ORIGINAL RESEARCH

Singledose prophylactic antibiotics versus empirical postoperative antibiotics in prevention of surgical site infections at a tertiary centre: A comparative study

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Received Date: 25 June, 2020 Acceptance Date: 29 July, 2020

ABSTRACT
Background: Surgical site infections are one of the most common causes of morbidity following surgery (SSI). The present study compared single dose prophylactic antibiotic versus empirical postoperative antibiotics in prevention of surgical site infections (SSI). **Materials & Methods:** 110 cases of clean and clean contaminated wounds of both genders were divided into 2 groups. Group I comprised of 55 patients who received a single dose of antibiotics half hour preoperatively. Group II (control) comprised of 55 patients who received post operative antibiotics after surgery for about 5-10 days. Parameters such as fever, swelling, hospital stay, pain, wound discharge, type of organism, SSI etc. was recorded. **Results:** Group I had 30 males and 25 females and group II had 27 males and 28 females. SSI was seen in 7 in group I and 11 in group II. Swelling was present in 10 in group I and 157 in group II and pain was present in 12 in group I and 18 in group II and fever was seen in 8 in group I and 16 in group II. The hospital stay was 1-3 days was 11 days in group I and 5 days in group II, 4-7 days in 32 in group I and 35 in group II and >7 days was 12 in group I and 15 in group II. Streptococcus viridans was isolated in 3 cases in group I and 5 cases in group 2 and Staphylococcus aureus in 4 cases in group I and 6 cases in group II. Wound discharge was serous in 4 in group I and 7 in group II and purulent in 3 in group I and 4 in group II patients. The difference was significant (P< 0.05). **Conclusion:** Prophylactic single-dose antibiotics have been demonstrated to be more effective in lowering hospital stays and surgical site infections than empirical post-operative therapy.

Key words*:* Antibiotics, Pain, Wound

INTRODUCTION

Surgical site infections are one of the most common causes of morbidity following surgery (SSI).[1] Infections of the tissues, organs, and places that surgeons expose when performing an invasive procedure are referred to as surgical site infections. Organ/space infection and incisional infection are two categories for SSI.[2]

There are two more classifications for incisional SSI: deep and superficial. The introduction of antibiotics in the 20th century led to a major improvement in surgical outcomes. Surgery used to be a terrifying event, but because to the advancement of antiseptic techniques and—more importantly—the discovery of antibiotics, it is now a common occurrence in contemporary life.[3] Widespread antibiotic use, however, also brought with it a host of problems, such as a rise in MRSA prevalence and other drug-related illnesses like allergies. The clinical features of the surgical site infection are influenced by the skin's surface, the type of organism causing the

infection, and host resistances.[4] Infections can cause pain, edema, redness, heat, and loss of function where the intrusive surgery was performed. Finally, as the infection enters the systemic phase, the microbes enter the bloodstream and travel to distant organs.[5] This is due to the macrophages' inability to completely phagocytose all dead cells during the local phase of infection. Poisons produced by the bacterium enter the host and damage host tissue. Many pathways, such as the remodeling, fibroblastic, and inflammatory phases.[6]

AIM AND OBJECTIVES

The present study compared single dose prophylactic antibiotic versus empirical postoperative antibiotics in prevention of surgical site infections (SSI).

MATERIALS & METHODS

The present prospective observational study was comprised of 110 cases of clean and clean contaminated wounds of both genders, conducted at the Department of General Surgery, Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar, India, for a period of two years (June 2019–May 2020). The Institutional Ethics Committee gave the study its approval. Patients' consent was obtained before starting the study.

Inclusion Criteria

- Those patients who gave consent were included.
- Patients of both sex, age ≥18 years, who had surgical wound pus discharge, with serous or sero-purulent discharge and with signs of sepsis present concurrently (warmth, erythema, in duration, tenderness, pain, raised local temperature).
- Exudate and swab samples of patients received with suspected Surgical Site Infection were included.
- Clean and clean contaminated cases

Exclusion Criteria

- Those patients who do not gave consent were excluded.
- Patients who had suture abscesses, wounds with cellulitis and no drainage were excluded from the study.
- Infected Burns.
- Contaminated cases are excluded.
- Patients below 18 yrs age were excluded.
- Pregnant patients were excluded.
- Emergency cases were excluded.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups. Group I comprised of 55 patients who received a single dose of antibiotics half hour preoperatively. Group II(control) comprised of 55 patients who received post operative antibiotics after surgery for about 5-10 days. Parameters such as fever, swelling, hospital stay, pain, wound discharge, type of organism, SSI etc. was recorded.

A detailed history regarding age, sex, type of illness, diagnosis, type and duration of surgery performed, antibiotic therapy, and the associated comorbid diseases was obtained from the patients. Data such as name, age, gender, type of illness, diagnosis, type and duration of surgery performed, antibiotic therapy, and the associated co-morbid diseases were obtained from the patients and recorded. Samples were collected using sterile cotton swabs from all patients having clinically suspected SSIs and were processed as per standard microbiological techniques. All the pus samples or wound swabs of clinically suspected SSI cases were received in the Department of Microbiology, Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar, India. These samples were subjected to direct microscopic examination by Gram stain and inoculated onto nutrient agar, 5% sheep blood agar, and Mac Conkey agar using a sterile bacteriological loop. Plates were incubated aerobically at 37°C for 24 hours, and if there was no growth, they were incubated for another 48 hours. Antimicrobial susceptibility testing was done using the modified Kirby-Bauer disc diffusion method.

Statistical Analysis

The results were subjected for statistical analysisby using SPSS version 22.0 (IBM Corp., 2016) and Microsoft 16. P value less than 0.05 was considered significant.

RESULTS

Table I and figure 1, shows that group I had 30 males and 25 females and group II had 27 males and 28 females.

Table 1: Gender wise distribution of patients

Gender	Group I (n=55)	Group II(n=55)
Method	Preoperatively single dose of antibiotics	post operative antibiotics
M:F	30:25	27:28

Table I and figure 1, shows that group I had 30 males and 25 females and group II had 27 males and 28 females.

Figure 1: Gender wise distribution of the patients in both groups

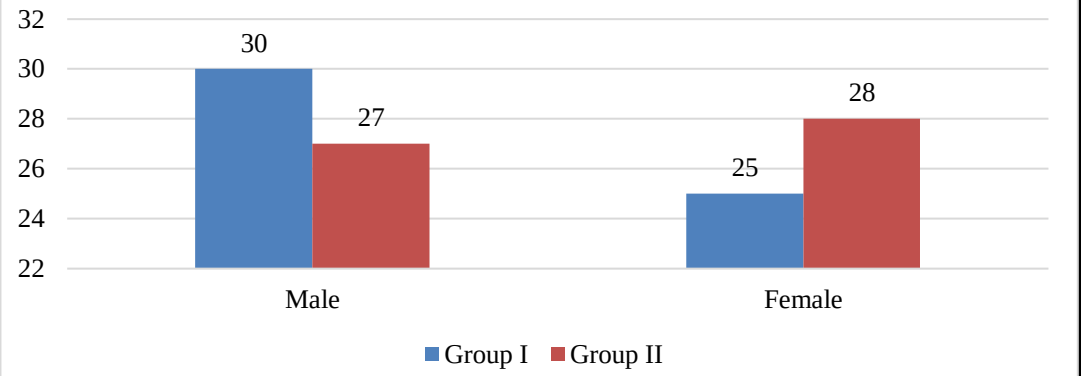
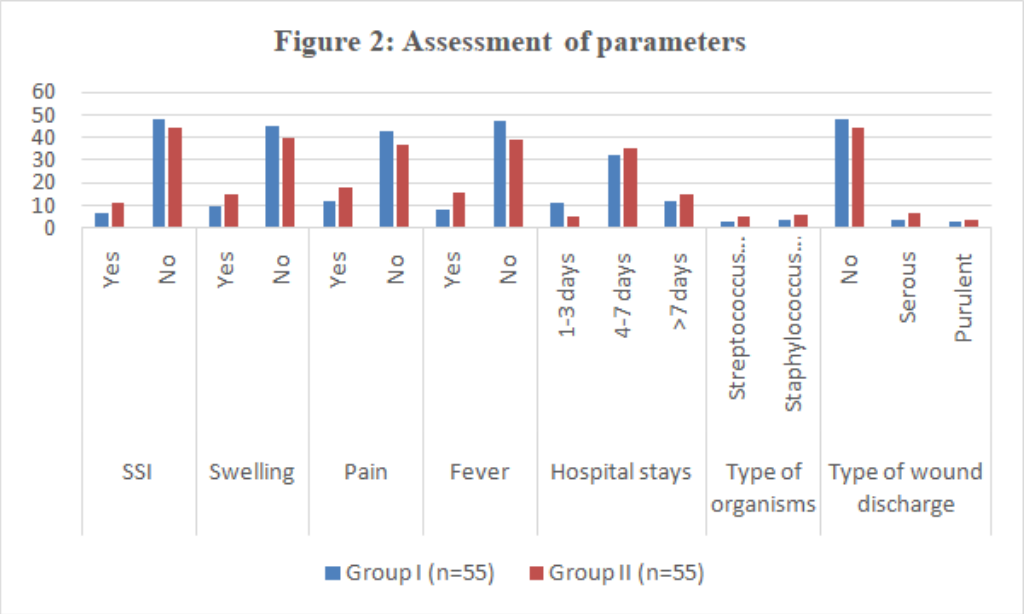


Table 2: Assessment of parameters

Parameters	Variables	Group I (n=55)	Group II (n=55)	P value
SSI	Yes	7	11	0.02
	No	48	44	
Swelling	Yes	10	15	0.05
	No	45	40	
Pain	Yes	12	18	0.04
	No	43	37	
Fever	Yes	8	16	0.01
	No	47	39	
Hospital stays	1-3 days	11	5	0.02
	4-7 days	32	35	
	>7 days	12	15	
Type of	Streptococcus	3	5	0.75

organisms	viridans			
	Staphylococcus aureus	4	6	
Type of wound discharge	No	48	44	0.18
	Serous	4	7	
	Purulent	3	4	

Table II, Figure 2, shows that SSI was seen in 7 in group I and 11 in group II. Swelling was present in 10 in group I and 157 in group II and pain was present in 12 in group I and 18 in group II and fever was seen in 8 in group I and 16 in group II. The hospital stay was 1-3 days was 11days in group I and 5 days in group II, 4-7 days in 32 in group I and 35 in group II and >7 days was 12 in group I and 15 in group II. Streptococcus viridans was isolated in 3 cases in group I and 5 cases in group 2 and Staphylococcus aureus in 4 cases in group I and 6 cases in group II. Wound discharge was serous in 4 in group I and 7 in group II and purulent in 3 in group I and 4 in group II patients. The difference was significant (P< 0.05).



DISCUSSION

Surgical site infection is a common postoperative complication that usually appears 30 days following the procedure.[7] An infection at the surgical site can damage any part of the anatomy, deep soft tissue, subcutaneous tissue, and skin.[8] Even with apparently healthy patients, many surgeons would still recommend antibiotics for a period of 7–10 days following surgery due to concern about surgical site infections. Patients may have to pay more for their healthcare as a result of this, and they may also be more likely to become ill in the hospital.[9,10]

Despite some data indicating that antibiotics were misused to treat surgical site infections, prophylactic antibiotic treatment prior to surgery has been shown to minimize the incidence of wound infections and infection-related complications.[11,12]

The present study compared single dose prophylactic antibiotic versus empirical postoperative antibiotics in prevention of surgical site infections (SSI).

We found that group I had 30 males and 25 females and group II had 27 males and 28 females. In a study by Salih et al.[13], group A received a single intraoperative dosage of

metronidazole. Sixty patients in Group B received repeated surgical dosages of metronidazole. The two groups were compared with respect to seroma, intrabdominal collections, postoperative fever, and wound infections. The patients' initial features were similar for both groups. There was no appreciable variation in the two groups' incidence of wound infections or postoperative fever. Four patients (7.8%) in Group A developed wound infections, while five patients (9%) had postoperative fever. Out of the six patients in Group B (10%), four (6.7%) had wound infections and six (10%) had postoperative fever. None of the patients developed seroma or intraabdominal abscesses.

We observed that SSI was seen in 7 in group I and 11 in group II. Swelling was present in 10 in group I and 157 in group II and pain was present in 12 in group I and 18 in group II and fever was seen in 8 in group I and 16 in group II. The hospital stay was 1-3 days was 11 days in group I and 5 days in group II, 4-7 days in 32 in group I and 35 in group II and >7 days was 12 in group I and 15 in group II.

Bangaru H et al.[9] studied 202 patients and found that the rate of surgical site infection in group A (preoperative antibiotics only) was 2.5% and in group B (both preoperative and postoperative antibiotics) was 3.6%. The mean duration of postoperative hospital stay was 3.4875 ±1.079 in group A and in group B was 4.12±1.2809 (i.e., the mean duration of postoperative hospital stay was longer in group B than in group A), and the difference was found to be significant (p = 0.009).

Khichy et al.[14] studied the effectiveness of short-term antibiotic coverage during decisive period in the prevention of postoperative wound sepsis in clean surgical cases. The prospective randomized comparative study included 50 patients divided into two groups of 25 each. Group A (short-term ceftriaxone prophylaxis) patients received three doses of 1 g intravenous ceftriaxone. First dose 12 h, 2nd dose 1 h before operation and the 3rd dose was given 10 h after the operation. The Group B (conventional postoperative ceftriaxone prophylaxis) patients received postoperatively 1 g B. D intravenous ceftriaxone for 5 days. We compared the incidence of surgical site infection in two groups. Surgical site infection rate was 4% in Group A and 24% in Group B. The severity of infection was less in short-term prophylaxis group. Anaemia, nutritional status, and use of drain were other factors associated with postoperative wound infections.

We observed that Streptococcus viridans was isolated in 3 cases in group I and 5 cases in group 2 and Staphylococcus aureus in 4 cases in group I and 6 cases in group II. Wound discharge was serous in 4 in group I and 7 in group II and purulent in 3 in group I and 4 in group II patients.

It is recommended to administer antimicrobial prophylaxis in clean, contaminated cases. When administered at an appropriate time and dosage before an incision, prophylactic antibiotics help ensure that therapeutic tissue levels are reached.[15,16]

LIMITATIONS OF THE STUDY

The antibiotics used in various studies were not consistent throughout all of the clinical trials that were analysed. The second limitation was the significant discrepancy in the number of cases between the intervention and control groups throughout several trials.

CONCLUSION

Authors found that prophylactic single-dose antibiotics have been demonstrated to be more effective in lowering hospital stays and surgical site infections than empirical post-operative therapy.

ACKNOWLEDGEMENT: The authors would like to acknowledge the entire faculty and staff members of the Department of General Surgery, Narayan Medical College and Hospital, Jamuhar, Sasaram, Bihar, Indiafor their valuable support and time-to-time suggestions in undertaking the present study. Dr. Balbodh Singh,gave study design, data collection, and analysis, and Dr. Ashok Kumar Lalhelped with manuscript drafting, manuscript revision, data collection, and analysis.

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