

## The Assessment of Antibiotic Utilization in Cholecystectomy Patients in a Tertiary Care Hospital: A Prospective Study

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### Abstract

**Background:** Laparoscopic cholecystectomy, a minimally invasive procedure, decreased postoperative pain, hospital stay, and surgical site infection (SSI). Most surgeons use intravenous antibiotics as prophylactic to avoid any complications. Furthermore, there is still debate over whether or not antibiotic prophylaxis is useful before elective laparoscopic cholecystectomy. We, therefore, carried out a study to evaluate the use of antibiotics in patients having cholecystectomy at a hospital.

**Materials and Methods:** A 6-month prospective analytic analysis was conducted on 100 patients who were scheduled to have open or laparoscopic cholecystectomy procedures at the Department of Pharmacology, Hitech Medical College & Hospital, Bhubaneswar, Odisha. During the recovery period, information about prescribed antibiotics, including their dosage and route of administration, was gathered via patient data. The patient was monitored up until discharge for any drug additions, and the date of discharge was recorded to indicate how long the patient had taken drugs following surgery.

**Results:** In our analysis, the majority of cases (54%) and the preponderance of females (71%) were observed in the 40–5 year age category. Metronidazole (46%) and Cefoperazone-Sulbactam (24%) are the most commonly utilised post-operative antibiotics in open cholecystectomy. The average hospital stay was between 5 and 8 days. The majority of patients undergoing open cholecystectomy received metronidazole for a maximum of seven days. The typical post-operative hospital stay for a laparoscopic cholecystectomy is four to five days. In these situations, cefoperazone sulbactam and metronidazole have been used most frequently.

**Conclusion:** In low-risk patients undergoing elective laparoscopic cholecystectomy, antibiotic prophylaxis is safe and helpful in lowering surgical site infections, systemic infections during hospitalization or after release, and postoperative length of hospital stay.

**Keywords:** Open Cholecystectomy, Laparoscopic Cholecystectomy, Antibiotic Prophylaxis, Surgical Site Infection (SSI)

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## Introduction

When treating benign gallbladder conditions like simple gallbladder stones, laparoscopic cholecystectomy is recommended to open cholecystectomy as the gold standard procedure. The incidence of surgical site infection (SSI), length of hospital stay, postoperative pain, and treatment expenses have all decreased as a result of the minimally invasive laparoscopic cholecystectomy technique [1]. The length of the hospital stay during an open cholecystectomy lengthens the financial burden per patient [2]. Both open and laparoscopic cholecystectomy procedures are carried out in a strictly sterile environment. Most surgeons use intravenous antibiotics as prophylactic to avoid any complications. Third-generation cephalosporin and metronidazole are frequently prescribed together post-operatively, which raises patient healthcare costs because most medications are not provided by hospitals [2].

Although recent SSI guidelines from the Scottish Intercollegiate Guidelines Network and the American Society of Health-System Pharmacists do not recommend antibiotic prophylaxis for elective laparoscopic cholecystectomy in the low risk group[3,4], prophylactic antibiotics are nonetheless still prescribed to low risk patients having laparoscopic cholecystectomy. The rational medication of drugs, particularly antibiotics, might not only dramatically reduce the burden of expense but also prevent antimicrobial resistance in developing nations like India where the majority of the population visiting tertiary care hospitals are from middle to low socioeconomic conditions.

Regarding the efficiency of antimicrobial prophylaxis for elective laparoscopic cholecystectomy, there is still some uncertainty. So, in a hospital, we led the research on the use of antibiotics in patients having cholecystectomy.

**Inclusion Criteria:** Patients undergoing planned cholecystectomy procedures (open or laparoscopic) in the Department of Pharmacology must meet the inclusion criteria. Patients between the ages of 19 and 60, both genders, Patients ready to offer voluntarily written, conscious consent.

**Exclusion Criteria:** People with severe systemic illnesses, such as uncontrolled diabetes, renal failure, chronic liver disease, immunologically weakened patients, etc. Patients suffering from any acute surgical disease or acute cholecystitis. Patients with medication allergies and those who refused to voluntarily offer written informed permission were eliminated.

A prospective analytical study was conducted on 100 patients who were scheduled to have open or laparoscopic cholecystectomy surgery at the Department of Pharmacology, Hitech Medical College & Hospital, Bhubaneswar, Odisha. Based on the inclusion and exclusion criteria, patients were included in the study. After obtaining voluntarily given written informed consent, basic demographic information was obtained from the patient, along with a brief history concerning the course of the condition, the symptoms, and any concomitant diseases.

In order to gather information about the prescribed antibiotics, together with their dosage and method of administration, during the postoperative period, patient data were used. The patient was monitored up until discharge for any drug additions, and the date of discharge was recorded to indicate how long the patient had taken drugs following surgery.

To describe the demographic characteristics and research variables, the descriptive analysis was carried out using SPSS v21.0. Before the study began, the current study protocol received approval from our institutional ethics committee. Additionally, the patients' written freely

informed consent was obtained prior to the gathering of any information from them. All patient personal information was kept private, and only the data related to the study variables were examined.

### Result:

According to the inclusion and exclusion criteria listed, a total of 90 cases of cholecystectomy (both open and laparoscopic) were reported. In our investigation, women made up the majority of cases (71%) and were more prevalent in the 40-51 year age range (54%) (**Table 1**).

**Table 1: Age and Gender distribution of cholecystectomy patients**

Age group	Female	Male
21-30 years	6 (19%)	11 (11%)
31-40 years	7 (66.2%)	5 (33.2%)
41-50 years	39 (54%)	16 (27.26%)
51-60 years	2 (6.1%)	3 (39%)
Total	55 (71%)	35 (29%)

When it comes to post-operative antibiotic medication, metronidazole (41%) and cefoperazone-sulbactam (23%) are most frequently administered in open cholecystectomy (**Table 2**). The average hospital stay was between 5 and 8 days.

**Table 2: Pattern of Antibiotic Use in Patients Undergoing Total Cholecystectomy (Multiple response table)**

Antibiotic Prescribed	No. of Patients	Percentage
Cefixime	2	2%
Ciprofloxacin	2	2%
Cefpodoxime	2	2%
Amoxicilin & Clavunic acid	1	1%
Ciprofloxacin & Tinidazole	2	2%
Cefotaxime	2	2%
Ceftriaxone	6	6%
Amikacin	7	7%
Metronidazole	41	41%
Cefoperazone-Sulbactam	23	23%

In open cholecystectomy procedures, metronidazole was given to a maximum of patients for a maximum of 5 days. The typical post-operative hospital stay is 3–4 days following a laparoscopic cholecystectomy. These cases have primarily involved the administration of cefoperazone sulbactam and metronidazole.

### Discussion:

According to our research, out of the 90 instances, 55 (or 55%) involved open cholecystectomy, while the remaining 35 (or 35%) involved laparoscopic cholecystectomy. In the age range of 40 to

51 years, women underwent a higher percentage of open (94%) and laparoscopic (80%) cholecystectomy procedures, which was consistent with S.M. Naser et al. (2011) [2]. We all currently confront a serious health threat called antimicrobial resistance (AMR). Antibiotic resistance develops as a result of unnecessary antibiotic use. Therefore, using antibiotics as a preventative measure in clean procedures is prohibited by international recommendations because improper use of these medications is the primary driver of the emergence of antimicrobial resistance.

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Due to unregulated supply chains, the accessibility of numerous broad-spectrum antibiotics over-the-counter, and noncompliance brought on by poverty, AMR is frequently observed in developing nations [4-6]. These reasons all increase the financial strain on developing nations' already subpar healthcare systems. Another finding from our research adds to the problem of antibiotic resistance. The first-generation cephalosporin cefazolin is the prophylactic medication advised for use in all surgical procedures, per the most recent Stanford Health Care (SHC) surgical antimicrobial prophylaxis guidelines [7]. To prevent antimicrobial resistance, it is important to employ a medicine with a medium spectrum of activity that only targets the pathogens that are suspected to be present at the surgical site. Cefazolin satisfies this need. [8] In our study, despite taking the necessary aseptic precautions during the operation, the postoperative antibiotic medication was primarily provided prophylactically to cover up for the gramme positive and gramme negative organisms in the hospital setup. This result is in line with a recent study by S. M. Naser et al (2011) [2], which found that metronidazole was utilised in nearly every instance in a very large percentage of 97.42% of the cases. Also utilised were cefoperazone-sulbactam both by itself and

in conjunction with metronidazole. Cefoperazone-sulbactam was used 30.76% of the time during open cholecystectomy.

These data point to a widespread tendency among surgeons in underdeveloped nations to favour broad-spectrum medications, which exacerbates the issue of antibiotic resistance described above. Multidrug-resistant (MDR) bacteria grow as a result of the frequent use of broad-spectrum medications and cause severe postoperative complications [6]. The World Health Organization advises front line prescribers and dispensers of antibiotics to use medicines rationally and only when necessary in order to prevent the loss of antimicrobial efficacy [9]. To stop the emergence of resistant diseases and their dissemination throughout the population, this proposal needs to be implemented into surgical practise. The first dose of the medication should be taken 120 minutes prior to the incision, according to the recommended scheduling for surgical antibiotic preoperative prophylaxis [10]. It is important to administer antibiotics at the right time before making an incision since administering them within 120 minutes of making an incision or afterward increases the chance of developing a surgical site infection.

Laparoscopic Cholecystectomy reduced the length of stay from 5-8 days to 4-5 days, compared to open Cholecystectomy. This finding agreed with a research by I. Gangan et al., which found that laparoscopic surgery cut the hospital stay in half to two to three days [11]. In both situations, the appropriate preventive antibiotic medication was administered.

However, we discovered that in our environment, open cholecystectomy (58.1%) was done more frequently than laparoscopic cholecystectomy (41.78%). Gorecki P et al. have correctly noted that there is confusion surrounding the selection of the appropriate antibiotics by the surgeons as a preventative measure to lower the postoperative problems. The use of

several antibiotics without following the right protocol during both open and laparoscopic cholecystectomy was similar in the current study. [12]

### Conclusion:

In low-risk patients undergoing elective laparoscopic cholecystectomy, antibiotic prophylaxis is safe and helpful in lowering surgical site infections, systemic infections during hospitalisation or after release, and postoperative length of hospital stay.

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