



General Surgery

A COMPARATIVE STUDY TO EVALUATE THE LAPAROSCOPIC VS OPEN CHOLECYSTECTOMY IN PATIENTS WITH CIRRHOSIS

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ABSTRACT

Background: Throughout the world, gallstones are a leading source of morbidity. Patients with cirrhosis have twice as many gallstones as people in the general population. Gallbladder stones are associated with increased rates of morbidity and mortality when they manifest in cirrhotic individuals compared to non-cirrhotic individuals. Until the late 1980s, open cholecystectomy was considered the gold standard for treating gall bladder stones. Although laparoscopy has transformed surgery and led to a reassessment of therapeutic approaches, including cholecystectomy, it is not without risks. **Aim:** To compare the surgical outcomes of laparoscopic cholecystectomy with those of open cholecystectomy in cirrhotic patients. **Materials and Method:** This study was a prospective comparative study on laparoscopic versus open cholecystectomy in cirrhotic patients. The study was conducted for a period of one year from January 2023 till December 2023. A total of 40 patients with symptomatic gallstone disease and liver cirrhosis, including Child class A or B, were randomly assigned to two groups: Group (A): Laparoscopic Cholecystectomy (LC) and Group (B): Open Cholecystectomy (OC). Prospectively, the surgical results were examined. In cirrhotic patients, details were gathered to compare LC with OC in terms of operative time, intraoperative and postoperative blood loss, complications, and post-operative subjective pain score. SPSS 20.0 was used to analyze the data, and Fisher's exact test or Chi square was used to test for associations. **Results:** The Laparoscopic group had a significantly lower mean operation time (57.5 ± 24.9 minutes) compared to the Open group (98.7 ± 30.5 minutes). Patients who underwent laparoscopic cholecystectomy got pain relief earlier than those who underwent open cholecystectomy. The average length of hospital stay for patients in the LC group was found to be 2 ± 1.3 days, while the mean duration for patients in the OC group was 4 ± 1.4 days. In both groups, postoperative complaints of wound infection, nausea, vomiting, and distension of the abdomen were recorded. Group LC experienced a statistically significant decrease in complaints, with a p-value of less than 0.01. **Conclusion:** For cirrhotic patients (Child class A and early B) with gallstone disease, the LC proved a safe and efficient surgical treatment. Compared to open surgery (OC), laparoscopic surgery (LC) has lower morbidity, a shorter recovery period, and a shorter length of hospital stay.

KEYWORDS : Cirrhosis, Cholecystitis, Cholecystectomy, Laparoscopy.**INTRODUCTION:**

In the adult population, gallstone disease is a serious global health concern. In India, gallstone prevalence varies from 10% to 20%. It affects approximately 4.3% of the population.¹ Gallstone prevalence in cirrhotics is estimated to be between 29 to 46%, which is three times higher than in non-cirrhotic individuals. Black stones, or gallstones, are more common in those with cirrhosis, with a prevalence of 25% to 30% overall. Gallstones are associated with a higher rate of mortality and morbidity in liver cirrhosis patients than in those without the condition. This is especially true when the stones are symptomatic.²

The primary treatment for cholelithiasis has been open cholecystectomy (OC), which was initially carried out in 1882 by German surgeon Carl August Langenbuch. Individuals with liver cirrhosis have a higher death risk following cholecystectomy than individuals without liver cirrhosis.³ Post-cholecystectomy death rates, which can reach 83% in patients with end-stage liver disease, have been shown to be significantly influenced by the severity of underlying liver disease. Studies in the past have emphasized the potential risks and technical challenges of doing OC in patients with symptomatic gallstone disease and compensated cirrhosis.⁴

The management of gallstone disease was transformed with the introduction of limited access surgery. Gallstone disease was swiftly treated worldwide by laparoscopic cholecystectomy (LC). The first laparoscopic procedure was carried out by Philippe Mouret in Lyon, France, and it is currently the most often performed laparoscopic procedure globally.⁵

Since the advent of LC, with the accumulation of expertise and advancements in the instruments, laparoscopic cholecystectomy has expanded its indications, becoming a conventional surgical approach of cholecystectomy due to its advantages as a non-invasive operation.⁶ In terms of the patient, laparoscopic surgery has the benefit of minimizing blood loss, pain, and discomfort by avoiding big open wounds or incisions. Less analgesia is needed, therefore patients experience lesser side effects from it. There is less chance of tissue damage and blood loss with these small devices. Postoperative

complications, particularly those pertaining to the wound, such as dehiscence, infection, cellulitis, and incisional hernia, are generally less common.⁷

Although LC has many advantages, it also has disadvantages. Compared to open procedures, laparoscopic surgery has a higher setup cost and requires a longer learning curve in terms of proficiency.⁸ During laparoscopy, the creation of a pneumo-peritoneum raises intra-abdominal pressure, which may decrease liver perfusion. This might be detrimental to the hepatic functioning following surgery, particularly if the patient has liver cirrhosis.⁹ LC is technically more challenging in patients with liver cirrhosis because the stiff liver parenchyma makes it harder to retract the gallbladder fundus across the liver, a procedure normally utilized to acquire access to the cystic pedicle and Calot's triangle. Longer operating times and a higher risk of bile duct damage are two of the main drawbacks of LC.¹⁰

Accordingly, OC is often considered the best course of treatment for cholelithiasis in patients with hepatic cirrhosis who exhibit symptoms.¹¹ Contrary to conventional belief, a few small randomized clinical trials and prospective investigations have shown that liver cirrhosis patients can benefit from LC. Given the benefits and drawbacks of both laparoscopic and open cholecystectomy, further research is required to determine which procedure performs better than the other.

Aims And Objectives:

- To compare the surgical outcomes of laparoscopic cholecystectomy with those of open cholecystectomy in cirrhotic patients.

MATERIALS AND METHODS:

This prospective comparative study was carried out from January 2023 to December 2023 at the Department of General Surgery, Sree Mookambika Institute of Medical Sciences, Kulasekharam. The study involved 40 cirrhotic patients who had symptomatic gall bladder stones. They were divided into two equal groups by randomization. As a control, one group of twenty patients had an open cholecystectomy

(OC), whereas the other group of twenty patients had a laparoscopic cholecystectomy (LC).

Patients with compensated cirrhosis of Child-Pugh A and early Child B who exhibit symptomatic gallstones were included. Patients with blood disorders, drug allergies, acute cholecystitis, common bile duct stones, child C cirrhosis, or active hepatitis were excluded along who were completely contraindicated for laparoscopic procedures.

An ultrasound scan had confirmed the cirrhosis diagnosis. The severity of cirrhosis was evaluated using the Child-Pugh grading system. Every patient gave their informed consent before having surgery or participating in the trial.

Under general anaesthesia, all LC patients underwent a typical four-port laparoscopic procedure using two 5 mm ports and two 10 mm ports in an open method to create pneumoperitoneum via a transverse supraumbilical incision. At 14 mmHg, the intra-abdominal CO₂ pressure was regulated. A right upper paramedian incision or a 14 cm subcostal incision was used to do the OC. Hemostasis has been achieved by ligature, ligasure, and electrocautery techniques. An abdominal drain has been installed in the operative field for each patient. In terms of operative time, intraoperative and postoperative blood loss, complications, and post-surgical subjective pain score, all data were gathered to compare LC with OC in cirrhotic patients.

The SPSS 20.0 version was utilized for doing statistical analysis. For qualitative data, numbers and percentages (%) have been used, while for quantitative data, mean $\pm$ SD has been used. For quantitative data, the significance of the difference has been tested using the independent student test; for qualitative data, the significance of the difference has been tested using the Chi square or Fisher's exact test. Statistical significance was defined as a probability value (p value) of less than 0.05.

OBSERVATION AND RESULTS:

The demographic data for both groups were shown in (Table 1) with no statistically significant difference was observed between the both groups as regard to age, and gender.

Table 1: Patient's demographic data

Parameters		LC group	OC group	p value
Age (years)	Mean	43.13 $\pm$ 5.32	45.25 $\pm$ 3.72	0.054
	Range	36-51	37-55	
Gender	Male	17(85%)	16(80%)	0.162
	Female	3(15%)	4(20%)	

The severity of liver cirrhosis was displayed in Table 2. In the LC Group, the majority of 15 (75%) patients were in child Pugh class A, while the majority of 16 (80%) patients were in child Pugh class A.

Table 2: Severity of liver cirrhosis

Child Pugh class	LC group	OC group	p value
A	15(75%)	16(80%)	0.027
B	5(25%)	4(20%)	

Causes of liver cirrhosis are shown in (Table 3).

Table 3: Cause of liver cirrhosis.

Parameters	LC group	OC group	p value
Alcoholism	14(70%)	15(75%)	0.078
Hepatitis B	1(5%)	1(5%)	
Hepatitis C	3(15%)	1(5%)	
Unknown	2(10%)	3(15%)	

The Laparoscopic group had a significantly shorter mean operation time (57.5 $\pm$ 24.9 minutes) compared to the Open group (98.7 $\pm$ 30.5 minutes), with statistical significance. Compared to patients who underwent open cholecystectomy, those who underwent laparoscopic cholecystectomy got pain alleviation earlier. The average length of hospital stay for patients in the LC group was found to be 2 $\pm$ 1.3 days, while the mean duration for patients in the OC group was 4 $\pm$ 1.4 days (p<0.05) (Table 4).

Table 4: Comparison of operative time, hospital stay and post-operative pain distribution

Parameters	LC group	OC group	p value
Mean Operative time	57.5 $\pm$ 24.9	98.7 $\pm$ 30.5	0.013
Duration of hospital stay	2 $\pm$ 1.3	4 $\pm$ 1.4	0.001

Post-operative pain (VAS)	1.4 $\pm$ 0.56	3.1 $\pm$ 1.1	0.001
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In both groups, postoperative complaints of wound infection, nausea, vomiting were recorded. Group LC experienced significantly fewer complaints, as indicated by a statistically significant difference (p <0.01). Post-operative complications were shown in the following table 5 and 6.

Table 5: Comparison of Post-operative complications among both groups

Complications	LC group	OC group	p value
Yes	2(10%)	8(40%)	0.001
No	18(90%)	12(60%)	

Table 6: Descriptive analysis of Post-operative complications

Complications	LC group	OC group
Fever	1(5%)	7(35%)
Nausea, Vomiting	2(10%)	8(40%)
Wound infection	0(0%)	5(25%)
Bile leakage	0(0%)	1(5%)
Chest infection	0(0%)	2(10%)
Ascitic leak	0(0%)	1(5%)
Need for blood transfusion	0(0%)	3(15%)

DISCUSSION:

Patients with cirrhosis had twice the frequency of cholelithiasis as the general population. This is brought on by a decrease in gallbladder motility and evacuation, a rise in intravascular hemolysis, hypersplenism, and estrogen levels.¹²

Since the introduction of LC, there has been discussion on whether cirrhotic patients may benefit from this less intrusive procedure. For non-cirrhotic patients, laparoscopic cholecystectomy (LC) offers shorter hospital stays and surgery times, faster postoperative rehabilitation, less wound problems, and lower total costs. Similar results were also seen in the current study. The study found that the LC group had a considerably lower operating time (57.5 $\pm$ 24.9 minutes) compared to the OC group (98.7 $\pm$ 30.5 minutes).

The average surgical time (in minutes) for OC (Group B) and LC (Group A) was 97.69 $\pm$ 15.79 and 63.58 $\pm$ 9.93, respectively, in the study by Nabil AA et al.¹³ This difference was statistically significant (p<0.001), and it was associated with considerably higher intraoperative bleeding in the OC group. Shukla A et al.¹⁴ found that Group I had a considerably longer operation time (mean 52.32 minutes) than Group II (mean 37.66 minutes) (p<0.001).

Similarly, in the studies conducted by Chattopadhyay K et al.¹⁵ and Awasthi RC et al.¹⁶ the average operation duration for OC was noticeably longer than that of LC. The time component of the current study was crucial since cirrhotic patients in the LC group were less exposed to anaesthesia than those in the OC group, which prevented their livers from being overexhausted.

According to the current study, patients who had LC felt relief from pain sooner than those who received OC. The average duration of hospital stay for patients in the LC group was found to be 2 $\pm$ 1.3 days, while the OC group's mean stay was 4 $\pm$ 1.4 days. In terms of surgical morbidity Patients in the laparoscopic group exhibit a lower percentage of general problems (chest infection, bile leakage, etc.) and open wound complications (fever, infection) (p <0.01). In the current study, there was no patient death in either the laparoscopic or open cholecystectomy groups.

According to data from reviewed studies, infections and hemorrhage account for the majority of morbidity in cirrhotic patients receiving LC, which ranges from 7.8 to 75%. Increased perioperative blood loss in cirrhotic patients is caused by decreased clotting factor production, decreased vitamin K stores, extended prothrombin times, increased fibrinolytic activity, and thrombocytopenia. Patients with cirrhosis are more vulnerable to infections due to compromised immune systems.¹⁷

In laparoscopy group, the mean length of post-operative hospital stay was 1.8 days, but in open group, it was 4.8 days, according to the study by Singh P et al.¹⁸ In OC, it took 2.1 days to resume a regular diet after surgery, but in LC, it only took 1.2 days. Compared to LC, the rate of surgical site infections was greater in OC.

Elahwal EA et al.¹⁹ also noted that the OC Group had minor post-

surgical morbidity and no surgical death, but an average hospital stay (days) of 2.7 ± 1.9 days was significantly longer than that of group LC, with an average hospital stay of 2 ± 1.32 days for group A.

CONCLUSION:

For cirrhotic patients with gallstone disease (Child class A and early B), LC provided safe and efficient surgical therapy. According to the data, LC was a safe surgical method for the majority of patient with symptomatic gallstone disease and Child classes A and B. The technique was associated with no mortality, a decreased incidence of postoperative complications, a shorter operative time, a shorter hospital stays, and less postoperative pain.

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Conflicts Of Interest:

There are no conflicts of interest

REFERENCES:

- Shaffer EA. Epidemiology of gallbladder stone disease. Best practice & research Clinical gastroenterology. 2006 Jan 1;20(6):981-96.
- Mallick B, Anand AC. Gallstone disease in cirrhosis—pathogenesis and management. Journal of Clinical and Experimental Hepatology. 2022 Mar 1;12(2):551-9.
- Mannam R, Narayanan RS, Bansal A, Yanamaladoddi VR, Sarvepalli SS, Vemula SL, Aramadaka S. Laparoscopic Cholecystectomy Versus Open Cholecystectomy in Acute Cholecystitis: A Literature Review. Cureus. 2023 Sep 21;15(9).
- Abdelrahman TM. Laparoscopic cholecystectomy in patients with liver cirrhosis: review of intraoperative measures and recommendations. International Surgery Journal. 2021 Aug 27;8(9):2860-5.
- Rudiman R. Minimally invasive gastrointestinal surgery: from past to the future. Annals of Medicine and Surgery. 2021 Nov 1;71:102922.
- Rajah KH. Laparoscopic Cholecystectomy in Acute Cholecystitis: An Updated Review. Asian Journal of Medicine and Health. 2024 May 4;22(6):160-7.
- Manatakis DK, Antonopoulou MI, Tasis N, Agalinos C, Tsouknidas I, Korkolis DP et al. Critical view of safety in laparoscopic cholecystectomy: a systematic review of current evidence and future perspectives. World Journal of Surgery. 2023 Mar;47(3):640-8.
- Cinar AS, Sayin P, Celayir MF. Relationship between gastric pH measurement and intra-abdominal pressure in patients undergoing laparoscopic surgery. Şişli Etfal Hastanesi Tıp Bülteni. 2020;54(4):463-8.
- D'Acapito F, La Barba G, Togni C, Ercolani G. Difficult Laparoscopic Cholecystectomy: When to Convert to Open Technique. Difficult Acute Cholecystitis: Treatment and Technical Issues. 2021:101-17.
- Hosseini SV. Comparison of Laparoscopic Versus Open Cholecystectomy Results: Scoping Review. Eurasian Journal of Chemical, Medicinal and Petroleum Research. 2023 Oct 1;2(4):340-51.
- Shenoy R, Kirkland P, Hadaya JE, Tranfield MW, DeVirgilio M, Russell MM et al. Management of symptomatic cholelithiasis: a systematic review. Systematic Reviews. 2022 Dec 12;11(1):267.
- Cassinotti E, Baldari L, Boni L, Uranues S, Fingerhut A. Laparoscopic cholecystectomy in the cirrhotic: review of literature on indications and technique. Chirurgia. 2020;115(2):208-12.
- Nabil AA, Bosat EB, Ahmed A. Laparoscopic versus Open Cholecystectomy in Cirrhotic Patients: A Prospective Comparative Study. The Medical Journal of Cairo University. 2019 Dec 1;87(December):4239-45.
- Shukla A, Seth S, Ranjan A. A comparative study between laparoscopic and open cholecystectomy in cases of cholecystitis with cholelithiasis: one year experience in tertiary care center. International Surgery Journal. 2017 Feb 25;4(3):903-7.
- Chattopadhyay K, Das R. Laparoscopic and open cholecystectomy: a comparative study. International J Surg Sci. 2020;4(1):427-30.
- Awasthi RC. A Comparative Study to Evaluate the Laparoscopic vs Open Surgery Cholecystectomy: A Prospective Study. Journal of Advanced Medical and Dental Sciences Research. 2018 Oct 1;6(10):94-7.
- Lange NW, Salerno DM, Berger K, Cushing MM, Brown Jr RS. Management of hepatic coagulopathy in bleeding and nonbleeding patients: an evidence-based review. Journal of Intensive Care Medicine. 2021 May;36(5):524-41.
- Singh P, Gupta SK, Kumar M. A comparative study of open cholecystectomy and laparoscopic cholecystectomy in patients with cholelithiasis. International Surgery Journal. 2018;5(1):253-6.
- Elahwal EA, Mahmoud M, El-Kaseer MH. Comparative study between laparoscopic and open cholecystectomy in cirrhotic patients. Al-Azhar International Medical Journal. 2022 Aug 31;3(8):118-22.