# An Audit of antibiotic prophylaxis for laparoscopic cholecystectomy


## Abstract

Background :

Laparoscopic cholecystectomy is a commonly performed surgical procedure for the treatment of symptomatic gallstones. Antibiotic prophylaxis is recommended to prevent surgical site infection (SSI) and other related complications and has been known to lower the incidence of postoperative infection in surgeries. The American Society of Health-System Pharmacists (ASHP) guideline summarizes current data on the appropriate use of antibiotic for surgical prophylaxis.

Objective:

The objective of this study is to assess and audit the use of antibiotics for laparoscopic cholecystectomy surgeries in a tertiary care centre according to the recommendation of ASHP guidelines.

Methods:

A retrospective audit was conducted and medical records of patients who underwent laparoscopic cholecystectomy between August 2022 to February 2023 in the surgical wards of a private hospital in Mira road, were studied . Antibiotic indication and choice, dose, dosing interval, route of administration, and timing of first administration and duration of prophylaxis were compared with the ASHP guideline recommendations.

Results:

A total of 100 patients with the age of >18 years were retrospectively studied. About 87 % of procedures had full compliance with all guideline recommendations. The variables with least compliance were “Appropriate Dose” (87% compliance rate) and “Appropriate initiation time of prophylaxis” (97% compliance rate). The variables with most compliance were Appropriate Agent used (100%), Appropriate Duration of Prophylaxis (100%), Appropriate administration route (100%), and Appropriate decision regarding use and non-use of antibiotic prophylaxis (100%)

Conclusion:

This audit highlights the need for improved adherence to guidelines regarding antibiotic prophylaxis in laparoscopic cholecystectomy. The study revealed that most of the prescribed antibiotics for surgical prophylaxis in the hospital are in accordance with standard treatment guideline. The density of antimicrobial use in the hospital for preoperative antimicrobial prophylaxis is as indicated/optimal.

KEYWORDS: Antibiotic prophylaxis, laparoscopic cholecystectomy, guideline adherence, surgery

Introduction:

"The adoption of antimicrobial prophylaxis in surgical procedures is a pivotal strategy to curtail the incidence of surgical site infections (SSI)" [1]. "SSIs contribute significantly to prolonged hospital stays, heightened morbidity, mortality rates, and consequent strain on healthcare resources" [2]. The judicious use of antibiotics has proven effective in lowering SSI occurrence [3]. Despite the existence of global and national guidelines for surgical prophylaxis, recent studies exploring current prophylactic practices reveal persistent issues such as antimicrobial overuse, inappropriate use of broad-spectrum antibacterial agents, and discrepancies in timing and duration [4,5,6,7,8,9,10]. This study employs the guidelines established by the American Society of Health-System Pharmacists (ASHP) [11] to evaluate the appropriateness of antibiotic prophylaxis for cholecystectomy procedures within the expansive tertiary care setting of Wockhardt Hospital, Mira Road.

Methods:

A retrospective audit spanning August 2022 to February 2023 was conducted in a private hospital in Mira Road, housing 350 beds. Files of all patients aged ≥18 years admitted for elective laparoscopic cholecystectomy were scrutinized. Data collected included patient demographics (age, sex), comorbidities, ASA Score, wound class, and details of antibiotic therapy (agents, doses, intervals, route, number of doses, initiation times, and duration). Compliance with ASHP guidelines was assessed across all aspects of antibiotic prophylaxis. The American College of Surgeons' classification of surgical wound types (clean, clean-contaminated, contaminated, dirty-infected) [11] was utilized, with inclusion criteria involving patients with clean-contaminated and contaminated wounds. Exclusion criteria included patients with dirty wounds and those receiving antibiotics for infections.

Following data collection, a thorough evaluation of the data was conducted. The primary criterion examined was the preoperative antibiotic prophylaxis indication. If deemed inappropriate, other criteria were similarly considered inadequate. Each record's parameters were assessed against criteria such as indication for prophylaxis, choice of antibiotics, timing of first preoperative dose, duration of prophylaxis, dose of prophylactic antibiotic, and route of administration. Patients developing wound infections during admission had only pre-infection onset antibiotics considered, distinguishing prophylactic from treatment courses.

Results:

The study encompassed 100 elective procedures, with 97% classified as clean-contaminated and 3% as contaminated.

Table 1 shows the proportion of procedures in which the antibiotic therapy prescribed agreed with the ASHP guideline recommendation for indications and regimens of antibiotic prophylaxis.

| Variables | Compliance Percentage |
|---|---|
| Appropriate agent used | 100 |
| Appropriate dose | 87 |
| Appropriate administration route | 100 |
| Appropriate initiation time of prophylaxis | 97 |
| Appropriate duration of prophylaxis | 100 |
| Appropriate decision making regarding use or nonuse of antibiotic | 100 |
| Compliance with all recommendations | 87 |

The most frequently employed antibiotics were Cefuroxime (in 82 procedures, 82%), Piperacillin-Tazobactam (in 13 surgeries), Ceftriaxone-Sulbactam (in 3), Amoxicillin-Clavulanic acid (in 2), and Metronidazole (in 2, as a combination). Antibiotics were correctly prescribed in 100% of procedures. Intravenous administration was consistent with guidelines in all procedures. While the dosage was appropriate in 87% of procedures, the duration of prophylaxis adhered to guidelines in 100% of cases.

Antibiotic prophylaxis commenced within 60 minutes before incision in 97 out of 100 cases, with 3 patients starting prophylaxis over 2 hours before incision. Surgery duration averaged around 2 hours in all cases, and no additional antibiotic doses were administered during surgery. All 100 cases exhibited no mortality, with all patients discharged after receiving appropriate prophylaxis in line with guidelines.

Discussion:

The ASHP recommends cephalosporin prophylaxis as the primary choice for most procedures (clean and clean-contaminated) [11], and our study confirms 100% compliance with this recommendation.

“Common errors in antibiotic selection, such as the use of more than one drug without indication for multidrug prophylaxis and the use of antibiotics not recommended for prophylaxis (e.g., third-generation cephalosporins), were not prevalent in our facility”. [14] The consequences of antibiotic misuse, including bacterial resistance and increased healthcare costs, were not observed in our study.

“Extended use of prophylactic antimicrobials has been associated with bacterial resistance, superinfection risk, and drug toxicity” [12]. Our study indicates that prophylaxis initiation timing and duration were largely compliant with international guidelines, underscoring the importance of balancing the benefits of antimicrobial prophylaxis against the risks of adverse reactions, bacterial resistance, and direct costs [13].

“To enhance antimicrobial practices in hospitals, institutionalization efforts are recommended, either by adopting international guidelines or developing local hospital guidelines. A board of trustees, incorporating specialists, anesthesiologists, microbiologists, pharmacists, and infection control departments, should steer institutionalization efforts. Guidelines should be tailored to the hospital's bacterial epidemiology, supported by the best literature evidence and surgeon preferences. Standardized protocols should be disseminated to achieve consensus among surgeons before implementation. Previous studies have demonstrated that guidelines can significantly improve the quality of antibiotic use”.[14]

**conclusion**

In conclusion, our study affirms that the majority of prescribed antibiotics for surgical prophylaxis align with standard treatment guidelines. However, there is a need for introducing local prescribing guidelines and comprehensive educational interventions to elevate the quality of preoperative antibiotic use.

## Ethical Approval:

As per international standards or university standards written ethical approval has been collected and preserved by the author(s).

## Consent

As per international standards or university standards, patient(s) written consent has been collected and preserved by the author(s).

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