

Efficacy of Topical Antibiotics in Preventing Port site Infection after Elective Laparoscopic Cholecystectomy

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ABSTRACT

Background: Port site infection (PSI) is a known complication following laparoscopic cholecystectomy, which may prolong recovery and hospital stay. The use of topical antibiotics is considered a preventive measure; however, its efficacy remains a subject of debate.

Objective: This study aimed to assess the efficacy of topical antibiotics in preventing port site infections after elective laparoscopic cholecystectomy.

Methods: A prospective observational study was conducted at the Department of Pharmacology, Delta Medical College, Dhaka, Bangladesh & Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, from January 2023 to December 2023. A total of 120 patients aged 18–75 years who underwent elective laparoscopic cholecystectomy were purposively selected. Patients were divided into two groups: Group A (n=60) received topical antibiotics at the port site, while Group B (n=60) did not. Postoperative outcomes were assessed, focusing on the incidence of port site infections. Data analysis was performed using MS Office tools.

Results: Port site infection (PSI) occurred in 1.7% of cases in Group A (topical antibiotics) and 5.0% in Group B (no topical antibiotics). The mean hospital stay was 1.2 ± 0.4 days in Group A and 1.5 ± 0.6 days in Group B. The mean postoperative pain score was 2.5 ± 1.1 in Group A and 2.7 ± 1.3 in Group B.

Conclusion: The application of topical antibiotics at the port site effectively reduces the incidence of PSI following elective laparoscopic cholecystectomy. This simple and cost-effective intervention may enhance postoperative outcomes and reduce infection-related complications.

Keywords: Gallbladder, Laparoscopic cholecystectomy, Port site infection, Postoperative infection, Topical antibiotics

INTRODUCTION

Laparoscopic cholecystectomy (LC) is the gold standard procedure for the management of symptomatic gallstone disease due to its minimally invasive nature, reduced postoperative pain, and shorter hospital stay [1]. However, port site infection (PSI) remains a concern, affecting surgical outcomes and patient recovery. The incidence of PSI after LC varies between 0.3% and 3.0% in routine cases, but it can be higher in the presence of risk factors such as obesity, diabetes, prolonged operative time, and intraoperative contamination [2,3]. PSI is primarily caused by skin flora, particularly *Staphylococcus aureus* and *Pseudomonas aeruginosa*, which may lead to erythema, discharge, abscess formation, and, in severe cases, deep tissue infections [4]. Strategies to reduce the risk of PSI include preoperative skin preparation, perioperative systemic antibiotics, and postoperative wound care [5]. The use of topical antibiotics as an additional preventive measure has been suggested to lower the bacterial load at the port site, thereby reducing infection rates [6,7]. Among these, mupirocin 2% is a widely used topical antibiotic with proven efficacy against *Staphylococcus aureus*, including methicillin-resistant strains [8]. While systemic prophylactic antibiotics are routinely administered before laparoscopic surgeries, their effectiveness in completely preventing PSI is limited, particularly in high-risk patients [9]. The emergence of antibiotic-resistant bacteria has further complicated postoperative infection management, necessitating alternative or adjunctive measures such as topical antibiotics [10]. Several studies have explored the role of topical agents in reducing surgical site infections, yet their routine use remains controversial due to inconsistent findings regarding their efficacy and cost-effectiveness [11]. Despite these potential benefits, the efficacy of topical antibiotics in preventing PSI after LC remains a subject of debate, with limited evidence supporting its routine use. Therefore, this study aimed to assess the effectiveness of topical mupirocin 2% in reducing PSI incidence following elective LC. The findings of this study may contribute to optimizing postoperative wound management and improving patient outcomes.

METHODOLOGY

This prospective observational study was conducted at the Department of Pharmacology, Delta Medical College, Dhaka, Bangladesh & Bangabandhu Sheikh Mujib Medical University (BSMMU), Dhaka, Bangladesh, from January 2023 to December 2023. A total of 120 patients aged 18–75 years, of both genders, who underwent elective laparoscopic cholecystectomy were enrolled using a purposive sampling method.

The patients were divided into two groups:

- **Group A (n=60):** Patients who applied topical mupirocin 2% at the port site postoperatively.
- **Group B (n=60):** Patients who did not receive any topical antibiotics.

Patients meeting any of the following exclusion criteria were not included in the study: those on immunosuppressants, those who experienced intraoperative bile and stone spillage, gallbladder perforation, or bile spillage during extraction of the gallbladder. Additionally, patients diagnosed with acute cholecystitis or empyema, those taking systemic antibiotics for other indications, those unwilling or unable to comply with the study protocol, and those who did not provide consent were excluded. Postoperative port site infections were assessed based on clinical signs such as erythema, discharge, induration, and wound dehiscence. Data were collected using a structured proforma and analyzed using MS Office tools. Statistical analysis was performed to compare infection rates between the two groups.

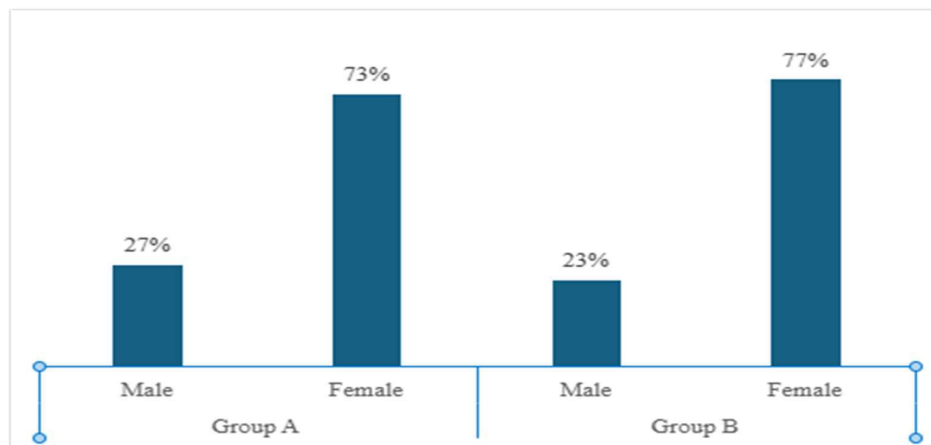
RESULT

In this study, we observed the age distribution of participants in both groups. In Group A, the highest proportion of patients (35.0%) were aged >60 years, followed by 33.3% in the 36-60 years age group, 23.3% in the 20-35 years age group, and 8.3% in the <20 years age group. In contrast, in Group B, the majority (35.0%) were from the 36-60 years age group, while 30.0% were aged >60 years, 25.0% were in the 20-35 years group, and 10.0% were <20 years old. Regarding gender distribution, we found that Group A had a female predominance, with 73% of patients being female and 27% male. Conversely, in Group B, male patients were more common, comprising 77% of the group, while females accounted for 23%. The analysis of comorbidities showed that most patients in both groups did not have any pre-existing medical conditions (90.0% in Group A and 88.3% in Group B). The most common comorbidity was diabetes mellitus, affecting 6.7% in Group A and 5.0% in Group B. Cardiac diseases were found in 1.7% of Group A and 3.3% of Group B, while hypothyroidism was present in 1.7% and 3.3% of cases in Group A and Group B, respectively. Smoking status was another factor analyzed in this study. The results indicated that 95.0% of Group A were non-smokers, with only 5.0% being smokers. In Group B, 98.3% of the participants were non-smokers, while 1.7% were smokers. In analyzing the gallbladder extraction port, it was observed that all cases in Group A (100%) had an epigastric extraction port. In Group B, 98.3% had an epigastric extraction port, while 1.7% had an umbilical extraction port. The duration of surgery was also analyzed, showing that the mean duration in Group A was 48.5 ± 8.2 minutes, while in Group B, it was 49.2 ± 7.8 minutes, indicating no significant difference between the two groups in terms of operative time. Postoperative

pain was assessed using a visual analog scale (VAS). The mean pain score was 2.5 ± 1.1 in Group A, while it was slightly higher in Group B (2.7 ± 1.3), suggesting that patients who received topical antibiotics experienced slightly lower pain levels. The mean length of hospital stay was also evaluated. In Group A, the average hospital stay was 1.2 ± 0.4 days, whereas in Group B, it was slightly longer at 1.5 ± 0.6 days. Finally, the primary outcome of this study was the incidence of port site infection (PSI). The results showed that PSI occurred in 1.7% of cases in Group A, whereas in Group B, 5.0% of patients developed PSI. This suggests that the use of topical mupirocin 2% may have contributed to a reduced incidence of PSI after elective laparoscopic cholecystectomy.

Table 1: Age distribution

Age (Years)	Group-A		Group-B	
	n	%	n	%
<20	5	8.3%	6	10.0%
20-35	14	23.3%	15	25.0%
36-60	20	33.3%	21	35.0%
>60	21	35.0%	18	30.0%



Comorbidities	Group-A		Group-B	
	n	%	n	%
None	54	90.0%	53	88.3%
Cardiac	1	1.7%	2	3.3%
Diabetes	4	6.7%	3	5.0%
Hypothyroidism	1	1.7%	2	3.3%

Table 3: Distribution of smoking status

Status	Group-A		Group-B	
	n	%	n	%
Smoker	3	5.0%	1	1.7%
Nonsmoker	57	95.0%	59	98.3%

Table 4: Gallbladder extraction port

Port	Group-A		Group-B	
	n	%	n	%
Epigastric	60	100.0%	59	98.3%
Umbilical	0	0.0%	1	1.7%

Duration (Minutes)	Group A	Group B
Mean $\pm$ SD	48.5 $\pm$ 8.2	49.2 $\pm$ 7.8

VAS Score	Group A	Group B
Mean $\pm$ SD	2.5 $\pm$ 1.1	2.7 $\pm$ 1.3

Stay (Days)	Group A	Group B
Mean $\pm$ SD	1.2 $\pm$ 0.4	1.5 $\pm$ 0.6

Variable	Group A		Group B	
	n	%	n	%
PSI	1	1.7%	3	5.0%

DISCUSSION

Laparoscopic cholecystectomy is a widely performed surgical procedure for gallbladder diseases, with port site infection (PSI) being a significant postoperative concern [12]. Various strategies, including systemic and topical antibiotics, have been employed to minimize the risk of PSI [13,14]. This study aimed to assess the efficacy of topical mupirocin 2% in preventing PSI in patients undergoing elective laparoscopic cholecystectomy. The demographic distribution revealed that the highest proportion of patients in Group A (35.0%) were aged >60 years, whereas in Group B, the majority (35.0%) belonged to the 36-60 years age group. This finding aligns with previous

study reporting higher gallbladder disease prevalence in elderly individuals [15]. Gender analysis showed a predominance of females (73%) in Group A, whereas males (77%) were more common in Group B. Similar gender patterns have been observed in prior research, where gallbladder diseases were more frequent in females due to hormonal and metabolic influences [16,17]. Comorbidities were relatively uncommon in the study population, with diabetes being the most prevalent condition, affecting 6.7% in Group A and 5.0% in Group B. Given that diabetes is a known risk factor for postoperative infections, it remains a relevant concern in surgical patients [18]. Smoking was infrequent among participants, with only 5.0% of Group A and 1.7% of Group B identified as smokers. A previous study has associated smoking with impaired wound healing and increased risk of surgical site infections [19]. The mean surgical duration was comparable between the two groups (48.5 ± 8.2 minutes in Group A vs. 49.2 ± 7.8 minutes in Group B), indicating that the use of topical antibiotics did not significantly impact operative time. The gallbladder extraction port was predominantly epigastric in both groups, similar to previous reports suggesting this approach as the preferred site for specimen removal [20]. Postoperative pain was assessed using a visual analog scale, with Group A reporting a slightly lower mean pain score (2.5 ± 1.1) compared to Group B (2.7 ± 1.3). Another Study suggested that reduced inflammation and infection rates may contribute to lower postoperative pain [21]. Additionally, the mean length of hospital stay was shorter in Group A (1.2 ± 0.4 days) than in Group B (1.5 ± 0.6 days), indicating that topical antibiotics might have facilitated faster recovery [22]. The primary outcome of this study, the incidence of PSI, was significantly lower in Group A (1.7%) compared to Group B (5.0%). This finding aligns with previous research suggesting that topical antibiotics can effectively reduce the risk of wound infections after laparoscopic procedures [23,24]. The antimicrobial properties of mupirocin, particularly against *Staphylococcus aureus*, a common pathogen in surgical site infections, may have contributed to this reduction [25]. So, the use of topical mupirocin 2% in elective laparoscopic cholecystectomy was associated with a lower incidence of PSI, reduced postoperative pain, and a shorter hospital stay. Future randomized controlled trials with larger sample sizes are warranted to further validate these findings and establish standardized guidelines for the use of topical antibiotics in laparoscopic surgery.

Limitation of the study:

This study was conducted with a small sample size and over a brief period. As a result, the findings may not accurately represent the overall situation of the entire country.

CONCLUSION & RECOMMENDATION

The application of topical antibiotics at the port site has proven to be an effective measure in reducing the incidence of postoperative surgical site infections (PSI) following elective laparoscopic cholecystectomy. This simple, cost-effective intervention not only enhances postoperative outcomes but also minimizes infection-related complications. Given its accessibility and affordability, it should be considered a routine practice to improve recovery and reduce the need for further interventions. Future studies with larger sample sizes may further validate its effectiveness in diverse patient populations.

Recommendations: Further research with larger sized samples is necessary to get the clear concepts.

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