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A Comparative Clinical Study of Laparoscopic Versus Open Cholecystectomy in The Management of Gall Bladder Disease

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A B S T R A C T

Cholelithiasis is a common biliary pathology, with laparoscopic cholecystectomy (LC) now considered the standard of care. In its early adoption in India, it faced challenges including equipment cost, surgical learning curves and intraoperative complications. Some of these points are relevant even today. This study aimed to compare the outcomes of LC and open cholecystectomy (OC) based on various parameters and also to compare the data with the present day clinical practise. retrospective analysis was conducted on 100 patients (50 LC, 50 OC) undergoing cholecystectomy at a tertiary hospital in Mumbai. Patients were included regardless of comorbidities, with exclusion criteria including choledocholithiasis and gallbladder carcinoma. Cases requiring conversion from LC to OC were noted. Key parameters included postoperative complications, duration of hospital stay, time to oral intake, and cosmesis. Data were statistically analysed using t-tests and a p-values <0.05 were considered significant. The conversion rate from LC to OC was 22%, primarily due to bleeding and technical difficulty. Mean hospital stay was significantly shorter for LC (6.34±4.29 days) vs OC (9.94±4.65 days) ($p<0.05$). Complications like vomiting, fever and wound infection were lower in the LC group, though not statistically significant. Cosmetic satisfaction was higher in the LC group. Intraoperative complications, notably CBD injury, were more frequent in LC. However, more recent studies showed lower conversion rate and intraoperative complications in LC. The intraoperative risks and complications associated with LC appear to have declined significantly over the period of time due to increased surgical expertise.whereas LC has always showed faster recovery and improved cosmesis. While surgical expertise significantly influences LC outcomes, making it a preferred option, OC may remain a relevant option in resource-limited settings due to other parameters.

Keywords: Laparoscopic cholecystectomy, Intra-operative complications, Conversion rate, Cosmesis, Oral feeds.

INTRODUCTION

Cholelithiasis is the most common biliary pathology with cholecystectomy being the most common surgical operation in the Western world [1]. The incidence of cholelithiasis, or gallstone disease is 4% in India and varies from 10% to 20% globally [2]. In India, in the last 20 years, the number of patients undergoing cholecystectomy has increased because of easy access to ultrasonography (USG) all over India, which is the most important investigation for diagnosing cholelithiasis [3].

Among the 20% of symptomatic cases, an estimated 1% to 4% will develop gallstone-related complications such as cholecystitis, gallstone pancreatitis, choledocholithiasis, gallstone ileus, etc. Gallstones are known to become increasingly common as people age, and demographic studies have shown that females are more likely than males to have them. The most common surgical intervention currently is laparoscopic cholecystectomy [4].

It has been more than 25 years since laparoscopic cholecystectomy was introduced in India. Soon after its introduction, it became the procedure of choice for the removal of the gallbladder. The advantages of laparoscopic cholecystectomy cited were the avoidance of large incisions, shortened hospital stay and earlier return to work. Laparoscopic cholecystectomy (LC) is avoided only when there is a specific contraindication to the procedure like cardio respiratory disease or in the event of laparoscopic surgery being unsuccessful due reasons like adhesions, obscured anatomy or other problems [5].

Despite its widely propagated advantages, the pitfalls of LC are also well known. The lack of three-dimensional imaging can lead to a limited surgical view and reduced discrimination of anatomical structures. It is an obvious contraindication in patients who cannot sustain or are not permitted general anaesthesia. In patients with cardiac illnesses, carbon dioxide insufflation can induce arrhythmia. Additionally, poor structural visualization can lead to an increased risk of haemorrhage and bile duct damage or leakage. Coupled with the elevated cost of equipment, the use of laparoscopic procedures in resource-limited setups is a troublesome task [4, 6-8]. The complication rate in laparoscopic cholecystectomy is likely to be different when the surgeon is in the learning curve as compared to results when the surgeon is well-versed with the technical details of the procedure [9]. With more experience of LC over the years, the complications rates have reduced significantly however the comparative data is not extensively available.

The aim of this study was to compare laparoscopic cholecystectomy and open cholecystectomy in patients with cholelithiasis by measuring parameters such as the rate of complications, length of hospital stay, morbidity, postoperative recovery, cosmesis, etc. We also aimed to compare laparoscopic cholecystectomy with open cholecystectomy over time, starting from its early adoption as a treatment modality by undertaking a thorough analysis of published articles.

MATERIALS AND METHODS

This was a retrospective study including 100 cases of cholecystectomy — 50 laparoscopic cholecystectomy (LC) and 50 open cholecystectomy (OC) — conducted at a tertiary public medical hospital in Mumbai. Patients above 18 years of age who had undergone cholecystectomy in the general surgery department were included, regardless of sex or associated illnesses. Patients with choledocholithiasis, carcinoma of the gallbladder, or perforated gallbladder were excluded. Two groups were formed based on the initial surgical plan. In the open group, the initial plan was open cholecystectomy; in the laparoscopic group, it was laparoscopic cholecystectomy. However, some laparoscopic cases required conversion to open cholecystectomy — the reasons for which were noted. For analysis, only those procedures successfully completed laparoscopically were retained in the LC group, while the OC group included both primary open and converted cases.

The two groups were compared based on intraoperative common bile duct (CBD) injury and post-operative complications such as blood loss, vomiting, fever, wound infection and re-exploration. Additionally, the timing of drain removal, initiation of oral intake, and length of hospital stay were recorded and compared. After discharge, patients were contacted to ascertain cosmetic factor and the degree of satisfaction with the scar. Data were subjected to statistical tests to find if the differences were statistically significant. A p-value less than 0.05 was considered statistically significant.

RESULTS

Table 1: Showing age distribution of all patients undergoing cholecystectomy

Age Range	Laparoscopic cholecystectomy (LC)	Open cholecystectomy (OC)	Total
20-30	15	9	24
31-40	15	16	31
41-50	8	14	22
51-60	10	8	18
>60 years	2	3	5
Total	50	50	100

55% of patients were in the age group between 20 to 40 years who either underwent open or laparoscopic cholecystectomy.

Table 2: Shows the sex distribution of all patients

Sex	Laparoscopic	Open	Total
Male	2	3	5
Female	48	47	95
Total	50	50	100

95% of patients were females in the study

Out of 50 cases of the laparoscopic group, 11 had to be converted to open cholecystectomy therefore, successfully completed laparoscopic cholecystectomies were only 39, whereas the total number of open cholecystectomies actually done were 61. Therefore, for comparison purposes total number of LC cases was taken as 39 and that of OC cases as 61.

Table 3: Post-Operative days for recovery

	LC	**OC**
Mean	6.34± 4.29	9.94± 4.65*
Min stay (days)	2	6
Max stay (days)	22	14

*= $p < 0.05$, which indicates that the difference was statistically significant.

The mean hospital stay after the surgery is generally indicative of the post-operative recovery time. The mean hospital stay in the laparoscopic group was much lower as compared to the open cholecystectomy group and the difference was statistically significant. This signifies that the recovery time in the laparoscopic group was significantly lower as compared to the open cholecystectomy group.

Table 4: Shows starting of oral feeds

	LC	**OC**
Mean	2.30±0.85	2.62±1.12
Min stay (days)	1	1
Max stay (days)	5	7

p-value (T-test) = 0.117. indicating that the difference was statistically not significant.

The mean time to initiate oral feeds postoperatively was lower in the laparoscopic group compared to the open group, although the difference was not statistically significant.

A drain was kept in patients in both groups. According to the results, the difference between the two groups was not statistically significant.

Apart from the above, an important observation was about the conversion from laparoscopic to open cholecystectomy. The total number of conversions from laparoscopic to open cholecystectomy was 11 in 50 laparoscopic cholecystectomies which is equal to 22% of the total cases of LC. The causes of these conversions in decreasing order of frequency were 1) excessive blood loss, 5 out of 11(45% of conversions); 2) technically difficulty to perform cholecystectomy, 3 out of 11(27% of conversions); 3)CBD injury, 2 out of 11(18% of conversions), 4) technical problems with the equipment, 1 out of 11(9%).

No patients deaths occurred in either group during the study.

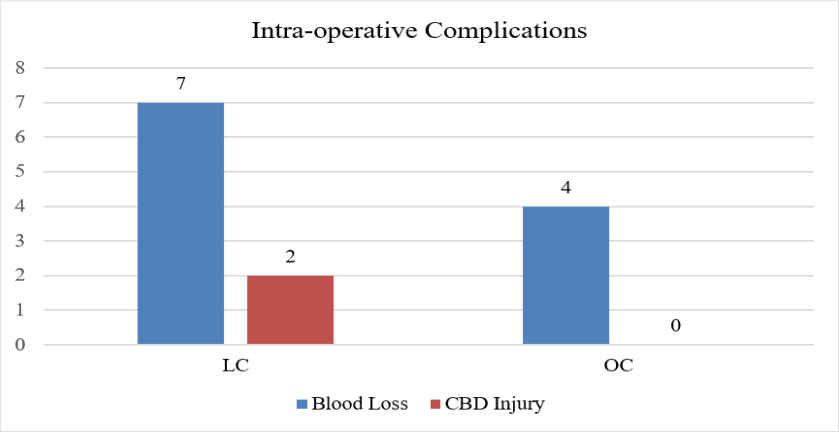

Figure 1: Shows intraoperative complications in both groups

The prominent complications included blood loss and injury to CBD. Even though the values were higher in the LC group, the difference was not statistically significant between both groups for both the parameters (p>0.05).

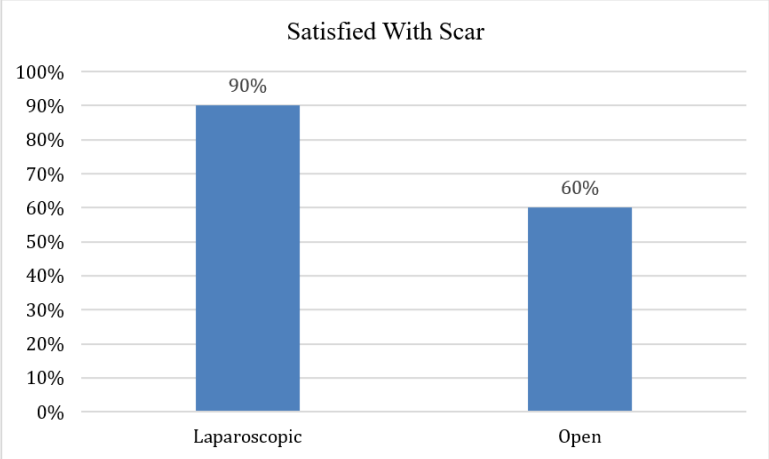

Figure 2: Shows the results of cosmesis in both the groups

Out of 39 successfully completed laparoscopic cholecystectomies, only 20 followed up in OPD after discharge for determining the cosmetic effect. Whereas in the open group, out of 61 completed cholecystectomies, 40 followed up in OPD.

Percentage of satisfaction with the scar was higher in laparoscopic group, but the difference was not statistically significant (p value = 0.652430).

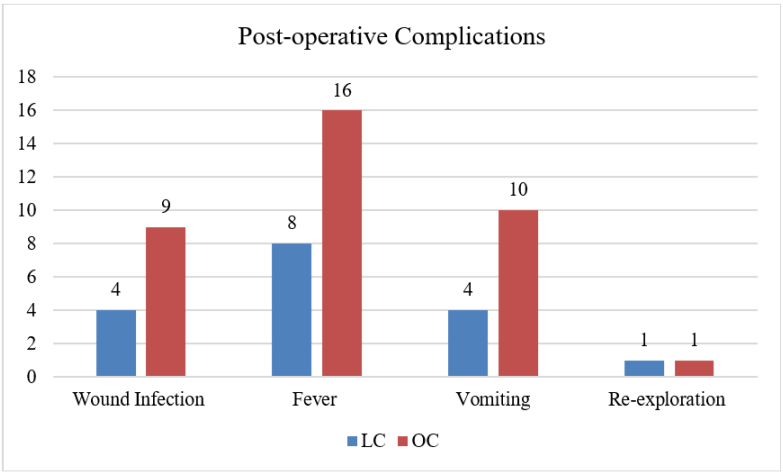

Figure 3: Shows details of postoperative complications in both the groups

Post operative complications such as wound infection, fever, vomiting and re-exploration of the two groups were compared.

Though the percentage of wound infection, fever and vomiting was lower in the laparoscopic group than in the open group, the difference was not statistically significant (p =0.521624).

In the laparoscopic group, one patient had a leak from the cystic duct stump, with the drain draining bile. It was due to the slipping of the cystic duct clip. The patent was re-explored on post-op day 2. The patient had an uneventful recovery.

In the open group, one patient had vomiting, and distention postoperatively and went into intestinal obstruction. The patient was re-explored on post-op day 10. Findings were bowel loops adherent to the GB fossa. The patient did well postoperatively.

The percentage of re-exploration was higher in the laparoscopic group (2.56%) than the open group (1.6%), but the difference was not statistically significant.

DISCUSSION

The advantages that laparoscopic cholecystectomy offers over open cholecystectomy, viz. less pain, less hospital stay, better cosmesis and early return to work, are all because of smaller incisions. Although the incisions are small, they are multiple [10]. These advantages come at the cost of expensive equipment and specialized training. Some surgeons have

tried cholecystectomy through a very small incision, usually less than 5cm, taken directly over the gallbladder. This procedure, termed 'mini-lap cholecystectomy', has proven to be as effective as laparoscopic cholecystectomy in offering these benefits to patients. It does not require any specialised equipment, except perhaps better illumination, and also does not require special surgical training [11].

The current study aimed to find out to what extent the above benefits were offered to patients who underwent laparoscopic versus open cholecystectomy and to compare them with the current scenario through published literature review.

For this study, 100 cases of cholecystectomies were selected retrospectively from a tertiary care hospital. They were divided into two groups, each group consisting of 50 patients. The first group comprised patients for whom the initial plan was laparoscopic cholecystectomy, while the second group consisted of patients for whom the initial plan was open cholecystectomy.

The incidence of cholelithiasis was highest among individuals aged 20 to 40 years, comprising 55% of the patient population. The incidence of cholelithiasis was predominantly higher in women (95%). This finding was similar when compared to studies conducted by B. Harsana & P. Jain et al [12] and also by Bhar et al [13]. The most common symptoms at presentation were abdominal pain (100%), followed by vomiting (77%), fever, and jaundice (18%).

The conversion rate in the present study was 22% i.e., 11 out of 50 laparoscopic cholecystectomies had to be converted into open cholecystectomy. In terms of conversion rate, the majority of the newer studies remained below 10% [14–16] while an older study by Sikora et al [17] had a similar conversion rate reaching 20%. Laparoscopy was evolving during the 1990s, using unclear video optical technology and crude laparoscopic devices. This could explain why older studies have higher conversion rates than newer studies [18]. A meta-analysis involving studies examining the reasons for intra-operative conversion of laparoscopic cholecystectomy patients to open cholecystectomy found 12 patient-related risk factors for conversion in laparoscopic cholecystectomy across all relevant trials. In almost every study, the most common causes of conversion were dense adhesions/fibrosis of the gallbladder and Calot's triangle, unclear anatomy at the Calot's triangle, and severe forms of inflammation. Most of the authors highlighted these three factors with substantially greater numbers [18].

Regarding the equipment-related aspects of conversion in laparoscopic surgery, six studies reported technical challenges with a small number of patients when converting the procedure to open cholecystectomy, which was also the fourth most common cause of conversion in our study [18].

According to the NIH 1992 consensus statement, the surgeon's training, experience, skill, and judgment have a significant impact on the outcome of LCs.(9) Since then, other studies have shown that case volume has a considerable impact on a surgeon's proficiency. Liu et al. revealed that the laparoscopic cholecystectomy conversion rate (LCCR) fell from 17% in a surgeon's initial 100 cases to 4% when the surgical experience reached 400-500 cases [19]. It is crucial to note that open conversion is not always caused by complications; rather, it is usually the result of the operating surgeon's appropriate and sensible decision [20].

Intraoperative complications were higher in laparoscopic cholecystectomy. Seven patients in the laparoscopic group had excessive blood loss as compared to 4 in the open group. Two patients in the laparoscopic group had CBD injury whereas no CBD injury was reported in the open group. These findings were similar to a study conducted by Shashirekha et al., [21] who also reported a higher incidence of intraoperative complications in the laparoscopic cholecystectomy group, such as haemorrhage due to slippage of staples, injury to the CBD or liver bed, missing of CBD stones, etc., as compared to the open cholecystectomy group, though the postoperative morbidity and length of hospital stay were much lower with laparoscopic surgeries than with open procedures, as expected [21]. The majority of issues result from a lack of experience or knowledge of common errors [20]. Because of technological advances in laparoscopic instruments, the incidence of life-threatening complications has decreased, as has the number of cases that must be converted to open surgery [22]. During the learning curve for laparoscopic cholecystectomy (LC), surgeons may face a greater rate of intraoperative problems, emphasizing the importance of diligent postoperative monitoring to identify and address potential concerns [23].

The laparoscopic group had lower incidence of post-op complications like vomiting, fever, and wound infection in this study but the difference was not statistically significant. A similar pattern was noted in research conducted by Lujan et al., where the laparoscopic group showed fewer complications, but the difference was not statistically significant [24]. Some newer studies conducted by Balaji et al [5] and Faruquzzaman et al [20]. showed a statistically significant difference between the two groups. Patients in the laparoscopic group recovered faster after surgery than those in the open group, which was in line with the studies described above. The open group employed a large incision, which can explain these findings.

Wound hematomas in large incisions can cause infection and problems such as delayed healing, dehiscence, and incisional hernia. Laparoscopic cholecystectomy results in faster recovery because of smaller skin incisions and less muscle and fascia dissection, leading to less local inflammation and pain [5].

The percentage of satisfaction with the scar was higher in the laparoscopic group but the difference was not statistically significant. Similar results were seen in some studies such as the one conducted by Balaji et al. where in terms of improved cosmesis, patients in the LAP group were significantly happier with the results of their surgery.

Compared to the open group, which received acceptable to average reviews, the majority of patients offered LC received excellent to good ratings[5].

The mean duration of hospital stay was 6.4 with a standard deviation of 4.29 in the laparoscopic group whereas in the open group, the mean hospital stay was 9.94 with a standard deviation of 4.65. This difference in hospital stay in this study was found to be statistically significant with the p-value being <0.05. This is consistent with the findings of research conducted by Harsana et al.(12), Bhar et al [13], and Balaji et al [5], which all found that the open cholecystectomy group experienced more days of hospitalization than the laparoscopic group. Patients benefit from early hospital discharge because it shortens the convalescence period, encourages an early return to work, and reduces the risk of nosocomial infections. Hospital expenses are also reduced by early release [5].

Mean time of initiation of orals in the laparoscopic group was 2.30$\pm$ 0.85 as against 2.62$\pm$1.12 in the open group. The difference was not statistically significant. The mean time of removal of the drain was 3.166$\pm$1.58 in the laparoscopic group and that of the open group was 3.18$\pm$0.9995. The difference was not statistically significant.

One of the most important benefits of laparoscopic cholecystectomy is reduced pain, but this could not be studied on two grounds. 1) the retrospective nature of the study. 2) all patients were given post-op analgesics routinely without actual demand by the patients. Another important aspect of laparoscopic cholecystectomy is the additional cost to the patient. Today in the private sector the cost of laparoscopic cholecystectomy is probably twice or thrice that of open cholecystectomy. Being a free general hospital, this factor also could not be compared as the cost was the same in either case.

CONCLUSION

100 cases of cholecystectomies done in a general hospital were selected, with 50 from each group comparing laparoscopic versus open cholecystectomy. Laparoscopic cholecystectomy group showed shorter duration of surgery,shorter hospital stay, better cosmesis while open cholecystectomy had a higher rate of postoperative complications like vomiting, fever, and wound infection. With more experience, the conversion rate from LC to OC has drastically decreased making laparoscopy a safer and better procedure for cholecystectomy .

Overall, considering all the various parameters, we conclude that laparoscopic cholecystectomy is better than open cholecystectomy. However, in resource-limited settings or where affordability is a concern, the option of open cholecystectomy may still be relevant.

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REFERENCES

1. Chang HJ, Moodley C and Kloppers C. Time is Precious: Factors Influencing Operative Time in Laparoscopic Cholecystectomy. Int J Surg Res Pract 2024;11(2):170.
2. Patel AM, Yeola M, Mahakalkar C. Demographic and risk factor profile in patients of gallstone disease in Central India. Cureus. 2022 May;14(5):e24993.
3. Behari A, Kapoor VK. Asymptomatic Gallstones (AsGS) - To treat or not to? Indian J Surg 2012 ;74(1):4–12.
4. Pateriya A, Agrawal MP, Samar SK. Open versus laparoscopic cholecystectomy: a comparative study on patient parameters. Int Surg J 2021;8(6):1767–71.
5. Balaji DG, Ponnapalli DY, Kb DT, Kumar DKS. Comparative study of open cholecystectomy versus laparoscopic cholecystectomy. Int J Surg Sci 2021;5(4):199–208.
6. Choy I, Kitto S, Adu-Aryee N, Okrainec A. Barriers to the uptake of laparoscopic surgery in a lower-middle-income country. Surg Endosc 2013 ;27(11):4009–15.

7. Pessaux P, Regenet N, Tuech JJ, Rouge C, Bergamaschi R, Arnaud JP. Laparoscopic Versus Open Cholecystectomy: A Prospective Comparative Study in the Elderly With Acute Cholecystitis. Surgical Laparoscopy, Endoscopy & Percutaneous Techniques 2001;11(4):252-255.
8. Lundberg O, Kristoffersson A. Open versus laparoscopic cholecystectomy for gallbladder carcinoma. J Hepatobiliary Pancreat Surg 2001;8(6):525–9.
9. Gallstones and laparoscopic cholecystectomy. NIH Consens Statement 1992;10(3):1–28.
10. Mannam R, Sankara Narayanan R, Bansal A, Yanamaladoddi VR, Sarvepalli SS, Vemula SL, et al. Laparoscopic cholecystectomy versus open cholecystectomy in acute cholecystitis: a literature review. Cureus 2023 ;15(9):e45704.
11. Handaya AY, Andrew J, Hanif AS, Tjendra KR, Aditya AFK. Effectiveness and predictors of conversion in mini-laparotomy cholecystectomy in developing country: a cohort retrospective study. BMC Surg 2022;22(1):344.
12. Harsana B, Jain P. A Comparative Study Between Open Cholecystectomy Versus Laparoscopic Cholecystectomy. International Journal of Current Pharmaceutical Research 2024;16(4):51-54
13. Bhar A, Karmakar S. A comparative study of open cholecystectomy versus laparoscopic cholecystectomy - A hospital based study. J Evid Based Med Health 2020;7(25):1–5.
14. El Nakeeb A, Mahdy Y, Salem A, El Sorogy M, El Rafea AA, El Dosoky M, et al. Open cholecystectomy has a place in the laparoscopic era: a retrospective cohort study. Indian J Surg 2017;79(5):437–43.
15. Taki-Eldin A, Badawy AE. Outcome of laparoscopic cholecystectomy in patients with gallstone disease at a secondary level care hospital. Arq Bras Cir Dig 2018;31:e1347.
16. Shamiyeh A, Danis J, Wayand W, Zehetner J. A 14-year analysis of laparoscopic cholecystectomy: conversion—when and why? Surg Laparosc Endosc Percutan Tech 2007;17(4):271.
17. Sikora SS, Kumar A, Saxena R, Kapoor VK, Kaushik SP. Laparoscopic cholecystectomy—can conversion be predicted? World J Surg 1995;19(6):858–60.
18. Khakimov M, Karimov R, Sabanovic J, Patel B. Intraoperative reasons for conversion of laparoscopic cholecystectomy to open surgery: a systematic review. Health Sci Rev 2022; 4:100035.
19. Liu CL, Fan ST, Lai EC, Lo CM, Chu KM. Factors affecting conversion of laparoscopic cholecystectomy to open surgery. Arch Surg 1996;131(1):98–101.
20. Faruquzzaman, Hossain SM. Overall operative outcomes of Laparoscopic Cholecystectomy and our experience in Statistics. Arch Clin Gastroenterol 2017;3(2):33-36.
21. Shashirekha CA, Sankar V, Ravikiran HR, Sreeramulu PN, Prasad K, Sathanantham DK. Laparoscopic cholecystectomy and Open cholecystectomy – A comparison of complications in a single center experience. JMSCR 2017;05(07):24490-24493
22. Mehmood A, Mei SY, Abuduhelili A, Dengcairenanrui B, Mehmood A, Mei SY, et al. Laparoscopic cholecystectomy versus open cholecystectomy. World J Biol Pharm Health Sci 2024;17(2):396–404.
23. The Southern Surgeons Club, Moore MJ, Bennett CL. The learning curve for laparoscopic cholecystectomy. Am J Surg 1995;170(1):55–9.
24. Lujan JA, Parrilla P, Robles R, Marin P, Torralba JA, Garcia-Ayllon J. Laparoscopic cholecystectomy vs open cholecystectomy in the treatment of acute cholecystitis: a prospective study. Arch Surg 1998;133(2):173–5.