ORIGINAL RESEARCH PAPER

General Surgery

EVALUATING THE ROLE OF PROPHYLACTIC ANTIBIOTICS IN REDUCING POSTOPERATIVE SURGICAL SITE INFECTIONS – A PROSPECTIVE OBSERVATIONAL STUDY

KEY WORDS: Prophylactic Antibiotics, Surgical Site Infections, Antibiotic Resistance

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ABSTRACT

Background: Surgical site infections (SSIs) are significant postoperative complications, causing morbidity and prolonged hospital stay. Prophylactic antibiotics are used to reduce SSI risk, but their effectiveness in elective general surgeries requires evaluation. **Aim:** To evaluate the effectiveness of prophylactic antibiotics in reducing postoperative SSIs and study the microbiological profile of infections in elective breast and inguinal hernia surgeries. **Methods:** A prospective observational study included 100 patients undergoing clean or clean-contaminated elective surgeries at a tertiary care hospital between January 2022 and June 2023. Ceftriaxone 1 g IV was administered preoperatively, with postoperative Cefotaxime 1 g IV twice daily for 5 days. Patients were monitored for SSIs on days 8, 15, 30, and at 3- and 6-month follow-ups. Data on SSI incidence, patient demographics, wound type, BMI, risk factors, duration of surgery, postoperative onset, and microbial isolates were collected. **Results:** Overall SSI incidence was 9%. Higher infection rates occurred in patients aged >60 years (15.4%) and <20 years (12.5%), in males (10.3%), emergency surgeries (16.7%), contaminated wounds (50%), and BMI 25.1–30 (9.4%). Hypertension (33.3%) and diabetes (11.1%) were common risk factors. Most infections occurred between postoperative days 3–6, with Klebsiella spp. as the most frequent pathogen (66.7%). **Conclusion:** Prophylactic antibiotics effectively reduced SSIs, but patient factors, wound type, and surgical duration remain critical determinants. Regular SSI surveillance, strict aseptic techniques, and targeted antibiotic use are recommended.

INTRODUCTION

Surgical site infections (SSIs) are among the most common postoperative complications, leading to increased morbidity, prolonged hospitalization, and higher healthcare costs (Mangram et al., 1999). Prophylactic antibiotics are recommended to reduce SSIs, particularly in clean and clean-contaminated procedures (Owens et al., 2008). Elective surgeries, such as breast and inguinal hernia operations, provide an opportunity to evaluate antibiotic effectiveness while monitoring patient, surgical, and microbial factors that influence infection rates. This study aimed to assess the role of prophylactic antibiotics in reducing SSIs and to identify causative microorganisms in a tertiary care setting.

Aim And Objectives

Aim: To evaluate the effectiveness of prophylactic antibiotics in reducing postoperative SSIs and their microbiological profile in elective breast and inguinal hernia surgeries.

Objectives:

1. Determine the incidence of SSIs in patients receiving preoperative prophylactic antibiotics.
2. Analyze clinical patterns and characteristics of SSIs following breast and inguinal hernia surgeries.
3. Identify causative microorganisms in SSIs and assess their antibiotic susceptibility profile.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of General Surgery at a tertiary care government teaching hospital between January 2022 and June 2023. Patients were enrolled based on inclusion and exclusion criteria and provided informed consent.

Inclusion Criteria: - Age >18 years - Clean or clean-contaminated elective procedures including hernia repair, breast surgeries, neck surgeries, and scrotal surgeries

Exclusion Criteria: - Age <18 years or refusal to consent - Fever, respiratory infections, pregnancy, chronic comorbidities, immunocompromised state, malnutrition

Methodology: Patients were evaluated with detailed history and examination. Prophylaxis: Ceftriaxone 1 g IV at induction (repeat if surgery >3 hours). Postoperative antibiotics: Cefotaxime 1 g IV twice daily for 5 days. Patients were monitored for SSI during hospitalization and followed up on days 8, 15, 30, and at 3 and 6 months. Outcomes included SSI incidence, hospital stay duration, ICU admission, mortality, and microbial analysis.

RESULTS

1. Overall SSI Incidence: - Total cases: 100 - Infected cases: 9 - Overall incidence: 9%

2. SSI Incidence By Age:

Age (years)	Total	Infected	Incidence (%)
<20	8	1	12.5
21–30	31	3	9.7
31–40	10	1	10.0
41–50	10	0	0.0
51–60	18	0	0.0
>60	26	4	15.4

3. SSI Incidence By Sex:

Sex	Total	Infected	Incidence (%)
Male	68	7	10.3
Female	32	2	6.3

4. SSI Incidence By Surgery Type:

Surgery Type	Total	Infected	Incidence (%)
Elective	76	5	6.6
Emergency	24	4	16.7

5. SSI Incidence By Wound Type:

Wound Type	Total	Infected	Incidence (%)

Clean	59	3	5.1
Clean-Contaminated	37	4	10.8
Contaminated	4	2	50.0

6. SSI Incidence By BMI:

BMI (kg/m²)	Total	Infected	Incidence (%)
<20	2	0	0.0
20.1–25	51	3	5.9
25.1–30	53	5	9.4
>30	0	0	0.0

7. SSI Incidence By Risk Factors:

Risk Factor	Infected (%)
Hypertension	33.3
Diabetes	11.1
Anaemia	11.1
None	44.4

8. SSI Incidence By Surgery Duration:

Duration	Total	Infected	Incidence (%)
≤1 hour	56	4	7.1
>1 hour	44	5	11.4

9. SSI Onset By Postoperative Day:

Day	No. of Cases
2	1
3	2
4	2
5	1
6	3

10. Microorganisms Isolated:

Organism	% Infections
Klebsiella spp	66.7
E. coli	22.2
Pseudomonas aeruginosa	22.2
Diphtheroids	11.1

DISCUSSION

The study found an overall SSI incidence of 9%, aligning with previous reports ranging from 2% to 20% in similar surgeries (Mangram et al., 1999; Owens et al., 2008). Age was a significant factor, with highest infection rates in patients >60 years and <20 years, consistent with studies demonstrating that diminished immunity and comorbidities increase susceptibility to SSIs (Culver et al., 1991; Gastmeier et al., 2000). Males had slightly higher SSI rates than females, potentially due to higher prevalence of risk factors such as smoking and diabetes (Sani et al., 2012). Emergency surgeries (16.7%) and contaminated wounds (50%) were associated with increased SSI rates, consistent with findings by Anaya et al. (2010) and Cruse & Foord (1980).

Patients with BMI 25.1–30 showed higher infection rates (9.4%), confirming obesity as a risk factor for SSI due to impaired wound healing and altered immune response (Olsen et al., 2008). Hypertension and diabetes were common comorbidities, highlighting that chronic illnesses impair healing and increase SSI risk (Perencevich et al., 2003). Most infections occurred between postoperative days 3–6, with Klebsiella spp. as the most frequent pathogen, emphasizing the importance of targeted antibiotic prophylaxis and stewardship (Leaper et al., 2015).

CONCLUSION:

Key Recommendations To Reduce Surgical Site Infections (SSIs)-

Based on the findings of this study, the following strategies are strongly recommended to minimize SSIs in elective surgeries:

1. **Regular SSI Surveillance:** Conduct continuous monitoring and provide audit feedback to surgeons.
2. **Minimize Preoperative Hospital Stay:** Shorter preoperative duration reduces infection risk.
3. **Optimize Surgical Duration:** Ensure trained staff and efficient techniques to shorten operative time without compromising quality.
4. **Judicious Use of Drains:** Avoid drains whenever possible; if necessary, use closed systems and remove promptly.
5. **Preoperative Patient Optimization:** Address comorbidities such as hypertension, diabetes, and anaemia before surgery.
6. **Strict Aseptic Techniques:** Maintain high standards of intraoperative antisepsis and asepsis.
7. **Target Known Risk Factors:** Pay special attention to high-risk groups, including elderly patients and those with elevated BMI.
8. **Timely Microbiological Assessment:** Collect and transport samples promptly if infection is suspected; tailor antibiotics based on sensitivity results.
9. **Antibiotic Stewardship:** Use prophylactic and therapeutic antibiotics judiciously to prevent resistant strains.

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