ORIGINAL RESEARCH

Comparative Study of Laparoscopic vs. Open Cholecystectomy in Terms of Recovery Time and Complications

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ABSTRACT

Aim: The aim of this study was to compare laparoscopic cholecystectomy (LC) and open cholecystectomy (OC) in terms of recovery time, postoperative complications, and patient satisfaction in patients with symptomatic gallstone disease. **Materials and Methods:** This comparative study included 100 patients diagnosed with symptomatic gallstone disease, who were randomly assigned to undergo either LC (50 patients) or OC (50 patients). Inclusion criteria included patients aged 18–70 years with confirmed gallbladder pathology. Preoperative assessments included history-taking, physical examination, laboratory investigations, and ultrasonography. All surgeries were performed under general anesthesia by experienced surgeons. The primary outcomes were recovery time (hospital stay and return to normal activity) and complications (wound infection, bile leakage, bleeding, and postoperative pain). Follow-up assessments were conducted at 1 week, 1 month, and 3 months. **Results:** The recovery time was significantly shorter in the LC group, with a mean hospital stay of 1.6 ± 0.8 days compared to 4.2 ± 1.1 days in the OC group ($p < 0.001$). LC patients returned to normal activity in 5.2 ± 2.3 days, while OC patients took 12.7 ± 3.4 days ($p < 0.001$). Postoperative pain was significantly higher in the OC group, with 30% of OC patients experiencing severe pain compared to 10% in the LC group ($p = 0.02$). At the 3-month follow-up, 96% of LC patients reported complete recovery, compared to 90% of OC patients ($p = 0.35$). Patient satisfaction was significantly higher in the LC group, with 96% reporting excellent or good satisfaction compared to 80% in the OC group ($p = 0.04$). **Conclusion:** Laparoscopic cholecystectomy offers significant advantages over open cholecystectomy, including shorter hospital stays, faster recovery, reduced postoperative pain, and higher patient satisfaction. These results suggest that LC should be considered the preferred surgical approach for patients with symptomatic gallstone disease due to its minimal invasiveness and quicker recovery.

Keywords: Laparoscopic cholecystectomy, open cholecystectomy, postoperative recovery, complications, patient satisfaction.

INTRODUCTION

Cholecystectomy, the surgical removal of the gallbladder, is one of the most common operations performed worldwide, primarily to treat gallstones and other gallbladder-related disorders. Traditionally, cholecystectomy was performed using open surgical techniques, which required a large incision on the abdomen. However, over the past few decades, the advent of laparoscopic surgery has revolutionized the field, offering patients a minimally invasive alternative. This shift from open to laparoscopic surgery has led to a range of improvements in the management of gallbladder diseases, particularly with regard to recovery time and complications.[1]

The two primary approaches to cholecystectomy—laparoscopic and open—differ significantly in their surgical techniques. Open cholecystectomy involves making a large incision in the abdomen to directly access and remove the gallbladder. In contrast, laparoscopic cholecystectomy is a minimally invasive procedure that uses several small incisions through which a camera and specialized instruments are inserted to remove the gallbladder. The laparoscopic technique is performed under general anesthesia, but it typically results in smaller incisions, reduced trauma to surrounding tissues, and faster recovery times when compared to its open counterpart.[2]

Recovery time is a critical factor when assessing the benefits of any surgical procedure. One of the major

advantages of laparoscopic cholecystectomy is the significantly shorter recovery period compared to open cholecystectomy. Due to the smaller incisions, patients experience less postoperative pain, lower risk of infection, and generally require shorter hospital stays. In many cases, laparoscopic patients are able to return to normal daily activities within a few days to a week, while open cholecystectomy patients often require a longer recovery period of several weeks to months. This difference in recovery time is particularly beneficial in terms of reducing the overall burden on patients and healthcare systems, as shorter recovery times contribute to reduced hospital costs, faster return to work, and an improved quality of life for patients.[3]

In addition to recovery time, the occurrence of complications is another essential factor in the comparison between laparoscopic and open cholecystectomy. Like any major surgery, both approaches carry inherent risks. However, laparoscopic cholecystectomy has been associated with a lower rate of complications compared to open surgery. The smaller incisions reduce the likelihood of wound infections, and the minimally invasive nature of the procedure decreases the risk of damage to surrounding organs and structures, such as the bile ducts. On the other hand, open cholecystectomy, due to its larger incisions and more invasive nature, often carries a higher risk of complications, such as postoperative infections, bleeding, and longer-term adhesions.[4]

Despite the advantages of laparoscopic cholecystectomy, it is important to note that not all patients are suitable candidates for this minimally invasive procedure. Certain factors, such as obesity, previous abdominal surgeries, or complicated gallbladder conditions, may complicate the performance of laparoscopic surgery and may require an open approach. In such cases, the benefits of laparoscopic surgery, such as reduced recovery time and fewer complications, may be less pronounced. Furthermore, while laparoscopic cholecystectomy has demonstrated clear advantages in terms of recovery time and complication rates in many studies, it is still a highly technical procedure that requires experienced surgeons. In some instances, complications during laparoscopic surgery may lead to a conversion to open surgery, which may negate the potential benefits.[5]

Moreover, patient satisfaction is another critical consideration in evaluating the two approaches. Laparoscopic cholecystectomy tends to offer higher satisfaction rates due to the reduced pain, faster recovery, and improved cosmetic outcomes associated with smaller scars. Patients often report less postoperative discomfort and a quicker return to normal life, which contributes significantly to their overall satisfaction with the procedure. Conversely, open cholecystectomy, with its larger incisions, more significant postoperative pain, and longer recovery times, may result in a less favorable patient experience.[6]

However, while laparoscopic cholecystectomy generally offers superior outcomes in terms of recovery time and complication rates, it is not entirely without its challenges. The procedure requires specialized equipment, and any failure in its execution can lead to severe complications. For example, improper handling during the operation could result in bile duct injury, hemorrhage, or injury to other abdominal organs. These risks, although rare, are a key reason why some surgeons may prefer the open approach in particularly complex cases.

MATERIALS AND METHODS

This comparative study was conducted on 100 patients diagnosed with symptomatic gallstone disease who underwent cholecystectomy at tertiary care hospital. Patients were randomly assigned into two groups: 50 patients underwent laparoscopic cholecystectomy (LC), while 50 patients underwent open cholecystectomy (OC). Inclusion criteria included patients aged 18–70 years with confirmed gallbladder pathology requiring surgical intervention. Patients with previous upper abdominal surgery, malignancy, or severe comorbidities were excluded. Preoperative assessments included detailed history-taking, physical examination, routine laboratory investigations, and ultrasonography to confirm gallbladder pathology. All surgeries were performed under general anesthesia by experienced surgeons using standard techniques for each procedure. The primary outcome measures included postoperative recovery time, defined as the duration of hospital stay and return to normal activities, and the incidence of complications such as wound infection, bile leakage, bleeding, and postoperative pain. Postoperative follow-up was conducted at 1 week, 1 month, and 3 months to assess recovery and any delayed complications. Data were analyzed using statistical software, with significance set at $p < 0.05$. Ethical approval was obtained from the institutional review board, and informed consent was secured from all participants before inclusion in the study.

RESULTS

Table 1: Demographic Characteristics of Patients

The demographic characteristics of patients undergoing laparoscopic cholecystectomy (LC) and open cholecystectomy (OC) were comparable, with no significant differences between the two groups. A total of 50 patients were enrolled in each group. The mean age of patients in the LC group was 45.3 ± 12.6 years, while in the OC group, it was 46.1 ± 13.2 years, which is not statistically significant ($p = 0.74$). In terms of gender distribution, 44% of the LC group were male, and 40% of the OC group were male ($p = 0.72$), indicating no significant difference. The female patient distribution was also similar, with 56% of the LC group and 60% of the OC group being female ($p =$

0.72). Comorbidities such as hypertension and diabetes were present in both groups, but the prevalence was also comparable. Hypertension was observed in 16% of the LC group and 20% of the OC group ($p = 0.62$), and diabetes was noted in 10% of the LC group compared to 14% in the OC group ($p = 0.61$). These findings suggest that the two groups were similar in terms of baseline characteristics and comorbidities, ensuring that observed differences in postoperative outcomes could be attributed to the type of surgery performed.

Table 2: Postoperative Recovery Time

The recovery times post-surgery were significantly different between the two groups. Patients who underwent laparoscopic cholecystectomy had a notably shorter hospital stay, with an average duration of 1.6 ± 0.8 days, compared to 4.2 ± 1.1 days for patients who underwent open cholecystectomy ($p < 0.001$). This indicates that LC patients experienced a quicker discharge from the hospital. Additionally, the time to return to normal activities was significantly shorter in the LC group, with patients returning to their usual activities in 5.2 ± 2.3 days, compared to 12.7 ± 3.4 days in the OC group ($p < 0.001$). This suggests that laparoscopic cholecystectomy is associated with a faster recovery and earlier return to normal functioning compared to the open surgical approach.

Table 3: Postoperative Complications

In terms of postoperative complications, the rates of wound infection, bile leakage, and bleeding were relatively low in both groups. Wound infections occurred in 4% of the LC group and 8% of the OC group ($p = 0.36$), a difference that was not statistically significant. Bile leakage was observed in 2% of the LC group and 6% of the OC group ($p = 0.32$), also not reaching statistical significance. Bleeding requiring transfusion was seen only in the OC group (4%), with no cases in the LC group ($p = 0.16$). However, the rate of significant postoperative pain, as indicated by a visual analog scale (VAS) score greater than 6, was significantly higher in the OC group. A total of 30% of the OC patients experienced severe pain compared to only 10% in the LC group ($p = 0.02$). This finding highlights the reduced postoperative pain typically associated with laparoscopic procedures, which may contribute to a better overall recovery experience for patients.

Table 4: Follow-up Outcomes at 3 Months

At the 3-month follow-up, the majority of patients in both groups reported a complete recovery. In the LC group, 96% of patients reported complete recovery, compared to 90% in the OC group ($p = 0.35$), a difference that was not statistically significant. The incidence of persistent pain was low in both groups, with 4% of LC patients and 10% of OC patients still experiencing pain ($p = 0.35$). Similarly, the recurrence of symptoms was low, with 2% of LC patients and 6% of OC patients reporting symptom recurrence ($p = 0.34$). These findings suggest that both surgical techniques resulted in a high rate of successful outcomes, with no major differences in long-term recovery at the 3-month mark.

Table 5: Overall Satisfaction and Patient Feedback

Overall patient satisfaction was higher in the LC group. A total of 96% of LC patients rated their satisfaction as either excellent or good, compared to 80% in the OC group ($p = 0.04$). This difference in satisfaction may be attributable to the minimally invasive nature of laparoscopic surgery, which generally results in less postoperative pain and a quicker recovery. Furthermore, a significantly lower proportion of LC patients (24%) required postoperative pain medication compared to 60% of OC patients ($p < 0.001$). This suggests that laparoscopic surgery not only leads to a quicker recovery but also reduces the need for pain management postoperatively. Additionally, 94% of LC patients expressed a preference for undergoing laparoscopic surgery again in the future, compared to only 70% of OC patients ($p = 0.01$). This indicates that patients who underwent laparoscopic cholecystectomy were more likely to choose this approach in the future, reflecting their higher levels of satisfaction and comfort with the procedure.

Table 1: Demographic Characteristics of Patients

Characteristic	Laparoscopic Cholecystectomy (LC)	Open Cholecystectomy (OC)	p-value
Number of Patients	50	50	-
Age (Mean ± SD)	45.3 ± 12.6 years	46.1 ± 13.2 years	0.74
Gender (Male)	22 (44%)	20 (40%)	0.72
Gender (Female)	28 (56%)	30 (60%)	0.72
Comorbidities (Hypertension)	8 (16%)	10 (20%)	0.62
Comorbidities (Diabetes)	5 (10%)	7 (14%)	0.61

Table 2: Postoperative Recovery Time

Recovery Time Parameter	Laparoscopic Cholecystectomy (LC)	Open Cholecystectomy (OC)	p-value
Average Hospital Stay (days)	1.6 ± 0.8 days	4.2 ± 1.1 days	<0.001
Time to Return to Normal Activity (days)	5.2 ± 2.3 days	12.7 ± 3.4 days	<0.001

Table 3: Postoperative Complications

Complication	Laparoscopic Cholecystectomy (LC)	Open Cholecystectomy (OC)	p-value
Wound Infection	2 (4%)	4 (8%)	0.36
Bile Leakage	1 (2%)	3 (6%)	0.32
Bleeding (requiring transfusion)	0 (0%)	2 (4%)	0.16
Postoperative Pain (VAS > 6)	5 (10%)	15 (30%)	0.02

Table 4: Follow-up Outcomes at 3 Months

Outcome	Laparoscopic Cholecystectomy (LC)	Open Cholecystectomy (OC)	p-value
Complete Recovery	48 (96%)	45 (90%)	0.35
Persistent Pain	2 (4%)	5 (10%)	0.35
Recurrence of Symptoms	1 (2%)	3 (6%)	0.34

Table 5: Overall Satisfaction and Patient Feedback

Parameter	Laparoscopic Cholecystectomy (LC)	Open Cholecystectomy (OC)	p-value
Overall Satisfaction (Excellent/Good)	48 (96%)	40 (80%)	0.04
Need for Pain Medication (Post-op)	12 (24%)	30 (60%)	<0.001
Patient Preference for Future Surgery	47 (94%)	35 (70%)	0.01

DISCUSSION

The demographic characteristics of patients undergoing laparoscopic cholecystectomy (LC) and open cholecystectomy (OC) in our study were similar, with no significant differences in age, gender, or comorbidities such as hypertension and diabetes. In this study, the mean age of the LC group was 45.3 ± 12.6 years, while the OC group had a mean age of 46.1 ± 13.2 years, which is consistent with findings by Kumar et al. (2009), who also reported no significant difference in age between the two groups. Their study included 120 patients and showed that demographic factors did not influence surgical outcomes (Kumar et al., 2009). The similarity in baseline characteristics ensures that the differences in recovery times and complications observed in this study can be attributed to the type of surgery rather than any confounding factors.[7]

Regarding postoperative recovery, our results demonstrate that patients undergoing LC had significantly shorter hospital stays (1.6 ± 0.8 days) and quicker returns to normal activity (5.2 ± 2.3 days) compared to those undergoing OC, who had a hospital stay of 4.2 ± 1.1 days and returned to normal activity in 12.7 ± 3.4 days. These findings are consistent with studies by Poon et al. (2006), who reported that laparoscopic cholecystectomy resulted in a significantly shorter hospital stay (2.3 ± 1.5 days) and faster return to normal activities compared to the open technique (Poon et al., 2006).[8] This difference is likely due to the minimally invasive nature of the laparoscopic approach, which typically involves less tissue trauma, leading to reduced postoperative pain and faster recovery. The reduction in recovery time and hospital stay is a well-documented advantage of laparoscopic surgery over the open approach (Hannan et al., 2009).[9]

In terms of complications, our study showed relatively low complication rates in both groups. Wound infection, bile leakage, and bleeding were more common in the OC group, but the differences did not reach statistical significance. However, postoperative pain was significantly higher in the OC group, with 30% of patients experiencing severe pain (VAS > 6) compared to 10% in the LC group. This aligns with the findings of Siddiqui et al. (2010), who observed higher rates of postoperative pain in OC patients. Their study involving 200 patients showed a postoperative pain incidence of 28% in OC compared to 12% in LC (Siddiqui et al., 2010). The higher incidence of pain in OC patients can be attributed to the larger incisions and more extensive tissue manipulation required in open surgeries, which contribute to longer pain duration and a more difficult recovery.[10]

The follow-up outcomes at 3 months revealed a high recovery rate in both groups, with 96% of LC patients and 90% of OC patients reporting complete recovery. The rates of persistent pain and recurrence of symptoms were also low in both groups, further confirming that both laparoscopic and open cholecystectomy provide excellent long-term outcomes. Similar results were reported by Soper et al. (2008), who found that 95% of LC patients and

90% of OC patients experienced complete recovery within 6 months post-surgery (Soper et al., 2008). These results suggest that both surgical approaches have comparable long-term success rates, although the laparoscopic approach has the additional benefits of faster recovery and less postoperative pain.[11]

In terms of overall satisfaction, our study found that 96% of LC patients rated their satisfaction as either excellent or good, compared to only 80% of OC patients. This finding is consistent with those of Ziser et al. (2007), who found that 92% of LC patients were highly satisfied with their surgery compared to 75% of OC patients (Ziser et al., 2007). Patients who underwent LC were more likely to prefer this surgical approach in the future, reflecting the increased satisfaction associated with less postoperative pain and quicker recovery. Additionally, LC patients required less postoperative pain medication, with 24% of them needing it compared to 60% of OC patients. This reduction in the need for pain medication further supports the advantages of the laparoscopic approach in minimizing discomfort and facilitating recovery.[12]

Our study supports the findings of previous research, which consistently demonstrates that laparoscopic cholecystectomy offers significant advantages over open cholecystectomy in terms of recovery time, postoperative pain, patient satisfaction, and overall outcomes. While the complication rates in both groups were low, the laparoscopic technique consistently outperforms the open approach in minimizing pain and speeding up recovery. These results reinforce the importance of laparoscopic cholecystectomy as the gold standard for gallbladder surgery in appropriately selected patients.

CONCLUSION

In conclusion, this study demonstrates that laparoscopic cholecystectomy offers significant advantages over open cholecystectomy, including shorter hospital stays, faster recovery times, and reduced postoperative pain. The complication rates were similar between both groups, but patients undergoing laparoscopic surgery reported higher satisfaction and required less pain medication. These findings support laparoscopic cholecystectomy as the preferred surgical approach for patients with symptomatic gallstone disease, particularly due to its minimal invasiveness and quicker recovery.

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