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Research Article

A Hospital Based Comparative Study of Open Cholecystectomy with Respect to Laparoscopic Cholecystectomy

Tejas Kale*, Sharadendu Bali, Ram Parajiya and Rajat Lohiya

Department of General Surgery, MMIMSR, MMU, Mullana, Ambala, India

***Corresponding Author:** Tejas Kale, Department of General Surgery, MMIMSR, MMU, Mullana, Ambala, India.

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Abstract

Introduction: Laparoscopic cholecystectomy has quickly gotten established as the mainstream alternative to open cholecystectomy, yet it ought to have a safety profile better than that of open technique.

The point of this study was to compare open cholecystectomy and laparoscopic cholecystectomy with respect to time required for procedure, inconveniences encountered in the procedure, duration of analgesics requirement, time required to recover post-operatively, incidence of post-operative sepsis and duration of hospital stay.

Methods: The study subjects consisted of 40 patients with a diagnosis of Cholelithiasis that underwent Cholecystectomy between November 2019 and September 2021 were included in this study.

All the patients were selected at random and interviewed for a full clinical history and examined according to the proforma. Following that, they were subjected to routine blood, urine and other investigations, as well as an abdominal ultrasound was performed in all cases.

Using simple lots, Patients were randomly assigned to one of the two study groups (20 in each group). Patients in one group underwent laparoscopic cholecystectomy while the patients in the other had an open cholecystectomy.

Results: There was similarity between the two groups with respect to clinical characteristics and demographics. No significant difference in the amount of blood loss and rate of intra-operative complications was seen. Patients undergoing Open Cholecystectomy had significantly less duration of surgery when compared to those undergoing laparoscopic cholecystectomy. Mean duration of analgesic use was 3.05 days in laparoscopic group, while it was 4.55 days in open group. The average period of hospital stay was significantly Less in laparoscopic group (mean 4.30 v/s 6.75 days in OC group).

Conclusion: Except for the prolonged operative time required in Laparoscopic cholecystectomy, which can also be lowered over time as the learning curve improves, laparoscopic cholecystectomy was found to be related with reduced analgesic use, duration of hospital stay and wound infection.

Keywords: *Acute Calculous/Acalculous Cholecystitis; Ultrasonography; Open Cholecystectomy; Laparoscopic Cholecystectomy*

Introduction

Biliary tract benign disorders are one of the most common surgical complications in the globe [1]. Millions of people are affected by gallstones. In 1987, France's Philippe Mouret was the first to introduce laparoscopic cholecystectomy, (LC) which swiftly revolutionised gall stone therapy [2]. Gastro-intestinal surgery has gone through a revolution in the recent years by the presentation of laparoscopic

methods.

Cholelithiasis, which keeps on being perhaps the most widely recognized stomach related issues experienced, was generally being managed by traditional (open) cholecystectomy. With the introduction of laparoscopic cholecystectomy the time required to recover post-operatively has reduced drastically.

Because of better magnification in LC this technique can be performed with much safety and ease.

Shorter hospital stays, lower morbidity, faster return to work, and better cosmetic results have all been demonstrated as advantages of Laparoscopic Cholecystectomy.

It has been suggested by some of the surgeons that the complication rates, particularly injury to bile duct might be significantly higher in LC.

The procedure is inherently risky and dangerous due to the high expenses of laparoscopic equipment and the specialized training required for mastery of the technique.

Is laparoscopic cholecystectomy a viable, safe, and cost-effective alternative to open cholecystectomy? (OC) We intend to analyse the pros and cons of both approaches in our research.

Methods

Between November 2019 and September 2021, 40 patients with diagnosis of Cholelithiasis who underwent cholecystectomy in all surgical units of Maharishi Markandeshwar Institute of Medical Sciences and Research, Mullana, Ambala were included in this study.

All the patients were selected at random and interviewed for a full clinical history and examined according to the proforma. They were then subjected to routine blood investigations, urine and other investigations, including an abdominal ultrasonography in all cases.

Inclusion criteria:

- Patients with cholelithiasis who were eligible for elective cholecystectomy and had at least one bout of upper abdominal pain were included in the study.

Exclusion criteria

Patients having the following conditions were not included in the study:

- There is a history or investigations that suggest CBD stones.
- Previous abdominal surgery history.
- The patient is over the age of 70.
- Coagulopathy patients and those on Anti-Coagulant therapy.

Patients were randomly assigned to one of the two study groups (20 in each group) using simple lots. Patients in one group underwent conventional cholecystectomy while the patients in the other underwent cholecystectomy laparoscopically.

All of the patients were kept NPO for the night before surgery and a dose of prophylactic antibiotic was also given. All patients were advised to empty their bladders before surgery, and a nasogastric tube was also inserted if necessary. The surgical team, which included consultants and residents, performed all the surgeries under general anaesthesia. Both intraoperative and postoperative data were recorded and analysed, and the results were compared using simple statistical tests such as the Chi square test and the Z-test.

Observations and Results

20 subjects were randomized to each group of Open Cholecystectomy and Laparoscopic Cholecystectomy. There were six male subjects and fourteen female subjects in LC group, with a M:F (Male:Female) ratio being 1:2.33. Among OC group 12 were females and 08 males with 1:1.5 being the M:F ratio.

The average age of the patients in the OC and LC groups was 47.55 and 44.90 years, respectively. However, the difference was not statistically significant.

Pain in the right hypochondrium was present in all patients in both the groups. The other complaints seen were Nausea (12 in OC and 12 in LC), Post-prandial fullness (8 in OC and 8 in LC), Dyspepsia (9 in OC and 9 in LC), Vomiting (5 in OC and 5 in LC) and Fever (3 in OC and 5 in LC). There was no evidence of jaundice or a history of jaundice in any of the individuals.

Abdominal sonographic study was done in all the patients. 7 patients in OC group and 7 patients in LC group were found to have solitary stones. Multiple stones were found in 13 patients in the OC and 13 patients in the LC groups, respectively. Peri-cholecystic fluid collection suggestive of acute cholecystitis was found in 3 patients of OC group and 3 patients of LC group. However, the difference was not statistically significant.

Patients were operated under General anaesthesia. The intra-operative blood loss was < 100 ml in 16 patients and > 100 ml in 4 patients who underwent OC and was < 100 ml in 17 patients and > 100 ml in 3 patients who underwent LC. Bleeding from the gall bladder bed, slippage of the clip applied on cystic artery and extensive dissection of dense adhesions being the main causes for blood loss.

Mean time duration of OC was 74.75 minutes and 96.05 minutes for LC. However, the difference was statistically significant ($p = 0.014$). The time required in LC was comparatively longer due to intraoperative gas leakage, extensive dissection of dense adhesions, dissection of Calot's triangle, stone spillage, clip slippage, and gallbladder extraction through the port site.

Bile leak (7 patients in LC and 4 patients in OC groups), Stone spillage (5 in LC and 2 in OC) and Hemorrhage (3 in LC and 4 in OC) were the main notable complications. There were no cases of liver injury or CBD injury in either group.

Conversion was required in two cases from laparoscopy to open surgery. One was because of clip slippage applied to the cystic artery and the other was due to dense adhesions in the Triangle of Calot's in a case of acute cholecystitis.

Initially pain was more in both the groups for the first two days. NSAIDs were used for a mean duration of 4.55 days in OC group as compared to 3.05 days in LC group with $p = 0.001$ and significant.

There was a difference in overall wound infection rates between the two groups, with 9 patients in the OC group and just 1 patient in the LC group. Wound dehiscence occurred in 5 patients in the OC group ($p = 0.010$), which was sutured subsequently under anaesthesia. 4 patients in OC group had wound infection ($p = 0.025$) which resolved with daily aseptic dressing. Only 1 patient in LC group had Port site infection. Hence, antibiotics and analgesic requirement was more in OC group compared to LC group.

The average length of stay in the hospital was 6.75 days in OC and 4.30 days in LC, because of large incision, increased pain, wound infection, IV antibiotics used & less mobilization due to pain. There was a statistically significant difference.

LC patients were able to return to normal work in 5.75 days on average, compared to 9.35 days for OC patients. Difference was statistically significant, p = 0.001.

Post operatively patients in both groups were evaluated for features of sepsis (Heart rate, Blood pressure, Respiratory rate, Total Leucocytes count etc.). 4 patients in OC group had features of sepsis whereas none of the patient in LC group had any feature of sepsis. All 4 patients who had features of sepsis also had suture site infection. With a p = 0.035, the comparison was found to be statistically significant.

Discussion

A study of 20 open cholecystectomy patients (12 female and 8 male patients) was compared to a study of 20 cases of laparoscopic cholecystectomy (14 female and 6 male patients).

Gallbladder illness affects people of all ages and genders, however we found 65% of study population was female and the male to female ratio was 1:1.85. In our study, highest age incidence was in 6th decade with mean age of 46.25 years. Parambil SM., *et al*. also had almost similar findings in his study with mean age as 44 ± 13.33 yrs and a male to female ratio of 1:2 in his study [3].

The laparoscopic procedure was observed to be related with a lengthier operating time than the open procedure in this study (Mean of 96.05 minutes for laparoscopic against 74.75 minutes for open method). An intra-operative gas leak, significant adhesions, clip slippage, and gall bladder extraction through the port site all contributed to the extra time needed in LC. This is comparable to Trondsen [4] and Porte's [5] research. The operating time decreases as experience is acquired. The "learning curve" represents the process of adapting to operating in a 2-D screen, becoming comfortable with the equipment, and becoming accustomed to the approach. On the other hand, studies by a number of different writers, including Pramod Singh., *et al*. (44.7 versus 72.4 min), Pessaux P., *et al*. (103.3 min vs. 149.7 min) Doke A., *et al*. and Jaswant Jain., *et al*. found that laparoscopic cholecystectomy took less time than open cholecystectomy, which contradicted our findings [6-9].

This study had no major complications, however there were a few small ones. There were no perioperative deaths, CBD injuries, or liver injuries. Bile leak (OC-4, LC-7), stone spillage (OC-2, LC-5), haemorrhage (OC-4, LC-3) and wound infection (OC-9, LC-1) were the observed complications which were found to be comparable in both groups.

Bile leakage through the drain tube in the LC group was caused by an injury to the gall bladder bed in the liver during dissection. All 11 subjects were managed conservatively. The primary source of blood loss was slippage of the clip affixed to the cystic artery and from the gall bladder bed, as well as significant dissection of dense adhesions.

The LC group only had one patient with wound infections (Port site infection). 9 in the OC group developed wound infections that required regular dressing, and the wounds healed over a 10-day period. Wound infections were more prevalent in the open group than in the laparoscopic group. Post operatively patients were also assessed for features of Sepsis. 4 patients in OC group were in sepsis post-operatively compared to zero in LC group and co-incidentally all 4 in OC group had suture site infection (The study was found to be statistically significant with p = 0.035).

In his research, Harris [10] discovered similar outcomes, such as bile leak (LC-2 percent, OC-1 percent), bleeding requiring transfusion (LC-1 percent, OC-2 percent), and wound infection rate (LC-0 percent, OC-1 percent).

The conversion from laparoscopic to open surgery was required in two of the twenty patients. One was converted to open because the clip applied on the cystic artery slipped, and the other was converted to open due to thick adhesions in the Calot's triangle in a case of acute cholecystitis. The rate of conversion was 10%. In other studies (0 - 45%) [11-13], Conversion rate was also found to be higher in acute cases.

Minimally invasive procedures in elective surgeries are related with a reduced inflammatory stress response, better pulmonary function and less hypoxia [14,15]. The OC group experienced more pain and required more analgesics, especially when the patient developed a wound infection.

The duration of analgesics required (mean 3.05 days for LC, mean 4.55 days for OC patients and p = 0.001) were likewise considerably shorter in the LC group patients. It was discovered that the data was statistically significant. The smaller incision size in LC was the basis for this.

The short hospital stay and the speedy recovery [16] are the two most advantageous aspects of LC. The mean duration of hospital stay in this study was 4.30 days for LC group and 6.75 days for OC group. It was discovered that the difference was statistically significant (p = 0.0001). Due to elevated pain, wound infection, the use of injectable antibiotics, and reduced mobilisation due to pain, the OC group spent longer time in the hospital. Similar results were discovered by Porte [5], Trondsen [4], Lujan [12] and Anmol N [17].

The time taken for Post operative recovery was found to be more in OC (mean 9.35 days) compared to LC (mean 5.75 days). It was comparable to the study of Schietroma [18] who found the time taken was 4.4 days for LC and 7.6 days for OC patients.

Conclusion

Laparoscopic cholecystectomy outperforms open cholecystectomy in our study as Surgical anatomy is better visualized and magnified. Analgesic requirements are required for a shorter duration. Rates of Wound infection are less. Improved compliance and quicker return to normal activity. A shorter stay in the hospital post operatively.

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