

Original Research Article

INCIDENCE AND DETERMINANTS OF PORT-SITE INFECTIONS FOLLOWING LAPAROSCOPIC CHOLECYSTECTOMY: A PROSPECTIVE COHORT STUDY

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ABSTRACT

Background: Laparoscopic cholecystectomy is the standard operative approach for symptomatic gallbladder disease because it is associated with reduced pain, early mobilization, shorter hospitalization, and faster recovery. However, port-site infection remains an important postoperative complication that can prolong recovery and increase morbidity. The objective is to determine the incidence of port-site infection after laparoscopic cholecystectomy and identify the factors associated with its occurrence in a tertiary care setting.

Materials and Methods: A prospective cohort study was carried out over a period of three years among 103 patients undergoing elective laparoscopic cholecystectomy. Demographic profile, body mass index, intraoperative events, and microbiological findings were recorded and analyzed.

Results: Port-site infection developed in 14.6% of cases. Age, sex, and body mass index did not show a statistically significant association with infection. Intraoperative bile or gallstone spillage was significantly associated with port-site infection ($p = 0.004$). *Escherichia coli* and *Staphylococcus aureus* were the organisms most frequently isolated from infected sites.

Conclusion: Intraoperative contamination, especially bile or gallstone spillage, appears to be the principal determinant of port-site infection after laparoscopic cholecystectomy. Careful surgical handling, prompt control of spillage, and strict aseptic precautions are essential to reduce postoperative infection.

Keywords: Port-site infection, laparoscopic cholecystectomy, bile spillage, surgical site infection, prospective cohort.

INTRODUCTION

Laparoscopic cholecystectomy has become the preferred treatment for symptomatic gallbladder disease because it offers several advantages over the open approach, including less postoperative pain, shorter hospital stay, early ambulation, and better cosmetic results.^[1,2]

Despite these benefits, port-site infection continues to be a recognized complication and may offset some of the advantages of minimally invasive surgery.

Reported rates of port-site infection after laparoscopic cholecystectomy vary across studies, commonly ranging from 3% to 15%, depending on the case mix, operative difficulty, and infection-control practices followed at different centers.^[3,4]

Both patient-related and procedure-related factors have been implicated in the development of port-site infection. Variables such as obesity, diabetes, duration of surgery, contaminated bile, gallstone spillage, and tissue handling during specimen extraction may influence postoperative wound infection.^[5,6]

Among these factors, intraoperative bile or gallstone spillage has been repeatedly identified as an important contributor because it may directly contaminate the port wounds and surrounding tissues.^[7,8]

Understanding the determinants of port-site infection is important for preventing avoidable morbidity, improving postoperative outcomes, and refining perioperative protocols. Therefore, the present study was undertaken to estimate the incidence of port-site infection following laparoscopic cholecystectomy and to identify the major determinants associated with it in a tertiary care hospital.

MATERIALS AND METHODS

This prospective cohort study was conducted in the Department of General Surgery at a tertiary care teaching hospital over a period of three years after getting approval from the institutional ethics committee (IEC).

Patients aged 20 to 60 years undergoing elective laparoscopic cholecystectomy were included after obtaining informed consent.

Patients who required conversion to open surgery, those with immunosuppression, and those who did not consent to participate were excluded from the study.

All procedures were performed using a standardized four-port laparoscopic technique. Prophylactic antibiotics were administered at the time of induction of anesthesia according to institutional protocol.

The variables recorded included age, sex, body mass index, intraoperative bile or gallstone spillage, and postoperative development of port-site infection. When infection was identified, samples were subjected to microbiological analysis to determine the causative organism.

The collected data were entered into a spreadsheet and analyzed using SPSS version 26. Categorical variables were compared with the chi-square test, and a p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1: Demographic Profile of Patients

Variable	Total (n=103)	PSI Present (n=15)	PSI Absent (n=88)
Mean Age (years)	42.3	43.1	41.9
Male : Female	38 : 65	6 : 9	32 : 56
Mean BMI (kg/m ²)	24.6	25.1	24.4

The overall incidence of port-site infection in the study population was 14.6%. No statistically

significant association was observed between port-site infection and age, sex, or body mass index.

Table 2: Association of Bile/Gallstone Spillage with Port-Site Infection

Intraoperative Spillage	PSI Present	PSI Absent
Yes	9	18
No	6	70

Intraoperative bile or gallstone spillage showed a statistically significant association with port-site infection ($p = 0.004$).

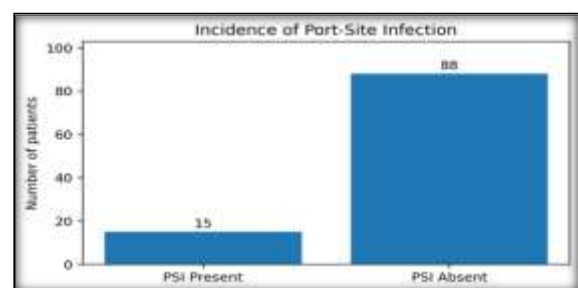


Figure 1: Incidence of Port-Site Infection

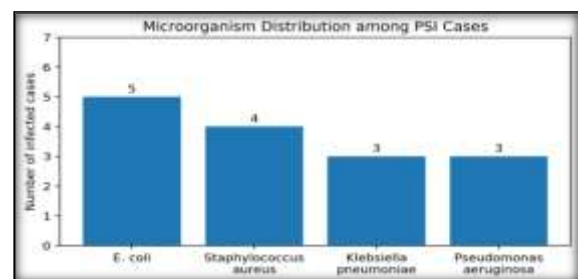


Figure 2: Microorganism Distribution among PSI Cases

DISCUSSION

The present study assessed the incidence and determinants of port-site infection after laparoscopic cholecystectomy. The observed infection rate of 14.6% lies within the higher range of values reported in previous studies, where rates have varied from 3% to 15%.^[3,4] The variation across studies may be related to differences in patient selection, perioperative antibiotic practices, operative difficulty, and wound care measures.

In this study, demographic variables such as age, sex, and body mass index did not demonstrate a statistically significant association with port-site infection. Comparable findings have been reported in earlier studies, suggesting that intraoperative events may be more influential than baseline demographic characteristics in determining postoperative wound infection risk.^[9,10]

Bile or gallstone spillage during surgery emerged as the most important determinant of port-site infection in the present series. Spillage can contaminate the trocar wounds directly and may increase the microbial load at the incision site, particularly when infected bile or friable gallbladder contents are

present. Similar observations have been documented by other authors, who found a significantly greater risk of postoperative wound infection in cases complicated by intraoperative spillage.^[7,11]

The microbiological pattern observed in the infected cases showed *Escherichia coli* and *Staphylococcus aureus* as the most frequent isolates. This distribution is biologically plausible because contamination may arise either from biliary flora or from skin commensals during extraction of the gallbladder specimen.^[12,13] Early identification of the causative organisms and use of targeted antimicrobial therapy are therefore important to prevent progression to deeper infection or persistent sinus formation.

The findings of the present study underline the importance of meticulous operative technique, careful handling of the gallbladder, prompt suction and irrigation when spillage occurs, and strict adherence to aseptic precautions. Selective use of antibiotic prophylaxis in high-risk situations may also help reduce postoperative wound complications.^[8,14]

The study was limited by its single-center design and modest sample size. Larger multicenter studies are needed to confirm these observations and define preventive strategies more precisely.

CONCLUSION

Port-site infection after laparoscopic cholecystectomy is influenced predominantly by intraoperative contamination rather than by demographic factors. Prevention depends on gentle tissue handling, avoidance and immediate

management of bile or gallstone spillage, and maintenance of strict asepsis throughout the procedure. Adoption of these measures can reduce postoperative morbidity and improve overall surgical outcome.

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