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A comparative study on port-site infection following gall bladder retrieval using endobag and conventional method in laparoscopic cholecystectomy

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ABSTRACT

Background: Gallbladder (GB) retrieval is essential to reduce postoperative pain after laparoscopic cholecystectomy (LC). Limited data are available for the use of endobags for GB extraction. **Aims and Objectives:** The study aims to assess the incidence of postoperative infection after GB extraction. **Materials and Methods:** The randomized prospective study was conducted in the Department of General Surgery, Government Rajaji Hospital, for 6 months. After the ethical approval, 100 patients who underwent elective LC were enrolled in the study. Patients who underwent LC and removed the GB using an endobag were included in Group A. The patients in whom the bladder was removed without using an endobag were included in Group B. **Results:** The study reports a female predominance, 76% in Group A and 70% in Group B. A significant difference was reported between the port-site spill in Group B patients who underwent conventional treatment without endobags and reported spillage in six patients (12.0%). In addition, port-site infection was also prevalent in four patients under Group B with a significant difference, respectively. The mean operating time was higher in Group A patients with 88.24 ± 7.4 (hours) compared with Group B with 85.3 ± 6.6 (hours); however, no significant difference was reported between operating time and hospital stay. **Conclusion:** The use of endobags in GB extraction has been reported beneficial with a lower incidence of port-site spillage and infection. This signifies the essential benefit of endobags for GB extraction with a lower incidence of postoperative complications.

Key words: Gall bladder extractions; Endobags; Port site infection; Laparoscopic cholecystectomy

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INTRODUCTION

The laparoscopic cholecystectomy (LC), first performed in the 1980s, is now recognized as the most effective way to treat gallbladder (GB) illness. LC has effectively reduced postoperative morbidity rates, hospital stays, and quick recovery. It is still very unusual for LC patients to have their GBs perforated during surgery, either during dissection or specimen extraction, which increases the risk of surgical site infection (SSI).[1] Because it eliminates the organ that contributes to the production of gallstones and the difficulties that result from them, cholecystectomy is the preferred treatment for symptomatic gallstones. The most frequent laparoscopic procedure performed worldwide is LC, which has replaced open surgery as the standard gold treatment for symptomatic gallstones. The most frequent (25%) problems after GB dissection and removal are GB perforation and spilling.[2]

Less postoperative pain, a shorter hospital stay, a quicker recovery, improved cosmetic results, an earlier return to work, fewer complications such as infections and adhesions, a shorter operating time, a lower learning

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curve, and superiority to other developed techniques due to cost are all benefits of the laparoscopic approach.[2] GB removal is a crucial last stage of LC and is known to affect postoperative discomfort at the surgical port site. Usually, the epigastric or umbilical port is used to remove the GB. Two ports have been suggested for the LC GB retrieval procedure.[3] Laparoscopy has been linked to a decreased incidence of SSI and should be utilized when patients are candidates. Second, SSI rates should be classified by method type for interhospital comparisons.[4]

Major problems after a laparoscopic operation occurs at a rate of around 1.4/1000 surgeries. Nonetheless, the incidence of port site problems after laparoscopic surgery is estimated to be roughly 21/100,000 instances, with a proportionate increase with the size of the port site incision and trocar. Overall, gastrointestinal (0.6/1000), genitourinary (0.3/1000), vascular (0.1/1000), and omentum complications/injuries occur during laparoscopic procedures (0.4/1000).[5] Port-site non-tuberculosis mycobacterium infection has recently been a source of worry for laparoscopic surgeons due to the prolonged morbidity it causes. It washes away all of the benefits of laparoscopic surgery and annoys both the surgeon and the patient owing to continuous redundant infection.[6] An acutely inflamed or swollen GB filled with stones invariably causes complications during removal. GB removal in these situations necessitates needle decompression, stone fragmentation, removal from the GB near the port site, or the expansion of one of the fascial incisions to allow GB extraction, resulting in increased postoperative port-site discomfort.[7]

The umbilical and epigastric ports have been approved for GB retrieval during LC. Nonetheless, there is considerable disagreement over which is superior.[8] Several outcome metrics have been used to evaluate the outcome of LC in the literature, including bile duct damage, conversion rates, morbidity, and death. Yet, there is substantial disagreement on which metrics should be employed to indicate surgical quality, as each has merits and disadvantages.[2] The study aims to assess the incidence of port-site infection after GB removal utilizing an endobag against the traditional approach during LC.

Aims and objectives

The study aims to assess the incidence of postoperative infection after GB extraction.

MATERIALS AND METHODS

A randomized prospective study was conducted in the Department of General Surgery at Government Rajaji Hospital for 6 months, from June 2022 to November 2022. After approval from the Institute's ethical committee and getting informed consent, 100 patients underwent the study. All the patients in the study who underwent elective LC for various indications were included in the study. Patients were randomized into two groups, with 50 in each group into Groups A and B.

Inclusion criteria

Patients aged >18 and <70 years of both sexes who underwent LC and provided proper consent according to the designated pro forma were selected for the study.

Exclusion criteria

Patients who underwent LC converted to open cholecystectomy, patients with evidence of cholangitis, pancreatitis, previous biliary tract surgeries, and diabetic patients were excluded from the study. Furthermore, patients who were immune-compromised and did not consent to the study were not included in the following study.

The patients were divided into two groups as per the selection criteria. Patients who underwent LC and removed the GB using an endobag were included in Group A. The patients in whom the bladder was removed without using an endobag were included in Group B.

One hundred patients who met the inclusion and exclusion criteria of the study were further assessed for the retrieval of GB specimens using an endobag and without an endobag in LC. Antiseptic scrub was given. 30 min before the skin incision, the patients were given a 1 g Ampicillin injection intravenously. Four port conventional laparoscopy was done, and specimens retrieved through the epigastric port as per the group were placed in subhepatic drain. Patients were discharged on the third POD, and the follow-up was done once in 2 weeks for 1 month postoperatively. The study's primary outcome is the evaluation of the incidence of port site spill, port-site infection, mean operating time, and mean hospital stay.

The results were analyzed using the SPSS software. Quantitative data were represented as a mean and standard deviation, whereas qualitative data were expressed as numbers and percentages. The Chi-square test evaluates the relationship between the result and category variables. All patients were examined for wound infection and dehiscence on postoperative days 14 and 28. If any SSI was developed, the patients were graded according to the Southampton grading. The $P<0.05$ is considered statistically significant.

RESULTS

The current study reports a higher female incidence, with 38 female patients in Group A and 35 female patients in Group B comprising 76% and 70% of the overall incidence. However, no significant difference was reported between the gender distribution (Table 1).

Group A patients did not report any port-site spillage, and Group B with conventional management, reported spillage in 6 patients (12.0%). A significant difference was reported for port-site spill with P=0.01.

A port site infection was reported in 4 patients (8.0%) under group B; no infection was seen in Group A patients. A significant difference was reported for port site infection using different methods; P=0.04 (Table 1).

The mean operating time for both groups is nearly identical (Group A: 88.2 min and Group B: 85.3 min), which is statistically insignificant. A P=0.9 was seen for the mean operating time, with no significant difference for both groups (Table 2).

The average hospital stay in both groups was 2.42 days in Group A and 2.54 days in Group B, which is statistically insignificant (P=0.94).

DISCUSSION

Gallstone disease is a worldwide health issue. LC has now supplanted open cholecystectomy as the first therapy option for gallstones. LC is performed in over 90% of elective cholecystectomies and 70% of emergency cholecystectomies.

Table 1: Distribution of gender, port-site spill, and port-site infection between groups

Variables	Group A (%)	Group B (%)	P-value
Gender			
Male	12 (24)	15 (30)	0.49
Female	38 (76)	35 (70)	
Port site spill			
Yes	0	6 (12)	0.01
No	50 (100)	44 (88)	
Port-site infection			
Yes	0	4 (8)	0.04
No	50 (100)	46 (92)	

Table 2: Mean operating time and post-hospital stay between groups

Variables	Group A	Group B	P-value
Mean operating time	88.24±7.4	85.3±6.6	0.9
Mean post-procedural hospital stay	2.42±0.5	2.54±0.6	0.94

Making LC one of the most frequently performed surgeries in the world.[9] Our study included 100 participants divided into two groups of fifty in each group. The mean age of patients in our study was 40.25 years. In our study, female predominance was recorded in both groups. Group A had 76% and Group B had 70%. However, no significant results were recorded in the age and sex distribution of the patients in our study. This aligns with the study by Alam et al., where most patients were women, with a 92:16=5.6:1 female-to-male ratio of 37.57 years on average.[10] Because laparoscopic treatments are less intrusive and influence the immune system less than open ones. They have a lower rate of port-site infection than open cholecystectomy. Gallstones spill during LC is 5–40% of instances.[3]

The port-site spill occurred in no patients in Group A and 12% of patients in Group B, which is statistically significant. In the current research, the port-site infection was not recorded in Group A, whereas in Group B, port-site infection was seen in about 8% of the total participants. Our study's port-site infection results showed a significant P=0.04. Similar results were recorded in a study, in which the frequency of port-site wound infection decreased with the use of endo-glove removal of the GB during LC, as shown by the difference between the frequency of disease at the port site in the groups where endo glove was used and those where it was not. Moreover, there was a negligible correlation between age, gender, and duration of cholelithiasis and port-site wound infection.[11] In research, postoperative wound infections were discovered in 11 patients (4.23%), two of whom were in the end gloves group and nine were not. For postoperative wound infection, statistically, significant differences were discovered between the two groups.[3] A wound infection at the port site, where the GB was removed, affected 12 patients (11%). Three patients required incision and drainage, whereas nine patients were treated with primary dressings and antibiotics based on culture and sensitivity.[10] Port-site infection is more prevalent at the umbilical port site, according to research by Colizza et al., and Tocchi et al.[12,13]

In a research conducted by Narayanswamy and Prajwal it was discovered that utilizing an endobag during GB retrieval reduced port-site infection compared to retrieval without an endo bag. However, it has its drawbacks; delivering a GB in an endobag necessitates expanding the incision of the face layer, and the whole treatment duration rises when utilizing an endobag.[14] Endobag made collecting surgical samples and spilt gallstones easier, reduced the risk of the abdominal cavity and retrieval port-site contamination, and lowered the risk of port-site wound infection.[15] According to a Hajong et al., study, retrieving GB from the umbilical port took longer than the epigastric port (4.94±1.56 vs. 3.24±1.29), which was statistically significant (P=0.001).[16]

In the current study, both groups show more or less the same mean operating time (Group A – 88.2 min and Group B – 85.3 min), which is statistically insignificant. Furthermore, both groups show more or less the same duration of hospital stay (Group A – 2.42 days and Group B – 2.54 days), which is statistically insignificant. Patients in the epigastric group experienced more port-site pain than those in the umbilical group, even though GB was extracted from endobags in all patients in a series.[16]

Both methods – retrieving the GB through the epigastric port with an endobag and without one – have advantages and disadvantages of their own. This study found that GB removal without endobags led to higher wound infections than when endobags were used. Most of the diseases in our study were superficial infections treated conventionally. All of the cases are histologically verified to be cholecystitis instances. The difficulty of extracting the specimen and the requirement to extend the fascial incision while using the endobag for retrieval led to a lengthier operating time and greater postoperative pain. A surgeon has the option of using or not using an endobag. We believe endobag retrieval is necessary in acute cases and for those with risk factors for wound infections.[14]

Limitations of the study

The study has limitations due to its small sample size of 100 patients, its single-center design, and the limited follow-up period of only one month postoperatively. These factors may impact the generalizability and validity of the study's findings.

CONCLUSION

According to the data, it was discovered that the study group's incidence of port-site spills and infections was statistically lower than that of the control group. The average length of hospital stay and the average length of surgery was not statistically significant. Hence, using an endobag for a GB, specimen should be considered during LC. Due to decreased incidence of SSI and port-site spilling, it was determined that using a retrieval bag was preferable to direct retrieval without a bag. In acute cases and those with risk factors for wound infections, we believe an endobag retrieval is necessary. Using the endobag technique to retrieve the GB after LC is safe, inexpensive, and straightforward. It may significantly reduce port-site wound infection compared to not using endobags, according to the results of our study.

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JBR- Protocol review, review manuscript; **RM-** Study design, review manuscript; **MKP-** Manuscript preparation, performed the procedure; **GKC-** Literature review, data collection, data analysis; **SP-** Editing manuscript.

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