholecystectomy **Group II:** laparoscopic cholecystectomy

There were a significant differences between both groups regarding hospital stay after operation (45.3 ± 0.36 in group I Vs 31.4 ± 0.65 in group II) and post-operative pain 12% Vs 28 respectively. In-sgnificant differences between groups regarding duration of surgery 72.6 ± 3.04 Vs 65.9 ± 2.8 minutes respectively.

Table (3): Biochemical parameter of studied groups.

	Group I	Group II	P value
Duration of surgery Mean ± SE	**72.6 ± 3.04**	**65.9 ± 2.8**	**> 0.05**
Hospital stay **Mean ± SE**	**19.8 ± 0.58**	**31.4 ± 0.65***	**< 0.05***
Pain score **Mean ± SE**	**1.7 ± 0.11**	**2.3 ± 0.18***	**< 0.05***

Group I: mini- laparoscopic cholecystectomy **Group II:** laparoscopic cholecystectomy *= significance

In the present study, there were a significant differences between both groups regarding mean blood loss 18.1 ± 0.19 Vs 21.58 ± 0.2, cosmotic score 8.02 ± 0.12 Vs 6.68 ± 0.09 and days required to return to work 2.64 ± 0.09 Vs 3.48 ± 0.12.

Table (4): follow up of studied groups.

	Group I	**Group II**	**P value**
Mean blood loss (ml) Mean ± SE	**18.1 ± 0.19**	**21.58 ± 0.2***	**< 0.05***
Cosmotic score Mean ± SE	**8.02 ± 0.12**	**6.68 ± 0.09***	**< 0.05***
Days required to return to work Mean ± SE	**2.64 ± 0.09**	**3.48 ± 0.12***	**< 0.05***

Group I: mini- laparoscopic cholecystectomy **Group II:** laparoscopic cholecystectomy *= significance

4. Discussion:

Mini Laparoscopic cholecystectomy was introduced in 1997 as a further advancement to laparoscopic cholecystectomy with the goal of enhancing the benefits of the latter **(Gupta et al., 2005).** Ever since then, there have been studies that support its implementation based on results pointing toward better cosmetic outcomes, less postoperative pain due to smaller instruments resulting in lesser tissue damage **(Reardon et al., 1999).**

Laparoscopic cholecystectomy (LC) become the gold standard in the treatment of benign gallbladder disease, allowing the patients to recover promptly from the procedure with little postoperative pain and therefore promoting a shorter hospital stay, the Mini Laparoscopic cholecystectomy (MLC) is a faster postoperative recovery and superior cosmetic **(Carvalho et al., 2013).**

In this study we compare between Mini Laparoscopic Cholecystectomy and conventional laparoscopic cholecystectomy.

In the present study, age and BMI were nearly comparable between group I and II (age: 43.7 ± 0.64Vs 45.1 ± 0.63 years) and (BMI: 25.3 ± 0.08 Vs 25.6 ± 0.12 Kg/m^2).

These results agree with **Saad et al. (2013), Carvalho et al. (2013) and Aspinen et al. (2015)** who reported that the mean age and BMI was not different between the both groups (MLC and LC).

In the present study, duration of surgery was nearly comparable between group I and II (72.6 ± 3.04 Vs 65.9 ± 2.8 minutes) and this agree with **Schmidt et al. (2002), Ainslie et al. (2003), Rivas et al. (2010) and Carvalho et al. (2013)** who noticed that there is no difference in the operating time between MLC and LC.

Shaikh et al. (2017) noticed that the operative times of LC: 37.5 min versus MLC: 38.2 min are closest and comparable to **Sarli et al. (2003)** of 45 (20-120) and 50 (20-170) min (LC and MLC respectively). The difference in the operative times between LC and MLC did not reach statistical significance.

In the present study, the hospital stay after operation was significantly low in group I (MLC) (19.8 ± 0.58 hours) when compared with group II (LC) (31.4 ± 0.65 hours) and this agree with **Lee et al. (2010)** who noticed that MLC has lower hospital stay than LC.

In contradiction, **Garg et al. (2012)** and **Saad et al. (2013)** reported that there are in-significant differences between MLC and LC regarding hospital stay after operation. This occurs due to admission after cholecystectomy at least 3 days.

One of the most important benefits to the patient in terms of overall health of laparoscopic cholecystectomy has been a reduced length of hospital stay and an earlier resumption of the day-to-day activities for the patient (**Shaikh et al., 2017**). It would be logical to assume that if there is a significant reduction in postoperative pain, there would be a directly correlated shorter hospital stay. However, studies conducted for a comparison between LC and MLC have thus far provided conflicting results regarding mean hospital stay. With prospective studies by **Gupta et al. (2005) and Look et al. (2001)** reporting that despite a significantly decreased postoperative pain in the MLC group, there was no significant difference in mean times for hospital stay with a total study population of 40 and 64 respectively. However, **Lai et al. (2003)** reported during a prospective study of 150 patients that MLC group not only had statistically significant decrease in postoperative pain but also had a significantly reduced mean hospital stay.

In the present study, the pain score was significantly lower in MLC than LC (1.7 ± 0.11 Vs 2.3 ± 0.18, respectively). **Aspinen et al. (2015)** noticed that the LC patients had significantly lower pain score at normal activities and at fast movement/while coughing at 24 hours after surgery and the LC patients received significantly less antiemetics.

Tsimoyiannis et al. (2010) and Asakuma et al. (2011) noticed that reduced postoperative pain on the day of surgery.

The variation in postoperative pain is reported differently across multiple studies according to the size of instruments used. **Lai et al. (2003),** which reports that visual analogue scale (VAS) scores for trocars 3 mm or less were below 3 by 76% of patients, whereas patients in their comparison group with 5 mm trocars by 21% of patients reported significant postoperative pain. Some studies suggest that despite there being a significant decrease in postoperative pain in the immediate 24 h after surgery, over the longer term there will be no significant difference in VAS in the patients who underwent LC **(Huang et al., 2003).**

Carvalho et al. (2013) showed that there is little improvement by introducing MLC. However, it has to be taken into account that most of the patients undergoing LC already have an uneventful postoperative course with little postoperative pain and are often discharged on the same day of the surgery **(Thakur et al., 2011).**

Novistsky et al. (2005) compared postoperative pain using VAS at time intervals of: Postoperative, postoperative day 1, postoperative day 3, postoperative day 7 and postoperative day 28 and coming to a similar conclusion with only statistical significance at postoperative day 1.

The direct link between postoperative pain and incision size is not well established, with many other factors playing a role in postoperative pain including age, pressure of pneumo-peritoneum and preoperative neuroticism being part of the multivariate etiology and, therefore, even though incision size is one of the factors to reduce postoperative pain **(Gurusamy et al., 2009).**

In the present study, there were significant changes between MLC and LC regarding mean blood loss (18.1 ± 0.19 Vs 21.58 ± 0.2) and cosmotic score (8.02 ± 0.12 Vs 6.68 ± 0.09) and these agree with **Shaikh et al. (2017)** who reported that there was significant differences between MLC and LC regarding intra-operative blood loss.

The difference in intraoperative blood loss between SLC and MLC is negligible with **Huang et al. (2003)** comparing the differences between three groups undergoing LC, MLC and 5 mm LC and finding no statistical significance between the three groups.

The use of smaller-access incisions has been suggested to result in minimal scarring and better cosmesis. However, the evaluation of postoperative cosmetic results is challenged by the absence of a reliable objective scale. The combination of multiple contributing factors, potential observer bias, and variations in patients' expectations contributes to difficulties in assessing cosmetic results. Patients with mini-laparoscopic wounds were significantly better with regard to cosmetic appearance **(Novitsky et al., 2005).**

In the present work**,** the patient required to return to work 2.64 ± 0.09 days with MLC and 3.48 ± 0.12 with LC. This agree with **Shaikh et al. (2017)** who reported that there was significant differences between both group regarding days required to return to work (MLC; 2.2 days versus LC; 3.9 days).

In contradiction, **Lee et al. (2010)** who reported that there was no difference in the length of time to return to work between MLC and LC, probably because the two procedures caused similar levels of discomfort and pain. And this occurred due to high pain score in their patients.

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