



“A STUDY COMPARING PRE-OPERATIVE PROPHYLACTIC INTRAVENOUS ANTIBIOTIC WITH COMBINED INTRAVENOUS AND INTRA-INCISIONAL ANTIBIOTIC ADMINISTRATION FOR REDUCING SURGICAL SITE INFECTION IN A TERTIARY CARE HOSPITAL”

General Surgery

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ABSTRACT

Introduction: Surgical site infection (SSI) is one of the major causes for postoperative morbidity & mortality. Initially, the antibiotics were only administered post-operatively for treatment of already established SSI. The search for alternative modes of administration of prophylactic antibiotics was started so as to affect a further decrease in the rate of wound infection. This study was undertaken to evaluate the role of pre-operative intra-incisional and intravenous antibiotic administration in prevention of SSI.

Objectives of the study: To study the comparative efficacy of pre-operative prophylactic intravenous antibiotics with combined intravenous and intra-incisional antibiotic administration in reducing SSI.

Materials and Methods: This is a time bound prospective cohort study, conducted at Major OT of General Surgery, of a tertiary care hospital, VIMS, Ballari from December 2014- May 2016. 100 (50 in each group) patients satisfying inclusion & exclusion criteria are enrolled in the study.

Results: On comparison of incidence of SSI in Group A and B, it was found that 12 out of 50 (24%) patients in Group A & 2 out of 50 (4%) in Group B developed SSI, the incidence of SSI was less in Group B compared to Group A. On statistical analysis, the difference between the Group B & the Group A was significant.

Conclusion: Preoperative intra-incisional antibiotics significantly reduces the rate of SSI because of the higher concentration achieved at the incision site & theoretically makes it a better & alternative safe mode of administration.

But, this can be established in a larger study where factors like concentration of the antibiotic in the blood and at incisional site at various intervals, affinity of the antibiotic to adipose tissue are also studied.

KEYWORDS

Intra-incisional antibiotic, prophylactic antibiotic, surgical site infection.

INTRODUCTION

Surgical infection, particularly surgical site infection (SSI), has always been a major complication of surgery and trauma and has been documented for 4000–5000 years.¹

The prevention of bacterial contamination of the wound should be best achieved by the presence of very high levels of the appropriate antibiotic in the tissues throughout the course of the operation, so that organisms introduced into the wound during the operation would be destroyed immediately. Polk² has emphasized that wound levels, not blood or serum levels, appear to determine the efficacy of agents for prophylaxis of operative wound infection.

So this study was under taken to compare efficacy of combined intravenous and intra-incisional antibiotics with intravenous antibiotics

OBJECTIVES OF THE STUDY

To study the comparative efficacy of pre-operative prophylactic Intravenous antibiotics with combined Intravenous and Intra-incisional antibiotic administration in reducing surgical site infection.

MATERIALS AND METHOD

This is a time bound prospective cohort study, conducted at Major OT of General Surgery, of a tertiary care hospital, VIMS, Bellary from December 2014- May 2016.

SOURCE OF THE DATA

The study was set up in Vijayanagar Institute of Medical Sciences, Bellary. This study includes operations of general surgery which was conducted at Major O.T of Vijayanagar Institute of Medical Sciences, Bellary from December 2014- May 2016.

Method of collection of data (including sampling procedure, if any):

Source of data is from the patients being operated in the surgical Major OT & admitted for the same in the hospital from December 2014- May 2016.

All the patients satisfying inclusion & exclusion criteria are enrolled in the study & are put through a predesigned proforma of clinical details (clinical data, examination findings) & investigations (routine culture/sensitivity) & those giving a valid written informed consent for

the study are enrolled for the same. Duration of the hospital stay is noted.

SAMPLE SIZE

100 cases (50 in each group) admitted & undergoing operations at Major OT of general surgery, VIMS Ballari from December 2014- May 2016.

STUDY DESIGN

Hospital based Prospective Cohort study

INCLUSION CRITERIA

1. Patients in age group of 15–65 yrs.
2. Procedures that lasted for less than 2 hours clean and clean contaminated surgical procedures.
3. Patients willing to be included in the study

EXCLUSION CRITERIA

1. Patients with Diabetes mellitus, immunocompromised and those on steroid therapy.
2. Patients not willing for participation in the study.

Group A: A single dose of 1 gram of Ceftriaxone was administered intravenously 20 minutes before the surgical incision at the time of induction of anaesthesia.

Group B: Prophylaxis by both Intravenous and intra-incisional infiltration of the antibiotic.

One day prior to the surgery, test dose of antibiotic was given intradermally to exclude hypersensitivity reactions. The antibiotic was infiltrated along the incisional site 20 min before the surgery. Standardization of incision was done for all the cases being operated.

The dose of antibiotic used for infiltration was 1 gram of Ceftriaxone dissolved in 10 ml of distilled water & it was infiltrated uniformly 1cm circumferentially around all the margins of the planned incision with a disposable syringe and 21 G needle in subcutaneous tissue plane.



Color Plate 3. Antibiotic being infiltrated into subcutaneous space

Operation site was covered by occlusive dressings for 72 hours, when first inspection of the suture site was carried out. Swabs taken from the infected wounds site were sent to the Department of Microbiology to isolate the infecting organism and know their sensitivity and resistance patterns.

Occlusive dressing was done daily with povidone iodine cases with SSI. Wound complications were documented as per Centers for Disease Control and Prevention (CDC) guidelines.

Data were analysed using software SPSS v23.0. and Windows Microsoft Office 2007.

RESULTS

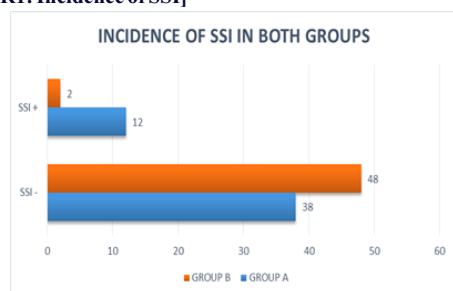
The present study was conducted in the Department of Surgery with 100 patients, 50 received only Intravenous antibiotic (ceftriaxone) Group A & other 50 who received Combined Intravenous with Intra-incisional antibiotic (ceftriaxone) Group B & comparing the Incidence of SSI in both Groups. The following results were obtained.

1. INCIDENCE OF SSI IN BOTH GROUPS

On comparison of incidence of SSI in Groups A and B, it was found that twelve out of 50 (24%) patients in Group A and two out of 50 (4%) in Group B developed SSI. The incidence of SSI was less in Group B as compared to Group A. On statistical analysis, the difference between the Group A and Group B was significant (P value- 0.04).

	SSI -	SSI +	TOTAL
GROUP A	38(76%)	12(24%)	50
GROUP B	48(96%)	2(4%)	50
TOTAL	86(86%)	14(14%)	100
P value – 0.04			

[Table R1: Incidence of SSI]



[Fig R1: Incidence of SSI in both groups]

2. AGE DISTRIBUTION:

Out of 50 patients in Group A, 24(48%) were in the age group of 36-65 years, and 26(52%) were aged below 35 years. Out of 50 patients in the Group B, 17(34%) were in the age group of 36-65 years, and 33(66%) were aged below 35 years.

These observations are shown in Tables R2.

Age group	Groups		Total
	A	B	
<35 years	26	33	59
36 – 65 years	24	17	41
Total	50	50	100

[Table R2: Age Distribution]

3. SEX DISTRIBUTION:

Out of 50 patients in Group A, 10(20%) were females and 40(80%) were males. Out of 50 patients in Group B, 21(42%) were females and 29(58%) were males. In total, out of 100 patients enrolled for the study, 31 (31%) were females & 69(69%) were males.

These observations are shown in Table R3.

Gender	Groups		Total
	A	B	
Female	10	21	31
Male	40	29	69
Total	50	50	100

[Table R3: Sex Distribution]

5) TOTAL NUMBER OF CASES:

Out of 50 patients in the Group A, 26 were Inguinal hernia (R/L), 9 were Acute appendicitis, 3 Incisional hernia, 4 Recurrent appendicitis & Others 8.

Out of 50 patients in the Group B, 13 were Inguinal hernia (R/L), 30 were Acute appendicitis, 4 Recurrent appendicitis & others 3.

These observations are shown in Table R5.

Diagnosis	Groups		Total
	A	B	
Inguinal hernia	26	13	39
Acute appendicitis	9	30	39
Incisional hernia	3	1	4
Recurrent/chronic appendicitis	4	4	8
Others	8	2	10
Total	50	50	100

DISCUSSION

Out of the 100 patients who participated in the study, 31 (10 among Group A and 21 among Group B respectively) were females, and 69 (40 among Group A and 29 among Group B respectively) were males. A study done by Hartemann-Heurtier A et al.,³ has ruled out differences in gender to be risk factor in acquiring infections. These have been depicted in Table R2 respectively.

On comparison of incidence of SSI in Groups A and B, it was found that 12 (24%) out of 50 patients in Group A and 2 (4%) out of 50 in Group B developed SSI. The incidence of SSI was less in Group B as compared to Group A. This shows that intra-incisional mode of administration may be more effective than I.V antibiotic. This compares favourably with the study carried out by Pollock AV et al.,⁴ where, a total of 624 consecutive eligible patients undergoing abdominal operations received a single preoperative dose of amoxicillin/clavulanic acid (1.2 g Augmentin) for the prophylaxis of surgical wound infection. The incidence of wound infections was considerably lower in the group, who were given the antibiotic into the abdominal wall (8.4% compared with 15.9%; chi square = 7.90, P = 0.005).

The study carried out by Greenall et al.,⁵ where the effect of intravenous and intra-incisional Cephaloridine was compared, both modes were found to be equally efficacious.

In another study, carried out by Dixon and Armstrong,⁶ where 205 patients who underwent elective and emergency operations upon the gastrointestinal tract and considered to be at risk of SSI, were randomized prospectively into three groups, the control group not receiving any antibiotics, and in the two test groups one receiving 1 gram of Cephmandole intravenously and the other intra-incisionally. The study showed that the intra-incisional infiltration is more efficacious than IV administration.

The study carried out in India by Bhaskar et al.,⁷ in which both, intra venous as well as intra-incisional antibiotic administration was employed pre operatively, it was found to be more effective and statistically significant. ($\chi^2 = 10.414$, $P < 0.01$) in reducing the incidence of SSI. In this study also the combination of intravenous and intra-incisional administration of antibiotic pre operatively has shown statistically significant value (p value- 0.04) comparing favourably with the above study.

CONCLUSION

The results from the study provided the following conclusions:

- 1) Significant reduction in incidence of SSI in the group, which received both Intra incisional and IV antibiotics preoperatively than the group which received only IV antibiotics.
- 2) Intra-incisional route for antibiotics delivery is safe and more effective when compared to intravenous antibiotics with no side effects which can be studied with other antibiotics too.

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