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Postoperative Antibiotic Prophylaxis and the Incidence of Surgical Site Infections: An Observational Study

[1]Pala Anand Kumar and [2]Yarra Sudhakar

[1,2]Department of General Surgery, Government Medical College and General Hospital, Suryapet, Telangana, India

ABSTRACT

Surgical site infections (SSIs) pose a significant healthcare challenge with implications for patient outcomes and healthcare costs. This observational study investigates the influence of postoperative antibiotic prophylaxis on the incidence of SSIs, recognizing the importance of evidence-based infection prevention in surgical practice. A diverse cohort of 100 patients undergoing various surgical procedures, including appendectomy (30%), cholecystectomy (25%) and orthopedic surgeries (15%), was included in the study. Demographic data, surgical details and antibiotic prophylaxis information were collected. Patients were categorized into those who received appropriate antibiotic prophylaxis (70%) and those who did not (30%). SSIs were monitored postoperatively. Statistical analysis, including chi-squared tests, was employed to assess the association between antibiotic prophylaxis and SSIs. In a study involving 100 diverse surgical patients, we found that 70% received appropriate antibiotic prophylaxis, while 30% did not due to various factors. Incidence of surgical site infections (SSIs) was significantly lower in the group with proper prophylaxis (8.6%) compared to those without (40%). This underscores the protective role of appropriate antibiotic prophylaxis against SSIs. This observational study reveals a substantial association between proper antibiotic prophylaxis and reduced SSIs. Patients who received appropriate prophylaxis experienced a significantly lower risk of developing SSIs compared to those who did not. These findings emphasize the critical role of evidence-based antibiotic prophylaxis in surgical infection prevention. Tailoring prophylaxis strategies to specific patient populations and surgical procedures is imperative. These results contribute to the ongoing efforts to enhance patient care and minimize the burden of SSIs in surgical practice, highlighting the importance of adhering to infection prevention guidelines.

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Key Words
Surgical site infections, antibiotic prophylaxis, surgical procedures, postoperative infections

Corresponding Author
Yarra Sudhakar,
Department of General Surgery, Government Medical College and General Hospital, Suryapet, Telangana, India
sudhakaryerra81@gmail.com

Author Designation
[1,2]Assistant Professor

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INTRODUCTION

Surgical site infections (SSIs) represent a significant healthcare challenge, contributing to prolonged hospital stays, increased healthcare costs and adverse patient outcomes[1]. These infections are associated with both morbidity and mortality, posing a substantial burden on healthcare systems and patient well-being. In an era where healthcare quality and resource utilization are paramount, understanding the factors that influence SSIs is of utmost importance[2].

Surgical procedures are among the most common interventions in modern medicine, with millions of surgeries performed globally each year[3]. Despite the advances in surgical techniques, infection remains a formidable adversary. Surgical site infections can occur in various surgical specialties and procedures, ranging from minor outpatient surgeries to complex inpatient interventions[3,4]. The consequences of SSIs extend far beyond the immediate postoperative period, affecting patient's quality of life, healthcare costs and the overall efficiency of healthcare delivery systems[5,6].

The prevention of SSIs has been a long-standing concern in the healthcare community. Numerous strategies and guidelines have been developed to minimize the risk of infection and among them, antibiotic prophylaxis has emerged as a cornerstone in SSI prevention protocols. Antibiotics, when administered appropriately before surgery, can help reduce the microbial load at the surgical site, mitigating the risk of infection. However, the effectiveness of antibiotic prophylaxis can vary depending on various factors, including patient characteristics the type of surgery and the choice of antibiotics. Moreover, overuse or inappropriate use of antibiotics can lead to antibiotic resistance, adding a layer of complexity to the management of surgical infections[7].

This observational study seeks to address critical questions regarding the role of antibiotic prophylaxis in reducing the incidence of SSIs. Our primary objective is to assess the association between the administration of appropriate antibiotic prophylaxis and the occurrence of SSIs in a sample of 100 surgical patients. By examining a diverse range of surgical procedures and patient demographics, we aim to provide valuable insights into the real-world implications of antibiotic prophylaxis.

The choice of surgical procedures included in this study reflects the diversity of cases encountered in clinical practice. Appendectomy, cholecystectomy and orthopedic procedures were selected as representative examples due to their frequency and relevance. Understanding the impact of antibiotic prophylaxis across various surgical specialties can help tailor infection prevention strategies to specific patient populations.

Additionally, the study acknowledges the challenges associated with antibiotic prophylaxis, such as factors that may contraindicate its use, including patient allergies and comorbidities. It is essential to recognize the complexity of antibiotic decision-making in surgical settings, as inappropriate prophylaxis can have adverse consequences

Aim and objectives: This observational study aims to assess the impact of postoperative antibiotic prophylaxis on the incidence of surgical site infections (SSIs) in a diverse cohort of 100 surgical patients. The objectives include evaluating the association between appropriate antibiotic prophylaxis and SSIs, examining SSI incidence in patients lacking proper prophylaxis, exploring the breadth of surgical procedures and patient demographics within the study and ultimately offering evidence-based insights to enhance infection prevention strategies in surgical practice. Through this investigation, we aim to contribute valuable information to improve patient outcomes and reduce the burden of SSIs in surgical settings.

MATERIALS AND METHODS

This study focuses on the impact of postoperative antibiotic prophylaxis on the incidence of surgical site infections (SSIs) in a diverse patient population.

Study design: This study employed an observational design to assess the relationship between postoperative antibiotic prophylaxis and the occurrence of SSIs.

Study setting: The study was conducted at Government Medical College, Suryapet, Telangana, India. The hospital serves as a tertiary care center, offering a wide range of surgical procedures across various specialties.

Study poarticipants: The study included a diverse sample of 100 adult patients who underwent surgical procedures at the hospital during the study period (January 2022 to December 2022). Patients from various surgical specialties, including but not limited to general surgery, orthopedics, were considered. Inclusion criteria encompassed patients aged 18 years and above who provided informed consent for participation.

Data collection: Patient Demographics: Patient data, including age, gender and medical history, were collected at the time of admission.

Surgical procedures: The types of surgical procedures were documented, with a focus on identifying the most commonly performed surgeries during the study

period. This information was categorized to include appendectomy, cholecystectomy, orthopedic procedures and other surgical specialties.

Antibiotic prophylaxis: The administration of antibiotic prophylaxis was documented for each patient. Data included the type of antibiotics used, timing of administration (preoperative or intraoperative) and adherence to hospital guidelines. Patients were categorized into two groups. Those who received appropriate antibiotic prophylaxis and those who did not.

Incidence of surgical site infections (SSIs): Postoperatively, patients were closely monitored for the development of SSIs. Signs and symptoms of SSIs, such as wound redness, swelling, discharge and fever, were assessed during regular follow-up visits and documented.

Statistical analysis: Data analysis was performed using appropriate statistical tools. The primary objective was to assess the association between antibiotic prophylaxis and the incidence of SSIs. The Chi-squared test or Fisher's exact test was utilized to determine the significance of this association. A p-value of less than 0.05 was considered statistically significant.

Ethical considerations: This study adhered to ethical principles, including obtaining informed consent from all participants. Ethical approval for the study was obtained from the Institutional Ethics Committee of Government Medical College, Suryapet.

RESULTS

Patient demographics: A total of 100 patients participated in the study, providing a diverse sample for analysis. The average age of the patients was 56 years, with the youngest participant being 28 years old and the oldest 78 years old. The sample was relatively evenly split in terms of gender, with 58 male patients (58%) and 42 female patients (42%).

Surgical procedures: The study encompassed a variety of surgical procedures, with the most common being:

- **Appendectomy:** This accounted for 30% of the surgeries in the study, suggesting a significant presence of appendicitis cases
- **Cholecystectomy:** This procedure represented 25% of the cases, indicating a substantial number of patients undergoing gallbladder removal
- **Orthopedic procedures:** These accounted for 15% of the cases, demonstrating a notable representation of musculoskeletal surgeries

Table 1: Patient demographics

Characteristic	Value
Total patients	100
Average age (years)	56 (Range: 28-78)
Gender distribution	Male: 58 (58%) / Female: 42 (42%)

Table 2: Surgical procedures

Surgical Procedure	Percentage of cases
Appendectomy	30%
Cholecystectomy	25%
Orthopedic Procedures	15%
Others	30% (Sum of other procedures)

Table 3: Antibiotic prophylaxis

Antibiotic prophylaxis	No. of patients	Patients (%)
Received Appropriate Prophylaxis	70	70
Did Not Receive Appropriate Prophylaxis	30	30

Table 4: Incidence of surgical site infections (SSIs)

Antibiotic prophylaxis	No. of patients	Incidence of SSIs (%)
Received appropriate prophylaxis	70	6 (8.6%)
Did not receive appropriate prophylaxis	30	12 (40%)

Antibiotic prophylaxis: The study assessed the administration of antibiotic prophylaxis, a crucial aspect of preventing surgical site infections. 70% of the patients received appropriate antibiotic prophylaxis in accordance with hospital guidelines. This suggests that the majority of patients had proper infection prevention measures in place. However, 30% of the patients did not receive proper antibiotic prophylaxis due to various factors, including allergies, comorbidities, or other contraindications. This highlights the complexity of managing antibiotic prophylaxis in some cases.

Incidence of surgical site infections: The study evaluated the occurrence of surgical site infections (SSIs) among the patients, which is a critical outcome measure. Among patients who received appropriate antibiotic prophylaxis (70% of the sample) 6 out of 70 (8.6%) developed surgical site infections. This relatively low incidence rate suggests that proper prophylaxis may have a protective effect against SSIs.

In contrast, among patients who did not receive proper antibiotic prophylaxis (30% of the sample), 12 out of 30 (40%) developed surgical site infections. This significantly higher incidence rate indicates that inadequate prophylaxis is associated with a higher risk of SSIs.

DISCUSSIONS

In the discussion of this observational study, we contextualize our findings by comparing them with previous research on the impact of postoperative antibiotic prophylaxis and its association with the incidence of surgical site infections (SSIs). Our study, which examined a diverse cohort of 100 surgical patients, yielded significant results: Appropriate antibiotic prophylaxis was notably linked to a lower SSI incidence rate (8.6%) compared to patients who did not receive proper prophylaxis (40%). These findings align with the consensus in existing literature emphasizing the critical role of antibiotic prophylaxis in reducing SSIs. Notably, Dellinger *et al*.[8] provided an

early standard for antimicrobial prophylaxis in surgical procedures, reinforcing the importance of prophylactic measures. Additionally, Niraula *et al*.[9] conducted a hospital-based prospective study corroborating the link between surgical antimicrobial prophylaxis and reduced SSI incidence. Starnoni *et al*.[10] underscored the significance of patient selection in high-risk categories for tailored prophylaxis.

However, it is crucial to acknowledge studies that have reported varying results regarding the impact of antibiotic prophylaxis. For instance, Shetye *et al*.[11] and Misganaw *et al*.[12] explored surgical antibiotic prophylaxis use and SSI patterns, highlighting the complexities and variations in different healthcare settings. Kefale *et al*. [13] examined antimicrobial agent usage patterns for SSI prevention, shedding light on the need for appropriate utilization.

Our study's diverse range of surgical procedures, including appendectomy, cholecystectomy and orthopedic surgeries, mirrors the approach taken by Khan *et al*.[14] who investigated multiple surgical specialties and found varying SSI risk levels. These variations underscore the importance of tailoring prophylactic strategies based on procedure type and patient-specific factors.

Moreover, our study addressed the issue of patients who did not receive proper antibiotic prophylaxis due to factors such as allergies or comorbidities, aligning with the work of Shetye *et al*.[11] Their emphasis on the challenges in managing antibiotic prophylaxis in certain patient populations resonates with our findings, which highlight the elevated SSI risk in patients without appropriate prophylaxis.

CONCLUSION

Our observational study reinforces the substantial protective effect of appropriate postoperative antibiotic prophylaxis against SSIs, in line with prior research. The variability in outcomes across different surgical procedures and the challenges associated with managing prophylaxis in certain patient populations underscore the importance of a nuanced, patient-centered approach to infection prevention. Further investigation is warranted to refine prophylactic protocols and improve patient care in the diverse landscape of surgical practice.

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