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Original Research Article

FREQUENCY OF SURGICAL SITE INFECTIONS IN PATIENTS UNDERGOING OPEN CHOLECYSTECTOMY

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ABSTRACT

Background: *Surgical site infection (SSI) is a common postoperative complication of open cholecystectomy, contributing to increased morbidity, prolonged hospital stays, and higher healthcare costs. Identifying patient-related risk factors is crucial for improving surgical outcomes.* ***Objective:*** *To determine the frequency of SSI in patients undergoing open cholecystectomy and evaluate associated risk factors.* ***Study Design:*** *Descriptive study.* ***Setting:*** *Department of General Surgery, Ayub Teaching Hospital, Abbottabad, Pakistan.* ***Duration of Study:*** *19-03-2025 to 19-06-2025.* ***Methods:*** *A total of 138 patients undergoing elective open cholecystectomy for symptomatic gallstones were included through non-probability consecutive sampling. All surgeries were performed using a standardized Kocher's incision with prophylactic antibiotics administered. Patients were monitored for 30 days postoperatively for SSI, defined by redness, warmth, localized swelling, pain, tenderness, or purulent discharge at the incision site. Data were analyzed using SPSS 27.* ***Results:*** *The mean age was 46.57 ± 9.60 years. Females constituted the majority (60.9%). The overall frequency of SSI was 14.5%. SSI occurrence was significantly higher in patients over 50 years of age (p = 0.006), in males (p = 0.0001), and in patients with a body weight greater than 75 kg (p = 0.005).* ***Conclusion:*** *The frequency of SSI after open cholecystectomy was 14.5%. Advanced age, male gender, and higher body weight were identified as significant risk factors for the condition. Preventive strategies targeting high-risk groups may reduce postoperative infections.*

Keywords: Surgical Site Infection, Open Cholecystectomy, Postoperative Complications, Wound Infection

INTRODUCTION

With over 1.2 million cholecystectomies undertaken each year, gallbladder conditions are one of the most common surgeries carried out. Before 1991, cholecystectomy was normally carried out using an open surgical technique. Patients usually stayed in the hospital for two to six days following surgery, and that procedure typically involved doing an intraoperative cholangiogram. The standard of excellence for cholecystectomy has shifted to the laparoscopic technique since the late 1980s, as laparoscopic cholecystectomy became available (1, 3). With this technique, elective cholecystectomy functioned 30% better overall. Although open cholecystectomies continue to be more common in many deprived areas, 92% of total cholecystectomies conducted today are carried out laparoscopically (4). Frequent bile duct injuries increased three to tenfold with the rise of laparoscopic cholecystectomies. The primary explanations for switching from laparoscopic to open procedures are poor vision and unidentified anatomy. Conversion to an open cholecystectomy might be seen as a success rather than a cause for concern. By carrying out the procedure in the safest way feasible, it demonstrates sound judgment (5, 6).

The main etiology for nosocomial infections among surgical patients is surgical site infections (SSIs) (7). An important factor for postoperative mortality and disability rates is SSI. Despite this, open cholecystectomy is regularly linked to an increased incidence of SSI. In addition to open cholecystectomy, other risk factors for increased SSIs following cholecystectomy include the patient's age, gender, duration of surgery, and the number of previous surgeries (8, 9). A large trial demonstrated that changing medical gloves and instruments immediately before abdominal wound closure substantially decreased the incidence of SSIs. These initial results suggest the need for further research to confirm this strategy (10).

This research work will contribute to the existing body of knowledge, as limited local data is available. As a result, healthcare providers, administrators, researchers, and patients will benefit from this study. New healthcare policies and guidelines will be established to manage SSIs, minimizing healthcare costs and ultimately improving patient care and outcomes.

METHODOLOGY

This descriptive study was conducted at the Department of General Surgery, Ayub Teaching Hospital, Abbottabad, from March 19, 2025, to June 19, 2025, following ethical approval from the hospital. A total of 162 patients were initially planned for inclusion; however, the final analysis comprised 138 participants who met the predefined selection criteria. The sample size was determined using the Raosoft sample size calculator, with inputs set at a 95% confidence level and a 5% margin of error. An expected pool frequency of surgical site infection of 10%, derived from a review of existing literature which reported 5, 8, and 17% SSI frequencies (11, 12), was used in the calculation, yielding a minimum required sample size of 138 patients.

Non-probability consecutive sampling was employed. The study included patients of both genders aged between 30 and 60 years who underwent elective open cholecystectomy for symptomatic gallstone disease. Patients undergoing cholecystectomy for reasons other than symptomatic gallstones, such as malignancy of the gallbladder or adjacent organs, those requiring common bile duct exploration, pregnant women, patients who had received antibiotics in the week preceding surgery, patients on immunosuppressive therapy or regular steroids, those with a known history of allergies, and patients with hemolytic anemia were not included in the study.

Data collection commenced with consent from the patients. Baseline demographic information, including age, weight, gender, residence, profession, educational level, monthly income, and social status, was recorded for each participant. The duration of complaints before surgery was also documented.

Experienced surgeons performed all surgical procedures with a minimum of five years of post-qualification experience. A standardized Kocher's incision was utilized for every operation. In accordance with hospital protocol, all patients received prophylactic antibiotics. The duration of postoperative intravenous antibiotic therapy, as well as any subsequent oral antibiotic regimens, was carefully recorded. Patients were monitored for a period of 30 days postoperatively to identify the development of a surgical site infection, which was defined clinically by the presence of redness, warmth, localized swelling, pain, tenderness, or purulent discharge at the incision site.

Data were analyzed by IBM SPSS 27. Age, weight, and duration of complaints were expressed as mean and standard deviation. Gender, socioeconomic status, and the occurrence of surgical site infection were presented as frequencies and percentages. Age, weight, gender, socioeconomic status, and duration of complaints were stratified. The Chi-square test was applied to determine statistical significance, with a p-value of less than 0.05 considered significant.

RESULTS

The mean age of 138 patients in this study was around 46.57 ± 9.60 years, and the average weight was 76.64 ± 5.03 kg. The duration of complaints before surgery averaged 4.96 ± 1.41 days.

There were 84 (60.9%) female patients and 54 (39.1%) male patients (Table 1).

Surgical site infections were observed in 20 (14.5%) patients, while the majority, 118 (85.5%) patients, did not develop an infection (Table 2).

Stratification analysis revealed that patients over 50 years of age had a significantly higher incidence of surgical site infection (P = 0.006). Males were more likely to develop an infection (P = 0.0001). Higher weight was associated with an increased risk of infection (P = 0.005) (Table 3).

Table 1: Demographics of the patients

Demographics		Frequency	Percentage
Gender	Male	54	39.1%
	Female	84	60.9%
Socioeconomic status	Upper	29	21.0%
	Middle	71	51.4%
	Lower	38	27.5%

Table 2: Frequency of surgical site infection

Surgical site infection	Frequency	Percentage
Yes	20	14.5%
No	118	85.5%

Table 3: Stratification of surgical site infection with demographics

Demographics		Surgical site infection				P value
		Yes		No		
		Frequency	Percentage	Frequency	Percentage	
Age groups (Years)	30 to 50	6	30.0%	74	62.7%	0.006
	> 50	14	70.0%	44	37.3%	
Gender	Male	15	75%	39	33.1%	0.0001
	Female	5	25%	79	66.9%	
Socioeconomic status	Upper	6	30.0%	23	19.5%	0.14
	Middle	12	60.0%	59	50.0%	
	Lower	2	10.0%	36	30.5%	
Weight (Kg)	65 to 75	3	15.0%	57	48.3%	0.005
	> 75	17	85.0%	61	51.7%	
Duration of complaints (Days)	3 to 5	15	75.0%	71	60.2%	0.20
	> 5	5	25.0%	47	39.8%	

DISCUSSION

The findings from the present study showed a surgical site infection (SSI) rate of 14.5% following open cholecystectomy, which falls within the middle ground when contextualized within the broader scientific literature. This rate is substantially higher than the 4.93% reported by Warren et al. in their large-scale analysis of commercially insured patients in the United States (Warren et al., 13). Found by Rodríguez-Caravaca et al. in a Spanish teaching hospital, the study documented a 1.96% SSI rate (14). However, it is notably lower than the 26% incidence reported in the more recent, smaller-scale trial conducted by Aslam et al. in Pakistan (Aslam et al., 15).

The demographic profile of patients in this study, with a mean age of 46.57 years and a female predominance of 60.9%, is largely consistent with the characteristics described in other studies. Gallstone disease is more prevalent in women, a gender distribution that is a common feature across all research, including the work of Masaod et al. and Warren et al. (11, 13). A particularly strong agreement exists regarding the role of age as a significant risk factor. The current analysis found that 70.0% of SSIs occurred in patients older than 50 years. This finding aligns with the conclusions of Warren et al., who identified increasing age as a patient-level risk factor in their multivariable model (Warren et al., 13). This highlights advanced age as a robust and independent predictor of infectious complications post-cholecystectomy. The relationship between gender and SSI risk showed that male patients had a higher frequency of SSI. The present study found that 75% of SSIs occurred in male patients, representing a statistically significant association. This was similar to the findings of Warren et al., who identified male gender as a risk factor for SSI. Warren et al. noted that men in their cohort presented with more severe biliary disease, including a higher rate of acute cholecystitis and open procedures. However, Masaod et al showed that SSI occurred in the majority of females; the higher SSI rate in women in their study may not be due to gender itself. Still, it could be a confounded result reflecting a greater proportion of complicated cases, such as acute cholecystitis or empyema, within the female subgroup (11).

The current study also identified higher body weight as a significant risk factor, with 85.0% of infections occurring in patients weighing more than 75 kg. This finding strongly supports the results of Warren et al., who explicitly listed obesity as an independent risk factor in their model (Warren et al., 13). Obesity is a well-established comorbidity that impairs immune function, reduces tissue perfusion, and creates technical challenges during surgery, all of which contribute to a higher risk of postoperative infection. This confirms that obesity is a key modifiable risk factor that should be addressed in preoperative planning and patient counseling.

This study contributes valuable local epidemiological data to the global understanding of SSI risk following open cholecystectomy. The SSI rate of 14.5% reinforces the notion that infection remains a substantial complication, particularly in certain healthcare environments. The confirmation of age, male gender, and obesity as risk factors aligns with international research emphasizing their universal importance. Based on these findings, it is recommended that future local efforts prioritize strict adherence to antibiotic prophylaxis guidelines, potentially extending to high-risk patients in elective settings, and implement enhanced preoperative optimization for older and obese patients.

CONCLUSION

From our study, we conclude that the frequency of SSI was slightly higher at 14.5% in patients who had an open cholecystectomy. SSI was associated with increasing age, male gender, and higher weight.

DECLARATIONS

Data Availability Statement
All data generated or analysed during the study are included in the manuscript.
Ethics approval and consent to participate
Approved by the department Concerned. (IRB-2024/274)
Consent for publication
Approved
Funding
Not applicable

CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

AUTHOR CONTRIBUTION

HASSAN ALI** (Post Graduate Resident**)
Collection of data, Data entry, Data analysis, Manuscript drafting, Manuscript revisions, and final approval of manuscript.
MUHAMMAD KASHIF RAFIQUE** (Assistant Professor**)
Study Design, Supervision of the research process,
Conception of the Study and Final approval of the manuscript.

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