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Role of Postoperative Antibiotics in Laparoscopic Cholecystectomy after Bile and Stone Spillage

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ABSTRACT

Objective: To determine the role of postoperative antibiotics in patients who had bile and stone spillage during laparoscopic cholecystectomy in terms of rate of postoperative surgical site infection and readmission.

Study Design: Quasi experimental study.

Place and Duration of Study: Surgical Department of Pak Emirates Military Hospital, Rawalpindi Pakistan, from Apr to Sep 2022.

Methodology: A total of 166 patients fulfilling the selection criteria were enrolled after taking written informed consent and were divided into two groups i.e. 83 each by odd and even number. Patients in Group-A received postoperative antibiotics and in Group-B did not have antibiotics and the outcome measures were assessed while the patients remained admitted and then weekly until day 30th.

Results: The mean age in the Groups A versus B was 41.27±7.05 versus 41.31±6.14 years and mean duration of hospital stay was 2.48±0.95 versus 2.59±0.81 days, respectively. In Group-A versus B, postoperative infections were present in 2(2.4%) versus 3(3.6%) (p=0.650), surgical site infection in 14(16.9%) versus 11(13.3%) (p=0.515) and readmission occurred in 8(10%) versus 6(7.2%) patients (p=0.576), respectively.

Conclusion: The rate of surgical site infections, rate of readmission and DOH stay was not significantly different between patients who received postoperative antibiotics compared to those who did not after laparoscopic cholecystectomy.

Keywords: Antibiotics, Bile, Laparoscopic cholecystectomy.

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INTRODUCTION

In the current era, the gold standard treatment for patients with symptomatic gallstone disease is laparoscopic cholecystectomy (LC).[1] In comparison to open cholecystectomy (OC), LC has been found to be associated with lower complications' rates[1]. However, LC has been found to be associated with two main problems i.e. common bile duct (CBD) injury and complications resulting from spillage of gallstones. Over the past decade, the rate of injury to CBD has significantly declined owing to the improved expertise of the laparoscopic surgeons, however, no change has occurred in the rates of spilled gallstones.[2] During OC, the spillage occurring from the gallbladder is routinely packed off and there is occlusion of Morrison's pouch with a laparotomy pad so spillage from the gallbladder cannot occur. In comparison, in LC the stones can disseminate in the abdominal cavity.[3]

A wide variety of complications have been reported with the use of LC keeping in view the biliary leakage and spillage of gallstones.[4] Surgical site infections (SSIs) is a commonly encountered and an important postoperative complication which significantly increases patient's morbidity and mortality.[5] It has been estimated to occur in 30% patients who underwent LC and had spillage of either bile or stone.[6] An important aspect of optimizing surgical outcomes is preventing postoperative infection using antibiotics.[7] Postoperative antibiotics have been shown to prevent bacterial contamination during both contaminated surgeries and clean operations like cholecystectomy. In elective LC, the use of postoperative antibiotics as a strategy of reducing SSIs is still debatable.[8] Usage of antibiotics during the postoperative period is advocated by some surgeons whereas some others do not recommend their use.[9] Additionally, the usage of antibiotics costs the health sector more money and increases the risk of the formation of multidrug resistance.[10]

Owing to the importance of this issue, the current study aimed to determine the role of postoperative antibiotics in patients who had bile and stone spillage during laparoscopic cholecystectomy in terms of rate of postoperative surgical site infection and readmission.

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METHODOLOGY

The quasi-experimental study was carried out at the Department of Surgery, Pak Emirates Military Hospital, Rawalpindi Pakistan, from April to September 2022, after taking approval from the Ethical Review Committee (ERC number A/28/58). The study enrolled 166 patients who underwent laparoscopic cholecystectomy and had spillage of bile and stone. The sample size of 166 patients was calculated by taking expected frequency of surgical site infection in patients who underwent LC and had spillage of either bile or stone as 30%.6 Non-probability consecutive sampling technique was used to recruit patients and informed consent was taken prior to data collection.

Inclusion Criteria: Patients of both genders with aged 20 to 70 years, who had spillage of bile and stone during LC and had American Society of Anesthesiologists (ASA) grade I and II were included.

Exclusion Criteria: Patients who had open cholecystectomy or had cholecystectomy as part of a bigger procedure or for a malignancy and those who underwent a subtotal cholecystectomy were excluded.

The primary outcome measure assessed was the rate of postoperative surgical site infection. The surgical site infection (SSI) was classified further into superficial and deep SSIs. SSI was defined as infection within the first 30 postoperative days involving only skin and subcutaneous tissue of the incision (superficial SSI) and/or involving deep soft tissue of the incision (deep SSI). Surgical site infection was confirmed by the presence of fever, redness, pain and swelling at the site of operation followed by a raised WBC count. The secondary outcome measures assessed were the duration of hospital (DOH) stay and rate of readmission.

Detailed history, physical examination and operative findings were noted down. The surgical technique was standardized for both the groups and any sort of confounding element was removed by the surgeon. The surgeons skilled in the technique performed all LCs while under general anesthesia and endotracheal intubation. Throughout the process, aseptic precaution was observed. All patients were injected with antibiotics preoperatively and intraoperatively. Following surgery, patients were observed in the recovery room for two hours before being sent to the post anesthesia care unit. Spillage of bile or stones during laparoscopic cholecystectomy was documented by the operating surgeons. Adequate measures were taken to drain the spillage as much as possible. Following surgery, the patients were divided by odd and even numbers into two groups (Figure-1).

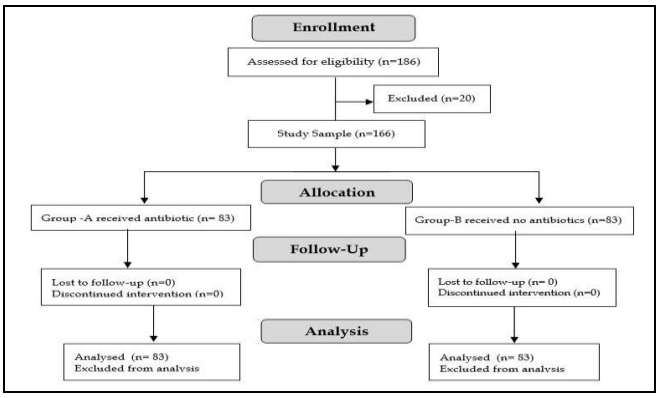

Figure: Patient Flow Diagram (n=166)

Patients with odd numbers were in Group-A and received antibiotics within 24 hours of bile and stones spillage, whereas patients with even numbers were in Group-B who did not receive any antibiotic and only had routine standard of care. In Group-A, extended postoperative antibiotic therapy i.e. Intravenous ceftriaxone 1 gm twice a day for 5 days was considered as an intervention of interest. It was defined as treatment with 3 or more doses of antibiotics (any type or strength) after LC. All patients were followed up daily until discharge and then weekly until 30th postoperative day.

Data was analyzed using Statistical Package for Social Sciences (SPSS) version 25.0. Quantitative data such as age, duration of stay at hospital was presented as mean and standard deviation. Qualitative data such as baseline demographics, bile and stone spillage, SSIs and rate of readmission were presented as frequency and percentages. Both groups were compared in terms of infectious complications, SSIs and rate of readmission by using Chi square test. Independent t-test was used to compare both groups in terms of mean duration of hospital stay and the p value of ≤0.05 was considered as significant.

RESULTS

A total of 166 patients were enrolled. The mean age (in years) in the Group-A (Antibiotic Group) was 41.27±7.05 and in Group-B (No Antibiotic Group) was 41.31±6.14.The mean DOH stay (in days) was 2.48±0.95 in Group-A and 2.59±0.81 in Group-B . There was no

significant difference between the two groups in terms of DOH stay, p=0.432 (Table-I).

Table-I: Age and Duration of Hospital Stay of Respondents (n=166)

Variables	Group (n=83)	Mean≤±Standard deviation	p-value
Age (in year)	Group-A (antibiotic)	41.00±7.05	-
	Group-B (no antibiotic)	41.00±6.14	
Duration of hospital stay (in days)	Group-A (antibiotic)	2.00±0.95	0.432
	Group-B (no antibiotic)	3±0.81	

There were 94(56.6%) males and 72(43.4%) females in the study. In Group-A, spillage of stone occurred in 19(22.9%) patients and spillage of bile occurred in 64(77.1%) patients, whereas, in Group-B, spillage of stone occurred in 23(27.7%) patients and of bile occurred in 60(72.3%) patients (Figure-2). Baseline demographic characteristics of the patients are revealed in Table-II.

Table-II: Baseline Characteristics of Respondents (n=166)

Variables	Group-A n=83 Frequency (percentage)	Group-B n=83 Frequency (percentage)
Age Group		
20 to 30 years	6(7.2%)	6(7.2%)
31 to 45 years	57(68.7%)	56(67.5%)
46 to 60 years	20(24.1%)	21(25.3%)
61 to 70 years	0(0%)	0(0%)
BMI		
Normal BMI	13(15.7%)	11(13.3%)
Overweight	50(60.2%)	47(56.6%)
Obese	20(24.1%)	25(30.1%)
ASA		
Grade I	42(50.6%)	22(26.5%)
Grade II	41(49.4%)	61(73.5%)
History of diabetes		
Yes	19(22.9%)	38(45.8%)
No	64(77.1%)	45(54.2%)
Indication for Laparoscopic Cholecystectomy		
Symptomatic gallstones	12(14.5%)	18(21.7%)
Acute cholecystitis	56(67.5%)	39(47%)
History of complicated	12(14.5%)	25(30.1%)
Gallstone diseaseOther	3(3.5%)	1(1.2%)

Surgical site infection was present in 14(16.9%) patients in Group-A and 11(13.3%) patients in Group-B (p=0.515), superficial surgical site infection was present in 9(10.8%) patients in Group-A and 10(12%) patients in Group-B (p=0.807), deep SSI was present in 5(6%) patients in Group-A and 1(1.2%) patients in Group-B (p=0.09) and readmission occurred in 8(10%) patients in Group-A and 6(7.2%) patients in Group-B (p=0.576) (Table-III).

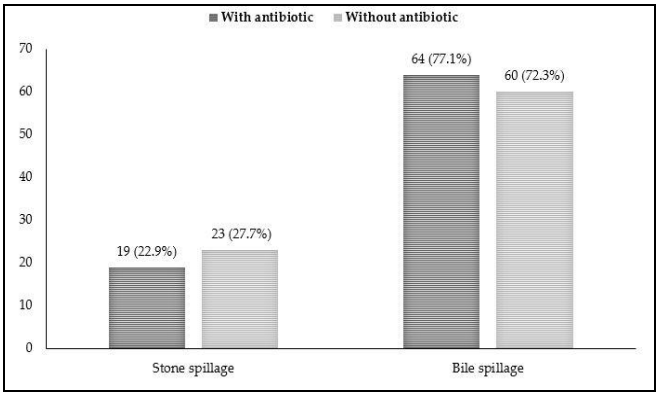

Figure-2: Frequency of Bile and Stone Spillage in both groups (n=166)

Table-III: Comparison of Postoperative Complications in both Groups (n=166)

Variables	Group-A n=83 Frequency (Percentage)	Group-B n=83 Frequency (Percentage)	p-value
Surgical Site Infection			
Yes	14(16.9%)	11(13.3%)	0.515
No	69(83.1%)	72(86.7%)	
Superficial Surgical Site Infection			
Yes	9(10.8%)	10(12%)	0.807
No	74(89.2%)	73(88%)	
Deep Surgical Site Infection			
Yes	5(6%)	1(1.2%)	0.09
No	78(94%)	82(98.8%)	
Readmission			
Yes	8(10%)	6(7.2%)	0.576
No	75(90%)	77(92.8%)	

DISCUSSION

In our study, there was no significant difference between the two groups in terms of duration of hospital stay. Around 15% of individuals receiving LC develop gallbladder perforation, which can lead to bile spill or stone passage.[11,12] Because the rates of infection problems were the same for patients receiving antibiotic agents as they were for patients not receiving antibiotic agents, the administration of antibiotic agents does not appreciably reduce infectious complications following bile spills or gallstones.[13,14] The current results are consistent with earlier studies on the frequency of spill and related problems after LC. The percentage of spillage of bile/stones was in

the range of 13%-30% in a comprehensive review that combined all the issues associated with gallstones and bile duct leakage, with a computed mean of 18.3% from eight studies.[15] By conducting a thorough search of literature documenting the follow-up of spill during LC, Zehetner *et al*. gathered all potential consequences following the spill of bile or stones.[16] According to their calculations, gallstones are spilled in 40% of patients, and 8.5% of these spilled gallstones result in complications like the development of an abscess or a fistula.[16] In our study the spillage of bile occurred more frequently in both groups compared to the spillage of stones.

In terms of postoperative infection and surgical site infection, Thapa *et al*. revealed that in patients who underwent LC, there was no significant difference in the individuals who received postoperative antibiotics in addition to the intraoperative antibiotic compared to those who received only intraoperative antibiotics[17]. Hajibandeh et al. in a systematic review also revealed that there was no additional benefit of postoperative antibiotics who underwent LC[18]. Regimbeau *et al*. similarly revealed that there was no difference in terms of postoperative complications in patients who had antibiotics postoperatively versus those who did not have them[19]. These findings are consistent with our study findings that there is no difference in terms of postoperative infections and SSIs in patients receiving antibiotics versus those who did not.

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study, helped in collecting data and did the relevant literature search.

CONCLUSIONS

The current study concluded that the rate of postoperative surgical site infection, rate of readmission and DOH stay was not significantly different between patients who received postoperative antibiotics compared to those who did not after LC. Hence, the study results propose that postoperative antibiotics should not be given frequently and should only be saved for specific situations.

Conflict of Interest: None.

Authors Contribution

Following authors have made substantial contributions to the manuscript as under:

UUS & FGK: Data acquisition, data analysis, drafting the manuscript, critical review, approval of the final version to be published.

SI & AUN: Study design, data interpretation, drafting the manuscript, critical review, approval of the final version to be published.

AA & MYS: Conception, data acquisition, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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