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Original Research Article

A RANDOMIZED CONTROL STUDY TO COMPARE THE EFFICACY OF SINGLE DOSE PROPHYLACTIC ANTIBIOTIC VERSUS EMPIRICAL POST OPERATIVE ANTIBIOTICS IN PREVENTION OF SURGICAL SITE INFECTION AMONG PATIENTS WITH SURGICAL WOUNDS IN A TERTIARY CARE CENTER IN CHENNAI

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ABSTRACT

Background: Surgical site infections (SSIs) remain a major cause of postoperative morbidity, prolonged hospitalization as well as increased healthcare costs. Rational antibiotic use, particularly surgical antibiotic prophylaxis (SAP) plays an important role in preventing SSIs. This study aimed to compare the effectiveness of single-dose preoperative prophylactic antibiotic with empirical postoperative antibiotic therapy in patients undergoing clean and clean-contaminated surgeries. **Materials and Methods:** A prospective randomized controlled trial was conducted over 18 months at a tertiary care center in Chennai. 200 adult patients undergoing elective clean and clean-contaminated surgeries were included in this study on the basis of a predefined inclusion and exclusion criteria. Participants were randomized into two groups: Group A received a single preoperative dose of antibiotics and Group B received empirical postoperative antibiotics for five days. Patients were followed on postoperative days (POD) 8, 15, and 30 for signs of SSI. Statistical analysis was performed using SPSS 23.0 and p value less that 0.05 was considered statistically significant. **Result:** Group A demonstrated significantly lower SSI rates compared to Group B at all time points (6% vs 14% on POD 8; 1% vs 5% on POD 15; 0% vs 2% on POD 30; p=0.04). Cumulative SSI incidence was 7% in Group A versus 21% in Group B. Postoperative complications such as pain, inflammation, wound discharge and pus culture positivity were consistently lower in the prophylactic group. Additionally, Group A had significantly shorter hospital stays. Clean-contaminated wounds showed higher SSI rates than clean wounds. **Conclusion:** Single-dose preoperative prophylactic antibiotics are more effective than empirical postoperative therapy in reducing SSIs, postoperative complications and hospital stay. This approach is cost-effective, minimizes antimicrobial resistance and should be adopted as standard practice in clean and clean-contaminated surgeries.

INTRODUCTION

Surgical site infection (SSI) is defined by Centre for Disease Control and Prevention (CDC) as proliferation of microorganisms in the incision of surgical site within skin and subcutaneous fat (superficial), Musculo-fascial layers (deep) or in an organ or cavity.[1] Surgical site infection is an important post operative complication because it cause morbidity and mortality to the patients. SSIs is the most common complication of surgery post operatively that develops within 30days after surgery. Surgical site infection is the more important nosocomial infection in India due to 38% of surgical patients develop SSIs.[2]

Surface of skin, infecting organism virulence and immunity of host influence Clinical features of the surgical site infection. The most common signs of infections are Pain, heat, redness, swelling and loss of function.[3]

During the local phase of infection, the Dead cells cannot be killed by macrophage that leads to organism growth in surrounding area when systemic phase of infection occurs the microorganism enter into the blood stream and reaches into distant organ.[4] The host tissue damage produced by microorganism toxin.[5]

Surgical Antibiotic Prophylaxis necessary to prevent SSIs. SAP means administration of antibiotics before surgery to prevent SSIs. SSIs are defined as infections that occur either within 30 days after surgery or within one year after the implantation of foreign material. Staphylococci aureus is the most common organism responsible for incision site infections after surgeries.[6]

For promoting the cost effective surgical practice and also to reduce the bacterial resistance to antimicrobial agents, surgical centres using a "single dose preoperative prophylactic antibiotic(s)" to prevent surgical site infections in surgical patients.

Antibiotic prophylaxis is a therapeutic method in which antimicrobial agents are used prophylactically to prevent the infectious complications in a therapeutic procedure.

Infection continues to be the most important cause of surgical operations failure despite the more powerful antimicrobial drugs. The prophylactic use of antibiotics for surgical procedures has become important practice nowadays, All types of procedures of having a microbiologically active drug available during the critical period in which bacterial contamination can occur. Appropriate antibiotics are given before the surgeries to prevent SSIs.[7]

Single dose prophylaxis is as effective as multiple dosing and is preferable because it is less likely to alter antibiotic resistance patterns of bacteria in a hospital.[8] An ideal prophylactic antibacterial regimen should be selected for surgeries and to be administered intravenously in the operating room just before induction of anaesthesia, rather than earlier. This will avoid the possibility of premature administration of the antibacterial regimen if the surgical procedure is delayed.[9] No single antibiotic agent or combination should be relied on for effective prophylaxis in all operations. The agent or agents should be chosen primarily based on their efficacy against the exogenous and endogenous microorganisms usually known to cause infectious complications in each clinical setting as well as their safety profile and cost10 Protocol for SSI prevention, helps in reducing the patient's morbidity, mortality and save cost for healthcare institutions.[10]

The aim of this study was to compare the rate of surgical site infection in Patients receiving a single dose pre-operative prophylactic antibiotic with patients receiving empirical post-operative antibiotics as per current practice.

MATERIALS AND METHODS

This was a prospective randomized controlled study done in the Department of General Surgery of a tertiary care institute in Chennai. The duration of study was 18 months that extended from November 2023 to May 2025. The aim of the study was to compare the efficacy of single-dose prophylactic antibiotic administration versus empirical postoperative antibiotic therapy in preventing surgical site infections (SSI) among patients with clean as well as clean-contaminated surgical wounds. Based on a previously published on similar topics the sample size was calculated with the help of formula $n = (Z(1-\alpha/2))^2 \times SD^2 / d^2$, where Z = 1.96 at 95% confidence interval, SD = 2.3, and precision (d) = 0.5. The minimum calculated sample size was found to be 81 per group, which was adjusted for a 10% non-response rate, yielding 90 patients per group. Thus, a total of 200 patients were included. Eligible participants were randomly allocated into each group with the help of computer-generated random numbers.

The study population comprised adult patients undergoing elective surgeries which were classified as clean (Class I) and clean-contaminated (Class II) wounds. Patients were included in this study on the basis of a predefined inclusion and exclusion criteria. Individuals in Group A (prophylactic group) received a single preoperative dose of antibiotics (for clean cases, 1 g intravenous ceftriaxone administered 30 minutes prior to incision; for clean-contaminated cases, a combination of 1 g ceftriaxone and 500 mg metronidazole) intravenously prior to incision. No further postoperative antibiotics were administered. Group B (empirical group) received postoperative antibiotics (clean cases were given ceftriaxone 1 g intravenously twice daily for 5 days, while clean-contaminated cases received ceftriaxone 1 g twice daily along with metronidazole 500 mg) thrice daily for 5 days. All surgeries were performed under standard operative conditions and uniform preoperative preparation and postoperative wound care protocols were strictly observed In both the groups.

Data collection was carried out using a structured questionnaire developed based on existing literature. Demographic details, clinical variables, and postoperative outcomes were analysed. Patients were monitored for presence of signs of surgical site infection including pain, erythema, inflammation or wound discharge. Additionally, presence of fever or pus formation was also looked for in operated cases. Wound assessment was performed on postoperative days 8, 15, and 30. The Southampton Wound Grading System was used to classify wound healing as well as severity of infection. Severity of infection was graded as 0 (normal healing) to V (systemic infection) depending upon the features of infection. All participants were followed up clinically and wound status was documented.

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Statistical analysis was performed using Statistical Package for Social Sciences (SPSS) version 23.0. Continuous variables were expressed as mean ± standard deviation. Categorical variables were documented as frequencies and percentages. The Chi-square test was used to compare categorical variables between 2 groups and the unpaired t-test was used to compare continuous variables. P-value of less than 0.05 was considered statistically significant.

Inclusion Criteria

- Patients undergoing elective surgeries which were classified as clean (Class I) and clean-contaminated (Class II) wounds.
- Age of the patients should be above 18 years.
- Patients ready to give informed and written consent to be part of study.

Exclusion Criteria

- Refusal to give consent to be part of study.
- Age less than 18 years.
- Unconscious, comatose or severely ill patients
- Known hypersensitivity to study drugs.
- Patients with comorbidities such as diabetes mellitus, chronic kidney disease, coronary artery disease, or cerebrovascular accidents
- Patients on long term steroids or with immunodeficiency states.
- Patients with significant psychiatric illness likely to hamper post-operative assessment.

RESULTS

A total of 200 patients were randomized equally into Group A (single-dose prophylactic antibiotic; n=100) and Group B (empirical postoperative antibiotics; n=100). The overall cohort comprised 102 males (51%) and 98 females (49%). Clean-contaminated wounds were slightly more common (108, 54%) than clean wounds (92, 46%). The most common procedures were open appendicectomy (51, 25.5%) and laparoscopic cholecystectomy (46, 23%) [Table 1].

Table 1: Baseline Demographic and Clinical Characteristics of Study Participants

Variable	Category	Group A (n=100)	Group B (n=100)	Total (N=200)
Age (Mean±SD)	—	36.69±10.41	39.48±10.87	—
Sex	Male	44 (44%)	58 (58%)	102 (51%)
	Female	56 (56%)	42 (42%)	98 (49%)
Wound Class	Clean (Class I)	51 (51%)	41 (41%)	92 (46%)
	Clean-contaminated (Class II)	49 (49%)	59 (59%)	108 (54%)
Surgery	Fibroadenoma Excision	9 (9%)	12 (12%)	21 (10.5%)
	Hernioplasty	15 (15%)	14 (14%)	29 (14.5%)
	Lap Appendicectomy	0 (0%)	16 (16%)	16 (8%)
	Lap Cholecystectomy	33 (33%)	13 (13%)	46 (23%)
	Open Appendicectomy	30 (30%)	21 (21%)	51 (25.5%)
	Open Cholecystectomy	2 (2%)	10 (10%)	12 (6%)
	Thyroidectomy	11 (11%)	14 (14%)	25 (12.5%)

On POD 8, postoperative complications and SSI were consistently lower in Group A, and were more frequent in clean-contaminated wounds. SSI occurred in 6 (6%) in Group A versus 14 (14%) in Group B, with most infections arising in clean-contaminated wounds. By POD 15, SSI declined to 1 (1%) in Group A and 5 (5%) in Group B. By POD 30, no SSI was seen in Group A, whereas 2 (2%) cases persisted in Group B, all in clean-contaminated wounds [Table 2].

Table 2: Distribution of Post-operative Complications and SSI by Wound Class on POD 8, POD 15, and POD 30.

POD	Complication	Group A C	Group A CC	Group A Total	Group B C	Group B CC	Group B Total	Total
POD 8	Pain	1 (1%)	3 (3%)	4 (4%)	3 (3%)	8 (8%)	11 (11%)	15 (15%)
	Inflammation & Erythema	1 (1%)	4 (4%)	5 (5%)	3 (3%)	10 (10%)	13 (13%)	18 (18%)
	Fever	0 (0%)	2 (2%)	2 (2%)	1 (1%)	5 (5%)	6 (6%)	8 (8%)
	Wound Discharge	1 (1%)	2 (2%)	3 (3%)	2 (2%)	9 (9%)	11 (11%)	14 (14%)
	Pus C/S Positive	1 (1%)	3 (3%)	4 (4%)	3 (3%)	9 (9%)	12 (12%)	16 (16%)
	SSI	1 (1%)	5 (5%)	6 (6%)	3 (3%)	11 (11%)	14 (14%)	20 (20%)
POD 15	Pain	0 (0%)	1 (1%)	1 (1%)	1 (1%)	4 (4%)	5 (5%)	6 (6%)
	Inflammation & Erythema	0 (0%)	1 (1%)	1 (1%)	1 (1%)	3 (3%)	4 (4%)	5 (5%)
	Fever	0 (0%)	1 (1%)	1 (1%)	1 (1%)	2 (2%)	3 (3%)	4 (4%)
	Wound Discharge	0 (0%)	1 (1%)	1 (1%)	1 (1%)	2 (2%)	3 (3%)	4 (4%)
	Pus C/S Positive	0 (0%)	1 (1%)	1 (1%)	1 (1%)	3 (3%)	4 (4%)	5 (5%)
	SSI	0 (0%)	1 (1%)	1 (1%)	2 (2%)	3 (3%)	5 (5%)	6 (6%)
POD 30	Pain	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (2%)	2 (2%)	2 (2%)
	Inflammation & Erythema	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)	1 (1%)	1 (1%)
	Fever	0 (0%)	0 (0%)	0 (0%)	0 (0%)	1 (1%)	1 (1%)	1 (1%)
	Wound Discharge	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (2%)	2 (2%)	2 (2%)

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	Pus C/S Positive	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (2%)	2 (2%)	2 (2%)
	SSI	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (2%)	2 (2%)	2 (2%)

On POD 8, Group A had significantly lower rates of pain (6, 6% vs 14, 14%; p=0.04), inflammation/ erythema (5, 5% vs 13, 13%; p=0.04), wound discharge (3, 3% vs 11, 11%; p=0.02), pus culture positivity (4, 4% vs 12, 12%; p=0.03), and SSI (6, 6% vs 14, 14%; p=0.04) [Table 3].

Table 3: Association between Post-operative Complications and Study Groups on POD 8.

Complication	Group A Yes n (%)	Group B Yes n (%)	Odds Ratio	95% CI	P value
Pain	6 (6%)	14 (14%)	0.392	0.144–1.066	0.04*
Inflammation & Erythema	5 (5%)	13 (13%)	0.352	0.121–1.029	0.04*
Fever	2 (2%)	6 (6%)	0.320	0.063–1.624	0.279
Wound Discharge	3 (3%)	11 (11%)	0.250	0.068–0.926	0.02*
Pus C/S Positive	4 (4%)	12 (12%)	0.306	0.095–0.983	0.03*
SSI	6 (6%)	14 (14%)	0.392	0.144–1.066	0.04*

On POD 15, Group A continued to show fewer complications. Significant differences were observed for pain (1, 1.1% vs 5, 5.8%; p=0.04), fever (1, 1.1% vs 3, 3.5%; p=0.03), wound discharge (1, 1.1% vs 3, 3.5%; p=0.03), pus culture positivity (1, 1.1% vs 4, 4.7%; p=0.03), and SSI (1, 1.1% vs 5, 5.8%; p=0.04) [Table 4].

Table 4: Association between Post-operative Complications and Study Groups on POD 15.

Complication	Group A Yes n (%)	Group B Yes n (%)	Odds Ratio	95% CI	P value
Pain	1 (1.1%)	5 (5.8%)	0.174	0.020–1.522	0.04*
Inflammation & Erythema	1 (1.1%)	4 (4.7%)	0.220	0.024–2.012	0.194
Fever	1 (1.1%)	3 (3.5%)	0.297	0.030–2.916	0.03*
Wound Discharge	1 (1.1%)	3 (3.5%)	0.297	0.030–2.916	0.03*
Pus C/S Positive	1 (1.1%)	4 (4.7%)	0.220	0.024–2.012	0.03*
SSI	1 (1.1%)	5 (5.8%)	0.174	0.020–1.522	0.04*

By POD 30, no complication was recorded in Group A. Residual morbidity in Group B included pain 2 (2.5%), wound discharge 2 (2.5%), pus culture positivity 2 (2.5%), and SSI 2 (2.5%), each reaching statistical significance (p=0.04) [Table 5].

Table 5: Association between Post-operative Complications and Study Groups on POD 30

Complication	Group A Yes n (%)	Group B Yes n (%)	Odds Ratio	95% CI	P value
Pain	0 (0%)	2 (2.5%)	1.025	0.990–1.061	0.04*
Inflammation & Erythema	0 (0%)	1 (1.2%)	1.013	0.988–1.037	0.344
Fever	0 (0%)	1 (1.2%)	1.013	0.988–1.037	0.344
Wound Discharge	0 (0%)	2 (2.5%)	1.025	0.990–1.061	0.04*
Pus C/S Positive	0 (0%)	2 (2.5%)	1.025	0.990–1.061	0.04*
SSI	0 (0%)	2 (2.5%)	1.025	0.990–1.061	0.04*

When analysed by wound class on POD 8, clean-contaminated wounds had significantly higher complication rates than clean wounds, including pain (16, 14.8% vs 4, 4.3%; p=0.014), inflammation/erythema (14, 13% vs 4, 4.3%; p=0.03), wound discharge (11, 10.2% vs 3, 3.3%; p=0.04), pus culture positivity (12, 11.1% vs 4, 4.3%; p=0.03), and SSI (16, 14.8% vs 4, 4.3%; p=0.014) [Table 6].

Table 6: Association between Post-operative Complications and Wound Class on POD 8

Complication	Clean Yes n (%)	Clean-contaminated Yes n (%)	Odds Ratio	95% CI	P value
Pain	4 (4.3%)	16 (14.8%)	0.261	0.084–0.812	0.014*
Inflammation & Erythema	4 (4.3%)	14 (13%)	0.305	0.097–0.963	0.03*
Fever	1 (1.1%)	7 (6.5%)	0.159	0.019–1.314	0.07
Wound Discharge	3 (3.3%)	11 (10.2%)	0.297	0.080–1.100	0.04*
Pus C/S Positive	4 (4.3%)	12 (11.1%)	0.364	0.113–1.169	0.03*
SSI	4 (4.3%)	16 (14.8%)	0.261	0.084–0.812	0.014*

On POD 15, the adverse impact of clean-contaminated wounds persisted, with significantly higher rates of pain (5, 5.4% vs 1, 1.1%; p=0.03), inflammation/erythema (4, 4.3% vs 1, 1.1%; p=0.03), pus culture positivity (4, 4.3% vs 1, 1.1%; p=0.03), and SSI (4, 4.3% vs 2, 2.3%; p=0.01) [Table 7].

Table 7: Association between Post-operative Complications and Wound Class on POD 15

Complication	Clean Yes n (%)	Clean-contaminated Yes n (%)	Odds Ratio	95% CI	P value
Pain	1 (1.1%)	5 (5.4%)	0.200	0.023–1.747	0.03*
Inflammation & Erythema	1 (1.1%)	4 (4.3%)	0.253	0.028–2.308	0.03*
Fever	1 (1.1%)	3 (3.3%)	0.341	0.035–3.342	0.334

Wound Discharge	1 (1.1%)	3 (3.3%)	0.341	0.035–3.342	0.334
Pus C/S Positive	1 (1.1%)	4 (4.3%)	0.253	0.028–2.308	0.03*
SSI	2 (2.3%)	4 (4.3%)	0.512	0.091–2.866	0.01*

On POD 30, all residual complications were confined to clean-contaminated wounds. SSI, pain, wound discharge, and pus culture positivity each occurred in 2 (2.3%), whereas no clean wound developed any complication. These differences were significant for pain, wound discharge, pus culture positivity, and SSI (all p=0.04) [Table 8].

Table 8: Association between Post-operative Complications and Wound Class on POD 30.

Complication	Clean Yes n (%)	Clean-contaminated Yes n (%)	Odds Ratio	95% CI	P value
Pain	0 (0%)	2 (2.3%)	1.023	0.991–1.056	0.04*
Inflammation & Erythema	0 (0%)	1 (1.1%)	1.011	0.989–1.034	0.321
Fever	0 (0%)	1 (1.1%)	1.011	0.989–1.034	0.321
Wound Discharge	0 (0%)	2 (2.3%)	1.023	0.991–1.056	0.04*
Pus C/S Positive	0 (0%)	2 (2.3%)	1.023	0.991–1.056	0.04*
SSI	0 (0%)	2 (2.3%)	1.023	0.991–1.056	0.04*

A progressive reduction in SSI was observed over time in both groups; however, rates remained consistently lower in Group A. SSI decreased from 6 (6%) to 1 (1%) to 0 (0%) across POD 8, 15, and 30 in Group A, compared with 14 (14%) to 5 (5%) to 2 (2%) in Group B. The between-group difference remained significant at each time point (p=0.04). Cumulative SSI was 7 (7%) in Group A and 21 (21%) in Group B [Table 9].

Table 9: Trend of SSI Rates across POD 8, POD 15, and POD 30 by Group and Wound Class.

Assessment Time	Group A Clean	Group A CC	Group A Total	Group B Clean	Group B CC	Group B Total	P value
POD 8	1 (1%)	5 (5%)	6 (6%)	3 (3%)	11 (11%)	14 (14%)	0.04*
POD 15	0 (0%)	1 (1%)	1 (1%)	2 (2%)	3 (3%)	5 (5%)	0.04*
POD 30	0 (0%)	0 (0%)	0 (0%)	0 (0%)	2 (2%)	2 (2%)	0.04*
Cumulative SSI	1	6	7 (7%)	5	16	21 (21%)	—

Hospital stay was significantly shorter in Group A (p<0.01). A stay of 1–3 days was observed in 65 (65%) patients in Group A versus 42 (42%) in Group B, whereas stay of >7 days occurred in only 3 (3%) in Group A compared with 27 (27%) in Group B [Table 10].

Table 10: Association between Duration of Hospital Stay and Study Groups

Duration of Hospital Stay	Group A n (%)	Group B n (%)	Total n (%)	P value
1–3 days	65 (65%)	42 (42%)	107 (53.5%)	<0.01*
4–7 days	32 (32%)	31 (31%)	63 (31.5%)	
>7 days	3 (3%)	27 (27%)	30 (15%)	
Total	100 (100%)	100 (100%)	200 (100%)	

DISCUSSION

Surgical site infection remains one of the most important causes of postoperative morbidity and usually occurs within 30 days of surgery. Its incidence can be reduced by strict asepsis, meticulous surgical technique, and rational antibiotic use. Surgical antibiotic prophylaxis has therefore become a standard component of operative care, as the presence of an effective antimicrobial drug during the critical period of bacterial contamination can reduce infectious complications. In this context, single-dose prophylaxis is often preferred because it is considered as effective as multiple-dose regimens while being less likely to promote antimicrobial resistance and unnecessary antibiotic exposure. The present randomized controlled study compared single-dose prophylactic antibiotics with empirical postoperative antibiotics for prevention of surgical site infection in patients with surgical wounds in a tertiary care centre in Chennai.

The baseline characteristics of the two groups were broadly comparable, although some variation was noted in age and sex distribution. The mean age was 36.69 years in Group A and 39.48 years in Group B. In Group A, females constituted 56%, whereas in Group B, males constituted 58%. These findings were not fully similar to those reported by Rajarajan et al,[11] and Shoba et al,[12] probably because of differences in geographical area, patient profile, and disease pattern. Such variation in baseline demographics is common across surgical studies and does not necessarily alter the overall interpretation when postoperative outcomes are clearly different between the treatment groups.

The main finding of the present study was the lower frequency of postoperative wound complications and surgical site infection in the prophylactic antibiotic group. On postoperative day 8, SSI was seen in 6% of Group A compared with 14% of Group B. By day 15, the corresponding rates were 1% and 5%, and by day 30, no patient in Group A had SSI, whereas 2%

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of Group B still had infection. Clean-contaminated wounds consistently showed higher infection rates than clean wounds.

The pattern of associated postoperative complications also favoured Group A. On day 8,15 as well as 30 signs of infection were lower in the prophylactic group than in the empirical antibiotic group. Likewise, clean wounds had fewer complications than clean-contaminated wounds at each follow-up point. This trend strengthens the argument that single-dose prophylaxis is not merely comparable, but may actually be superior in reducing postoperative morbidity in selected surgical patients.

The present findings are in agreement with several earlier studies. Naveen Kumar et al,[13] reported a highly significant reduction in SSI with single-dose preoperative ceftriaxone. Vasu et al,[14] also observed a significantly lower infection rate in the prophylaxis group than in the postoperative antibiotic group. Bunn et al,[15] in a Cochrane review, concluded that prophylactic antibiotics reduce surgical site infection after breast cancer surgery. Classen et al,[16] demonstrated that preoperative timing of antibiotic administration was associated with the lowest risk of surgical wound infection. Shoba et al,[12] also found lower SSI and shorter hospital stay in the single-dose group, although the difference between groups was statistically nonsignificant in that study.

However, not all published studies are in complete agreement. Thejeswi et al,[17] reported no significant difference between regimens. Rejab et al,[18] also did not find a significant association for SSI between groups. Thus, while the present study supports prophylactic single-dose antibiotic use, the benefit may not be identical across all surgical settings.

Hospital stay was another important outcome. Most patients in the present study had a hospital stay of 1–3 days, but prolonged stay beyond 7 days was less frequent in Group A than in Group B. There was a significant association between duration of hospital stay and treatment group, suggesting that better infection control translated into earlier discharge. This observation is consistent with reports by Rajarajan et al,[11] Shah et al,[19] Naveen Kumar et al,[13] and Shoba et al,[12] all of whom found shorter stay in patients receiving prophylactic antibiotics. In contrast, Bendre et al,[20] reported no significant difference in hospital stay between single-dose and multiple-dose groups. Even so, the overall direction of evidence in the present study suggests that reduction in postoperative complications may help decrease hospital stay and associated burden on both patients and hospitals.

Overall, the present study indicates that single-dose prophylactic antibiotics are effective in reducing surgical site infection, postoperative wound complications, and length of hospital stay when compared with empirical postoperative antibiotics. The findings support rational, timed antibiotic prophylaxis as a practical and safer strategy in surgical wound management, while also helping to avoid unnecessary postoperative antibiotic exposure.

CONCLUSION

This study demonstrates that single-dose preoperative prophylactic antibiotics is more effective than empirical postoperative antibiotic therapy in reducing surgical site infections. postoperative complications, and duration of hospital stay was also less in those patients who received single-dose preoperative prophylactic antibiotics in clean and clean-contaminated surgeries. The findings support the routine use of prophylactic antibiotics as a safe and cost-effective strategy that also helps limit unnecessary antibiotic exposure.

REFERENCES

1. Global guidelines for the prevention of surgical site infection, world health organization 2016.
2. Nandi PL ,Rajan SS , Mak KC, Chan SC, So YC, Surgical wound infection. Hong Kong Medical Journal. 1999; 5 (1):82-86.
3. Jonathan N, Meakins, M.D, D.S.C, F. A.G.S, and Byron F, Master son, F.D,G.S, Prevention of post operative infection. ACS surgery: Principle and practise 2005.
4. Mangram AJ, MD; Teresa C. Horan, MPH, CIC; Michele L. Pearson, MD; Silver LC, BS; Jarvis WR, MD; Guideline for prevention of surgical site infection. 1999; 251-266.
5. The Biochemical scientist, Mechanisms involved in wound healing 2008:609-615.
6. Anderson DK ,Billiar TR, Dunn DL , Hunter JG ,Mathews JB, Pollock RE, Schwartz's Principles of Surgery:135.
7. Turano A. Antibiotics prophylaxis for surgical infection. Am J Surg. 1992;64(4):15.
8. Dietmar H, Condon ER. Surgical Infection and AIDS. Oxford text book of surgery. 2000. 2 nd Edn. Volume 1. 2000:41-43.
9. Bal S. Estimating cost effectiveness of prophylaxis for surgical infection. Hospital Today. 1999;4(7):341-3.
10. Nichols RL. Current Strategies for Prevention of Surgical Site Infections. Curr Infect Dis Rep. 2004;6:426-34.
11. Rajarajan S, Devi TS, Simon NM, Shankar KN, Ganesan V. Comparative study on prophylactic antibiotic versus empirical antibiotic in prevention of surgical site infection. Journal of Drug Delivery and Therapeutics. 2019 Mar 15;9(2):9-13.
12. Shobha C, Amit Kumar, Bhimanagouda V Goudar, Shaileshkumar M Emmi. Surgical Site Infections in Single-dose versus Multiple-dose Broad-spectrum Intravenous Antibiotic Prophylaxis in Clean Surgeries: A Quasi-experimental Study. International Journal of Anatomy, Radiology and Surgery. 2024 May;13(3):SO09-SO12.
13. Naveen Kumar M. A Comparative Study of Single Dose Preoperative Ceftriaxone and Routine Conventional Postoperative Prophylaxis in Elective General Surgical Cases. Doctoral dissertation. Coimbatore Medical College, Coimbatore.
14. Vasu S, Sagar K. A randomised controlled trial comparing the efficacy of single dose prophylactic ceftriaxone versus post-operative ciprofloxacin and metronidazole combination in reducing post-operative wound infection after clean surgeries. International Surgery Journal. 2018 Nov 28;5(12):3864-3867.
15. Bunn F, Cunningham ME, Handscomb K. Prophylactic antibiotics to prevent surgical site infection after breast cancer surgery. Cochrane Database of Systematic Reviews. 2006;(2):CD005360.
16. Classen DC, Evans RS, Pestotnik SL, Horn SD, Menlove RL, Burke JP. The timing of prophylactic administration of antibiotics and the risk of surgical wound infection. New England Journal of Medicine. 1992;326:281-286.
17. Thejeswi P, Shenoy D, Tauro L, Ram S. Comparative Study of One-Day Perioperative Antibiotic Prophylaxis Versus Seven Day Postoperative Antibiotic Coverage In Elective Surgical Cases. The Internet Journal of Surgery. 2012;28(2):1-7.

18. Rejab AF, Hassouni MK. The use of single versus multiple doses cefotaxime as a prophylactic antibiotic in maxillofacial fractures. Al-Rafidain Dental Journal. 2012;12(1):96-101.
19. Shah Z, Kshirsagar NS, Shah S. Comparison of Single Dose Prophylactic Antibiotics versus five days Antibiotic in Cesarean Section. Journal of Evolution of Medical and Dental Sciences. 2014;3(12):3123-3129.
20. Bendre M, Kshirsagar V, Male P, Rathod S, Khandalkar S. Role of single dose antibiotic prophylaxis in clean general surgery. Journal of Medical Science and Clinical Research. 2016;4(6):11021-11026.