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Comparative Study of Single Dose Prophylactic Antibiotic Versus Empirical Postoperative Antibiotcs In Prevention Of SSI

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I. INTRODUCTION

Infections that impact either the incision or deep tissue at the operation site and arise up to 30 days after surgery (or up to one year following surgery in patients receiving implants) are known as surgical site infections (SSIs).The most frequent nosocomial infection among surgical patients is surgical site infection (SSI), which makes up 15% of all nosocomial infections. Increased postoperative hospital stays due to postsurgical infection result in significantly greater costs, higher rates of hospital readmission, and at-risk health outcomes. Therefore, preventing SSIs is the first step in treating them.(1,2)The patient's skin, mucous membranes, or hollow viscera flora causes most SSIs. Aerobic gram-positive cocci like Staphylococcus are usually the contaminant, however resistant bacteria like MRSA are becoming more common.(3)

Many surgeons prescribe antimicrobials for 7-10 days for even clean cases to prevent surgical site infections. This may increase patient costs and hospital-acquired illnesses. Antibiotics are usually not needed to prevent surgical site infections after clean surgeries, but some studies show that antibiotics were used irrationally to treat them. Giving direct prophylactic antibiotic therapy before surgery reduces the risk of wound infections and infection complications. Infection risk is reduced with preventive antibiotics. It should be administered to all clean contaminated cases. Antibiotics are essential for unclean wounds. Antibiotics for surgical site infection prevention based on pathogen identified. It must be affordable and safe for the patient.(4,5)

AIM

To assess the effectiveness of empirical post-operative prophylaxis against single dose antibiotic prophylaxis in SSI prevention.

II. MATERIALS AND METHODS

Our study is a prospective, cross-sectional study conducted in the Department of General surgery in Maharaja Institute of Medical Sciences, Nellimarla, Andhra Pradesh. The study is conducted over a period of 1 year i.e., from September 2021 to August 2022. The required data is gathered using a "Proforma" that has been predesigned and structured, including the patient's demographic profile, diagnosis, and information about the prescribed antimicrobial medications, including their name, strength, dosage, recommended route of administration, and frequency. A total of 60 surgery cases were grouped randomly into 2 groups of 30 each.

Study group: Received single dose of antibiotic preoperatively 1gm of inj. Ceftriaxonei.v half an hour before surgery. Did not receive antibiotics post-surgery.

Control group: Received inj. Ceftriaxone 1gm BD i.v for 5 days postoperatively.

Surgical wounds were considered infected if they met the following criteria:

- Grossly purulent material drained from the wound
- The wound spontaneously opened and drained purulent fluid
- The wound drained fluid that was culture positive or gramme stain positive for bacteria
- The surgeon observed erythema or pus drainage and opened the wound after determining the wound to be infected.

Contaminated cases, pregnant women, children below 10 years of age and emergency cases were excluded from the study. At the 8th POD, 15th POD, 30th POD, as well as afterwards at 3 months and 6 months, all patients were followed up on. Data was gathered and any wound-related problems were documented. In both groups, the incidence of SSI was computed, and the findings were analysed.

III. RESULTS

The mean age of the cases was 43.4± 8.4 years and the mean age of the controls was 39.8 ± 7.6 years. 64% were men and 36% were women.

Most common surgery performed was inguinal hernia among both the groups, followed by appendectomy. The SSI incidence was more in the appendectomy cases in both the groups compared to other elective procedures.

A total of 2 cases developed fever in the cases group compared to the 8 cases in the control group.

Post-operative complications:

Variable	Cases	Controls	p Value
Fever	2	8	0.032
Pus discharge	3	10	0.02
Serous discharge	5	11	0.052 (not significant)
Wound gaping	2	7	0.04
Swelling	4	9	0.02
Pain	8	14	0.06 (not significant)
Most common Organism	S. aureus	Streptococcus	-
SSI	3	8	0.04
Mean hospital duration	3.6 days	5.8 days	0.04

Fever, pus discharge, wound gaping, swelling, SSI and mean hospital stay duration were significantly lower in the cases compared to the controls. Most common organism isolated in cases was S. aureus whereas in controls was Streptococcus. In both cases and controls, pus drainage along with additional antibiotic coverage based on the culture and sensitivity report was implemented.

IV. DISCUSSION

Surgical antimicrobial prophylaxis is the term used to describe the administration of antibiotics before surgery. Its purpose is to lessen the burden of infection from both endogenous and external sources. Despite significant advancements in infection management, postoperative wound infections continue to be a leading cause of morbidity in surgical patients. Surgical site infections (SSI) are among the most prevalent hospital acquired conditions and play a significant role in patient morbidity & death.(6)In this prospective study, 60 patients were randomly allocated into 2 groups (study and control) of 30 each. Patients in study group received only pre-operative antibiotic (Inj. Ceftriaxone 1gm IV 30 min prior to the procedure) whereas control group received post-operative antibiotics (Inj. Ceftriaxone 1gm IV BD for 5 days). This was similar to study by Basant RK et.al. (7)It was equivalent to Jayalal JA et al, where study group patients undergoing surgery were given 1gm cefotaxime after test dosage 60min before operation. The control group received 3 days of intravenous ciprofloxacin 200mg twice a day and metronidazole 500mg three times a day. In both groups, infection rates were similar. Grade 2 infections occurred in 2 of 30 cases in each group, with no significant differences.(8)

The mean age of cases in this study was 43.4± 8.4 years and that of controls was39.8± 7.6 years. 64% were men and 36% were women. There was no significant difference in age and gender between the two groups as observed in other studies in literature. (4–7)

Most common surgery in this study was for inguinal hernia, followed by appendectomy. SSI was more common in appendectomy in both the groups. This was comparable to results of BasantRK et. al. and Jayalal JA et.al. (7,8)

In this study, SSIin control group was higher (26.6%) when compared to cases (10%) and the results were statistically significant with p value less than 0.05. These findings were similar to observations of Basant RK et. al. (6% in cases vs 8% in controls, but not significant statistically.)(7) and Rajarajanet. al. showed no significant difference between the groups.(4)

Fever (6.6% in cases vs 26.6% in controls), pus discharge (10% in cases vs 33.3% in controls), wound gaping (6.6% in cases vs 23.3% in controls), swelling (13.3% in cases vs30% in controls),were all significantly lower in cases groups when compared to controls ($p<0.05$) in the present study. All the findings were comparable to Basant RK et. al. and also added that 42% in control group stated that the cost was high. (7)Rajarajan et.al. stated that the cost of patients in control group was significantly more and found that it was economically more advantageous to use pre-operative prophylactic antibiotics.(4)

In this study,mean hospital duration was 3.6 days in cases vs 5.8 days in controls with a p value of less than 0.05 (significant). These results were comparable to Rajarajanet. al. and BasantRKet. al.'s study.(4,7)And also,according to studies by Patel SM et. al. longer hospital stays made patients more vulnerable to infection by decreasing host resistance or increasing the potential for bacterial colonisation. They also noted a greater prevalence of SSI in patients who had lengthy preoperative hospital stays.(9)

Serous discharge from the wound and pain at the site of surgery were not of significant difference between the groups as addressed by Saha et.al. (6)

Most common organism isolated from cases was *Staphylococcus aureus*, whereas *Streptococcus* was the most common organism isolated from control group. Apart from these bacteria, *E.coli* was also found in Basantet.al.'s study. (7)

The complications were more in control group when compared to study group. So, the use of a single dose prophylactic antibiotic may be restricted to 1-2 doses of an appropriate medication prior to surgery and never for more than 24 hours.

V. CONCLUSION

The risk of postoperative morbidity and death, the duration of time patients must be hospitalised, and the amount they must pay for their care are all impacted by surgical site infections. According to the results of our research, single-dose preventive antibiotics are superior than empirical post-operative treatment in terms of shortening patients' length of stay and lowering their overall healthcare costs. Since eliminating surgical site infections entirely is unrealistic, most we can hope for is a significantly reduced infection rate. However, there is no advantage to be gained from the abuse of antibiotics; instead, it raises the risk of patients incurring additional expenses and accelerates the development of drug-resistant germs. In a country like ours, where resources are few, switching to single-dose antibiotic prophylactic programmes can have a significant financial advantage.

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