

## Research Article

# A comparative study between open and laparoscopic cholecystectomy

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## ABSTRACT

**Background and objectives:** Laparoscopic cholecystectomy has rapidly become established as the popular alternative to open cholecystectomy, but it should have a safety profile similar to or better than that of open procedure. The aim of this study was to compare conventional cholecystectomy and laparoscopic cholecystectomy with respect to duration of procedure, complications, postoperative pain, analgesic requirement, antibiotic requirement, resumption of normal diet and period of hospital stay.

**Material and methods:** This comparative study was conducted at Department of Medicine Jinnah Hospital, Lahore from March 2017 to September 2017. Total 50 patients with acute calculous/acalculous cholecystitis, proven by USG with at least one attack of upper abdominal pain and considered fit for elective cholecystectomy either male or female were included in the study.

**Results:** The highest age incidence was in the 5<sup>th</sup> decade, more common in females. Pain in the RUQ of abdomen was the most common symptom. Ultrasonography showed gallbladder stones in almost all patients. The duration of LC (120min) was more than for OC (90min). The conversion rate of LC to OC was 8%. Post operative morbidity was more in case of LC. The antibiotic and analgesic requirements were less in LC group. The resumption of normal diet was 2 days earlier in LC compared to OC group, and the hospital stay was 4 days less in LC group.

### **Interpretation and conclusion:**

The result showed the incidence of acute calculous / acalculous cholecystitis was more in females, 5<sup>th</sup> decade, presented more commonly with pain abdomen. Ultrasonography was the most common investigation. Laparoscopic cholecystectomy reduces the number of antibiotic and analgesic requirement, hospital days, pain disability, wound infection, and with better cosmesis, except for the prolonged operative time, which can be minimized in due course of time as the learning curve progresses.

**Key words:** Acute calculous / acalculous cholecystitis, Ultrasonography, Open cholecystectomy, Laparoscopic cholecystectomy.

## INTRODUCTION

Gastro-intestinal surgery has undergone a revolution in the recent years by the introduction of laparoscopic techniques.<sup>1</sup> Acute acalculous/calculous cholecystitis, which continues to be one of the most common digestive disorders encountered, was traditionally being dealt by conventional (open) cholecystectomy.<sup>2</sup> With the introduction of laparoscopic cholecystectomy, the

surgical community witnessed a revolution in post-operative recovery of the patient.<sup>3</sup>

Laparoscopic cholecystectomy (LC) is safe and easy, which can be performed with much ease and safety because of the better magnification. LC has shown clear benefits in terms of shortened hospital stay, less morbidity, a quicker return to work and with cosmetic advantage.<sup>4</sup>

Some surgeons have suggested that the rates of serious complications, particularly bile duct injury might be significantly higher in laparoscopic procedure.<sup>5</sup> The high costs of the laparoscopic equipment and the specialized training that is mandatory for mastery of the technique, the procedure inherently carries hazards and risks.<sup>6</sup> Could laparoscopic cholecystectomy establish itself as a safe and cost effective alternative to the open method? In our study, we have planned an attempt to compare the advantages and drawbacks of both the procedures.

## MATERIAL AND METHODS

This comparative study was conducted at Department of Medicine Jinnah Hospital, Lahore from March 2017 to September 2017. Total 50 patients with acute calculous/acalculous cholecystitis, proven by USG with at least one attack of upper abdominal pain and considered fit for elective cholecystectomy either male or female were included in the study.

Patients with history or investigations suggesting CBD stones, patients with history of prior

abdominal surgery, patient's age above 70 years and patients of coagulopathy and those on Anti-Coagulant therapy excluded from the study.

Study is approved by ethical review committee and written informed consent was taken from every patient.

Patients were randomly allocated to the two study groups using simple lots (25 in each group). Patients in one group underwent laparoscopic cholecystectomy while those in the other group underwent open cholecystectomy.

All the patients were kept nil by mouth overnight, prior to surgery and were given a dose of prophylactic antibiotic. All the patients were asked to evacuate bladder prior to surgery and a nasogastric tube was passed if thought to be necessary.

All the surgeries were performed under general anesthesia, by the surgical team, consisting of consultants and residents. Intra operative findings and post operative data were all recorded and analyzed, using simple statistical tests like Chi square test and Z-test, to compare the results.

## RESULTS

**Table 1:** Duration of Surgery

Time	Open cholecystectomy	Laparoscopic cholecystectomy
60 – 90 min	9	0
90 – 120 min	11	8
120 – 150 min	5	14
> 150 min	0	3

Minimum time for open method : 70 min

Maximum time for open method : 130 min

Average time for open method : 90 min

Minimum time for laparoscopic method : 105 min

Maximum time for laparoscopic method : 170 min

Average time for laparoscopic method : 120 min

**Table 2:** Intra Operative Complications

Complications	Open ( n = 25 )	( % )	Lap ( n = 25 )	( % )
Bleeding	1	4	2	8
Bile duct injury	0	0	0	0
Bowel injury	0	0	0	0
Others	0	0	0	0
<b>Total</b>	1	4%	2	8%

**Table 3: Post Operative Complications**

<b>Complications</b>	<b>Open (n=25)</b>	<b>( % )</b>	<b>Lap ( n=25 )</b>	<b>( % )</b>
Bleeding	0	0	0	0
Bile leak through drain	0	0	3	12
Wound infection	2	8	0	0
Jaundice	0	0	0	0
Post cholecystectomy syndrome	0	0	2	8
Pulmonary complications	0	0	0	0
<b>Total</b>	2	8%	5	20%

**Table 4: Duration of Antibiotics Given**

<b>Days</b>	<b>Open cholecystectomy</b>	<b>Laparoscopic cholecystectomy</b>
<b>&lt; 4 days</b>	0	19
<b>4 – 6 days</b>	8	4
<b>&gt;6 days</b>	17	2

Minimum days of antibiotic for open method : 5 days

Maximum days of antibiotic for open method : 10 days

Average days of antibiotic for open method : 7 days

Minimum days of antibiotic for lap method : 3 days

Maximum days of antibiotic for lap method : 7 days

Average days of antibiotic for lap method : 4 days

**Table 5: Post Operative Pain**

<b>Post operative Day</b>	<b>Open cholecystectomy</b>	<b>Laparoscopic cholecystectomy</b>
<b>1</b>	25	25
<b>11</b>	25	5
<b>111</b>	20	3
<b>1V</b>	15	-
<b>V</b>	10	-
<b>V1</b>	5	-

**Table 6: Resumption of Normal Diet**

<b>Days</b>	<b>Open cholecystectomy</b>	<b>Laparoscopic cholecystectomy</b>
<b>&lt; 3 days</b>	0	19
<b>3 – 4 days</b>	10	4
<b>&gt; 4 days</b>	15	2

Minimum resumption of normal diet for open : 3 days

Maximum resumption of normal diet for open : 7 days

Average resumption of normal diet for open : 5 days

Minimum resumption of normal diet for lap : 2 days

Maximum resumption of normal diet for lap : 5 days

Average resumption of normal diet for lap : 3 days

**Table 7:** Hospital Stay

Days	Open cholecystectomy	Laparoscopic cholecystectomy
< 3 days	0	20
3 – 5 days	7	3
> 5 days	18	2

Minimum post-op hospital stay for open : 4 days

Maximum post-op hospital stay for open : 10 days

Average post-op hospital stay for open : 7 days

Minimum post-op hospital stay for lap : 2 days

Maximum post-op hospital stay for lap : 7 days

Average post-op hospital stay for lap : 3 days

**Table 8:** Clinical details of patients subjected to laparoscopic or conventional cholecystectomy

Variables	Laparoscopic cholecystectomy (n = 25)	Open cholecystectomy (n = 25)
Age (years)	42.76 +/- 12.09	39.12 +/- 13.79
Sex ratio (M/F) nos.	7 / 18	11 / 14
Duration of surgery (min)	120 +/- 10.80	90 +/- 13.84
Analgesic requirement (days)	3.12 +/- 0.33	6.08 +/- 0.40
Antibiotic requirement (days)	4.28 +/- 0.46	7.40 +/- 1.58
Complications (%) [N=50]	14 %	6 %
Resumption of normal diet (days)	3.16 +/- 0.85	5.24 +/- 1.23
Post operative hospital stay (days)	3.04 +/- 1.34	7.76 +/- 1.23

## DISCUSSION

A study of 25 open cholecystectomy patients of which 18 female and 7 male patients were compared with that of 25 cases of laparoscopic cholecystectomy of which 14 female and 11 male patients.

In this study, the laparoscopic procedure was found to be associated with a longer operating time than open procedure (Median of 120 minutes for laparoscopic against 90 minutes for open method). The more time required in LC was due to intraoperative gas leak, difficult adhesions,

slippage of clips and delivery of gall bladder through the port site. This is comparable with that of studies of Trondsen<sup>7</sup> and Porte<sup>8</sup>. As experience is gained, the operating time is decreased. This “learning curve” represents adapting to operating in the 2-D screen, becoming familiar with the instrumentation and becoming accustomed to the technique. The surgeon gets trained in dealing with challenging cases in the course of his / her learning curve.<sup>8</sup>

In this study, there were no major complications and had several minor ones. There was no peri-operative mortality and no CBD injury. The complications observed were bile leak (OC-0, LC-3), blood loss (OC-1, LC-2), wound infection (OC-2, LC-0) and post cholecystectomy syndrome(OC-0, LC-2) which were found to be comparable in both the groups.

Bile leak through drain tube in LC group was because of injury to the gall bladder bed in the liver during dissection. All the three patients were treated conservatively, drains were kept for a period of 2 days and the leak subsided.

The main reason for blood loss in LC group was the slippage of the clip applied to the cystic artery and from the gall bladder bed.

There was no wound infection in LC group. 2 patients of OC group had wound infection, requiring regular dressing of the wounds, and the wounds healed over a period of 10 days. Wound infections were more commonly seen in the open group compared to laparoscopic group.

Harris<sup>9</sup> in his study found similar results, Bile leak (LC-2%, OC-1%), bleeding requiring transfusion (LC-1%, OC-2%) and wound infection rate (LC-0%, OC-1%). Other studies also reported similar results<sup>10-11</sup>.

The conversion from laparoscopic procedure to open procedure was necessary in 2 patients out of 25. One patient required conversion due to difficult dissection in view of thick adhesions and the other due to excessive fat in Calot's triangle. Conversion rate was 8%. Conversion rate was also found to be higher in acute cases in other studies (0-45%)<sup>12-14</sup>.

The minimal antibiotic protocol used in our study was 5 days for open method against 3 days for laparoscopic method. Two of the open cases required antibiotics for a period of 10 days due to the wound infection, and two of the laparoscopic cases required antibiotics for a period of 7 days due to conversion. In our study, the antibiotic requirement was less in LC (median 4 days) to OC (median 7 days). This was due to the reduced size of the incision and lesser wound. This also reduced the need for post operative antibiotics in the laparoscopy group.

Use of minimally invasive techniques in elective surgeries is associated with a reduced inflammatory stress response with improved pulmonary function and less hypoxia<sup>15-16</sup>. The VAS was significantly less for LC group (median 2days) compared to (median 4days) for OC group;  $p < 0.005$ . Kum<sup>24</sup> also found a mean VAS score of 3.8 v/s 7.7 between LC and OC. There was more pain and more analgesics were required in patients in the OC group, especially when the patient developed wound infection. The pain duration (median 2days for LC and median 4days for OC patients) and the duration of analgesics used (median 2days for LC and median 4days for OC patients) also were significantly less in LC group patients. This was due to the lesser incision size in LC. Other studies have also shown similar results<sup>17-20</sup>.

The minimum resumption of normal diet for open method was 3 days compared to 2 days for laparoscopic method. The maximum resumption of normal diet for open method was 7 days due to wound infection, compared to 5 days for laparoscopic method following conversion. The mean resumption of normal diet for open method was 5 days compared to 3 days for laparoscopic method, suggesting the LC group returning to normal life earlier. The two most beneficial aspects of LC are the short hospital stay and the rapid recovery<sup>15</sup>. In this study, the median duration of hospital stay was 3days for LC group and 7days for OC group. The difference was found to be statistically significant ( $p < 0.005$ ).

Hospital stay was more in OC group due to increased pain, wound infection, injectable antibiotics used and less mobilization due to pain. Porte<sup>11</sup>, Trondsen<sup>7</sup> and Lujan<sup>13</sup> also found similar results. This was also confirmed in various other series.<sup>21-22</sup>

The OC group had larger wounds, which healed by primary intention with a single big scar. The LC group had port incisions of <1.5 cm, which healed by primary intention without much visible scar. Thus the cosmesis is the greatest advantage after lap cholecystectomy compared to open cholecystectomy.

### CONCLUSION

In our study the laparoscopic cholecystectomy surpasses the open cholecystectomy by the followings:

- Better visualization and magnification of surgical anatomy.
- Shorter duration of analgesic requirements.
- Shorter duration of antibiotic requirements.
- Decreased wound infection.
- Rapid resumption of normal diet.
- Quicker ambulance, better compliance and rapid return to normal activity.
- Shorter post operative hospital stay.
- Best cosmesis.

The disadvantages in the laparoscopic procedure is the prolonged operative time, and the complications which can be minimized in due course of time as the learning curve progresses.

We have also found that the conversion to open cholecystectomy should be done in proper time without any hesitation in case of complications that could not be managed by laparoscopic surgery and conversion in such case reflects sound judgment and should not be considered as a complication.

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