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ORIGINAL RESEARCH

Surgical site infection: Comparison of culture and sensitivity findings

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ABSTRACT
SSIs are infections of the tissues, organs, or spaces exposed by surgeons during performance of an invasive procedure. SSIs are classified into incisional and organ/space infections, and the former are further sub classified into superficial (limited to skin and subcutaneous tissue) and deep incisional categories. The patients were divided into two groups: **Group A:** Prophylaxis by systemic (intravenous) infiltration of the antibiotic. **Group B:** Prophylaxis by both systemic (intravenous) and intra-incisional infiltration of the antibiotic. The first patient was allocated to group A. The second patient to group B, the third one to group A and so on so forth till we achieved our desired number of subjects in both the groups. In Group 1, growth was seen in 7 patients. 1 (1.7%) patient had E. coli, 1 (1.7%) patient had pseudomonas and 5 (8.3%) patients had staphylococcus MRSA. In Group 2, only 1 (1.7%) patient had staphylococcus MRSA growth. In Group 2 majority of the patients did not have any growth on culture. Larger proportion of patients in Group 1 showed growth of organism in comparison to the Group 2, which was statistically significant ($p<0.05$).

Key words: Surgical site infection, culture and sensitivity

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INTRODUCTION

The infection of a wound can be defined as the invasion of organisms through tissues following a breakdown of local and systemic host defences, leading to cellulitis, lymphangitis, abscess and bacteraemia[1].

The infection of most surgical wounds is referred to as superficial surgical site infection (SSI). The other categories include deep SSI (infection in the deeper musculofascial layers) and organ space infection (such as an abdominal abscess after an anastomotic leak)[2].

Pathogens resist host defences by releasing toxins, which favour their spread, and this is enhanced in anaerobic or frankly necrotic wound tissue.

SSIs are infections of the tissues, organs, or spacesexposed by surgeons during performance of an invasive procedure. SSIs are classified into incisional and organ/space infections, and the former are further sub classified into superficial (limited to skin and subcutaneous tissue) and deep incisional categories[3].

If antibiotics are given empirically, they should be used when local wound defences are not established (the decisive period).

Ideally, maximal blood and tissue levels should be present at the time at which the first incision is made and before contamination occurs. Intravenous administration at induction of anaesthesia is optimal[4].

In long operations, those involving the insertion of a prosthesis, when there is excessive blood loss or when unexpected contamination occurs, antibiotics may be repeated 8 and 16 hours later.

The choice of an antibiotic depends on the expected spectrum of organisms likely to be encountered, the cost and local hospital policies, which are based on experience of local resistance trends.

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METHODOLOGY

STUDY DESIGN

The Present study was a prospective, descriptive, comparative, case series study.

STUDY POPULATION

All patients admitted to department of general surgery.

SAMPLE SIZE AND SAMPLING TECHNIQUE

Dogra *et al.* (2013)[5]in their studyreporteda proportional difference ofsurgical site infection between the two groupstobe 15.5%.Basedon this proportionaldifferencewehavecalculatedoursamplesize . Sample size calculation revealed that 57 patients per group will be required to detect a proportional difference of 15.5% between two groups, at an alpha of0.05 with power of 80%.

P values < 0.05 were considered to indicate statistical significance. Hence, we took 60 patients per group.

GROUPING

The patients were divided into two groups:

GROUP A: Prophylaxis by systemic (intravenous) infiltration of the antibiotic.

GROUP B: Prophylaxis by both systemic (intravenous) and intra-incisional infiltration of the antibiotic.

The first patient was allocated to group A. The second patient to group B, the third one to group A and so on so forth till we achieved our desired number of subjects in both the groups.

FOLLOW-UP PERIOD

10 days (till the day of suture removal).

INCLUSION CRITERIA

1. Patients in age group of 25-65 years.
2. Patients of either gender.
3. Procedures that lasted for less than 2 hours clean and clean contaminated surgical procedures.
4. Patient and/or his/her legally acceptable representative willing to provide their voluntary written informed consent for participation in the study.

EXCLUSION CRITERIA

1. PatientswithDiabetesmellitus,immunocompromisedandthoseon steroid therapy.
2. Patient and/or his/her legally acceptable representative not willing to provide their voluntary written informed consent for participation in the study.
3. Pregnant women.
4. Patients with bleeding disorders and on anticoagulant treatment.
5. Antibiotics related complications (known hypersensitivity).

RESULTS

Table 1a): Comparison of Culture and Sensitivity Findings

(N=120)

Culture and Sensitivity Findings	Group 1 (n=60)		Group 2 (n=60)	
	No.	%	No.	%
No growth	53	88.3	59	98.3
E. Coli	1	1.7	0	0.0
Pseudomonas	1	1.7	0	0.0
Staph. MRSA	5	8.3	1	1.7
Total	60	100.0	60	100.0

Table 1b): Comparison of Culture and Sensitivity Findings

(N=120)

Culture and Sensitivity Findings	Group 1 (n=60)		Group 2 (n=60)		Z Value	P Value
	No.	%	No.	%		
No growth	53	88.3	59	98.3		
Growth seen	7	11.7	1	1.7	2.24	0.025*
Total	60	100.0	60	100.0		

Z test for two sample proportion. P = 0.025, Significant

The above table shows the comparison of culture and sensitivity findings in both the groups.

In Group 1, growth was seen in 7 patients. 1 (1.7%) patient had E. coli, 1 (1.7%) patient had pseudomonas and 5 (8.3%) patients had staphylococcus MRSA.

In Group 2, only 1 (1.7%) patient had staphylococcus MRSA growth.

In Group 2 majority of the patients did not have any growth on culture.

Larger proportion of patients in Group 1 showed growth of organism in comparison to the Group 2, which was statistically significant (p<0.05).

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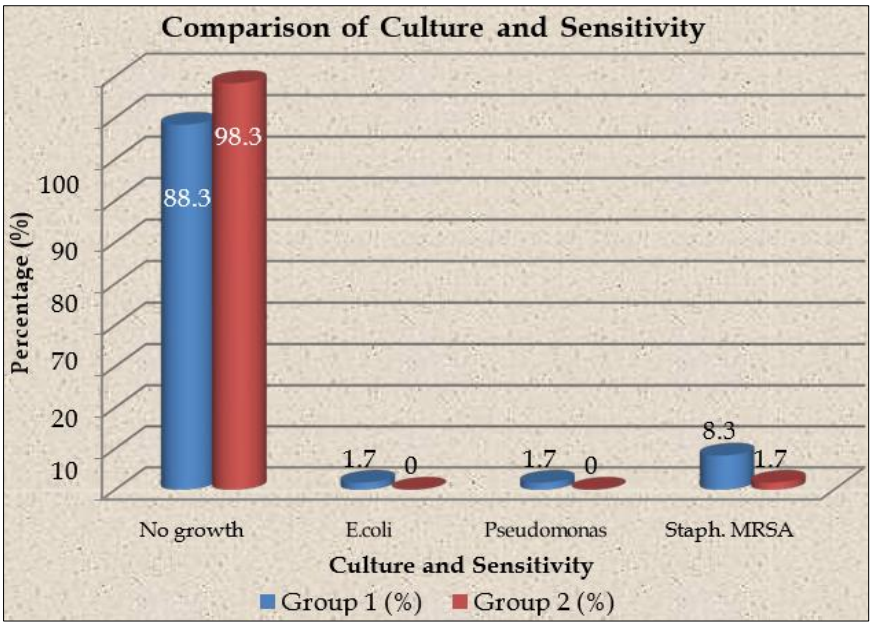


Graph 1: Bar diagram showing distribution of patients according to culture and sensitivity

Table 2: Distribution according to need for resuturing

(N=120)

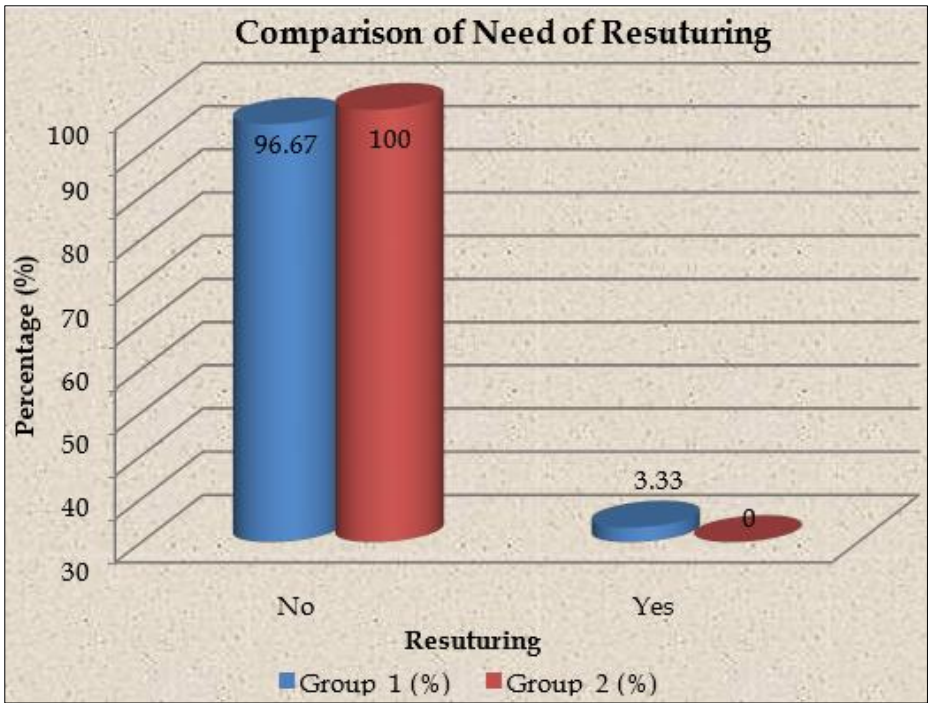
Resuturing	Group 1 (n=60)		Group 2 (n=60)	
	No.	%	No.	%
No	58	96.67	60	100.0
Yes	2	3.33	0	0.00
Total	60	100.0	60	100.0

$\chi 2=2.034$, df=1, P value = 0.154, Not significant

The above table shows the comparison need for resuturing in both the groups.

In Group 1, 2 (3.33%) patients required resuturing, while in Group 2 none of the patients required any resuturing.

There was statistically no significant difference in need for resuturing in both the groups (P>0.05).



Graph 2: Bar diagram showing distribution of patients according to need of resuturing

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Table3: Distribution according to additional antibiotics requirement

(N=120)

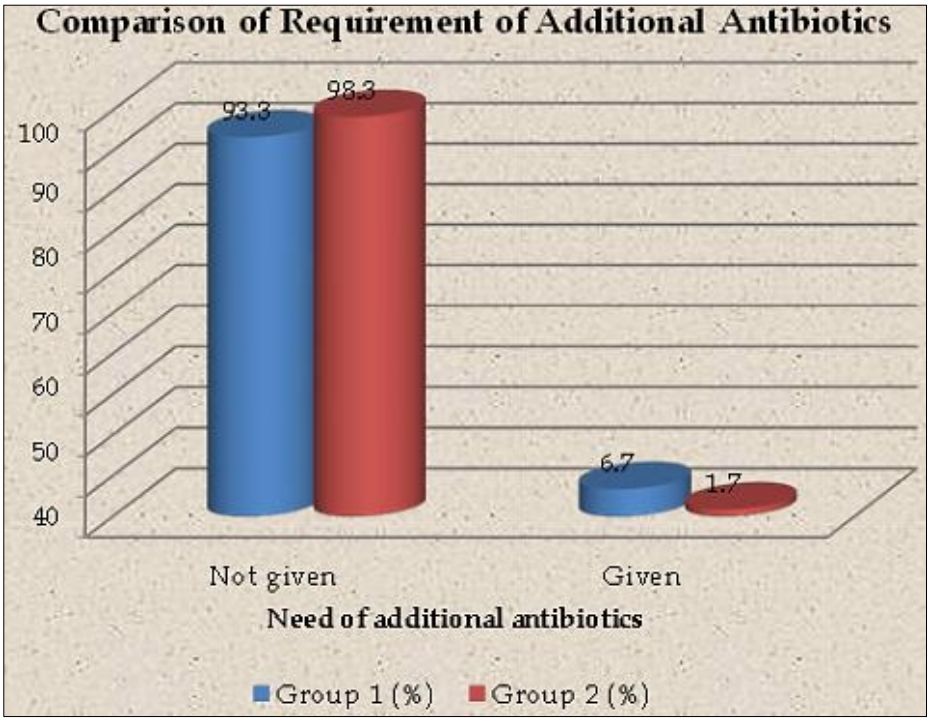
Additional Antibiotics Requirement	Group 1 (n=60)		Group 2 (n=60)	
	No.	%	No.	%
Not given	56	93.3	59	98.3
Given	4	6.7	1	1.7
Total	60	100.0	60	100.0

$\chi 2=1.878$, df=1, P value = 0.171, Not significant

The above table shows the need for additional antibiotics requirement in both the groups.

In Group 1, additional antibiotics were given in 4 (6.7%) patients and in Group 2, additional antibiotics were given in 1 (1.7%) patient.

Therewasstatisticallynosignificantdifferenceinneedfor additional antibiotics requirement (P>0.05).



Graph 3: Bar diagram showing distribution of patients according to requirement of additional antibiotics

DISCUSSION

In our study we found that in Group 1, SSI was present in 7 (11.7%) patients and in Group 2 it was present in 1 (1.7%) patient. There was a significantly higher number of patients of SSI in group 1 in comparison to the Group 2 ($p<0.05$). Similar study by Dogra *et al*. (2013)[5] found that there was also significant reduction in incidence of SSI in the group, which received both intra incisional and intravenous antibiotic(2.5%) preoperatively than the patients who received only intravenous (10%) and only intra incisional (18%)antibiotic. So also study by Pollock *et al*. (1989)[6] showed. The incidence of wound infections was considerably lower in the group which received the antibiotic into the abdominal wall (8.4% compared with 15.9%-chi 2 = 7.90, P= 0.005). Another study by Pollock *et al*.(1981)[7] showed there was no significant differences between the two groups in the rates of major (3.5% and 2.1%) or minor (12.4% and 15.5%) wound sepsis incidence. Taylor *et al*. (1985)[8] found that there was one wound infection in the group treated with preoperative intraincisional administration of cefamandole whereas 18 occurred in the control patientswith no antibiotic (P<0.001).Dixon *et al*. (1984)[9] found a significant reduction in the frequency of wound infections in patients receiving preincisional antibiotics over intravenous and group with no antibiotic. Griego *et al*. (1998)[10]found that 2.5% of SSI occurred in thegroup with no antibiotic, while only 0.2% occurred in the nafcillin group. This difference was highly significant (P = .003).

Also in Group 1, additional antibiotics were given in 4 (6.7%) patients than in Group 2, in 1 (1.7%) patient. But there was statistically no significant differences in need for additional antibiotics requirement (P>0.05). Similarly in Group 1, 2 (3.33%) patients required resuturing, while in Group 2 none of the patients required any resuturing. Hence there was statistically no significant difference in need for resuturing in both the groups (P>0.05). In Group 1, growth was seen in 7 patients. 1 (1.7%) patient was having E. coli, 1 (1.7%) patient was having pseudomonas and 5 (8.3%)

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patients had staphylococcus MRSA. Whereas in Group 2, only 1 (1.7%) patient had staphylococcus MRSA growth. i.e. larger proportion of patients in Group 1 showed growth of organism in comparison to the Group 2, which was statistically significant (p<0.05).

Given the absence of any evidence on efficacy and safety, this practice cannot be recommended to date, and it should be definitively be banned for aminoglycosides. However, it may deserve further research for time-dependent antibiotics because it could offer several advantages compared to other parenteral routes, especially Cephalosporins.

But we could not find any study pertaining with subcutaneous administration of SBT/CPZ in reducing SSI as far as our knowledge is concerned.

But in an animal study they found that: Plasma elimination half-life after parenteral administration in mouse, rat, rabbit, dog, monkey and man was 8to 120 minutes. No significant differences were seen in plasma elimination half-life between intramuscular, intravenous, subcutaneous and intraperitoneal administration. Committee For Veterinary Medicinal Products Cefoperazone Summary Report (1998)[11].

To compare the efficacy and safety of intramuscular cefoperazone and intramuscular ceftriaxone in the treatment of nursing home-acquired pneumonia in the nursing home setting and concluded, Intramuscular cefoperazone and intramuscular ceftriaxone are safe and effective in the treatment. Phillips *et al*. (1993)[12].

The advantages of the combination of cefoperazone plus sulbactam over cefoperazone alone include a prolonged half-life, a prolonged post-antibiotic effect, and a broadened spectrum of activity against microorganisms, including gram-negative bacilli, gram-positive cocci, and anaerobes. The combination of cefoperazone plus sulbactam has been shown to be clinically effective in the treatment of infections in immunocompetent hosts as well as those with concomitant hematologic malignancies.

As SBT/CPZ was choosen in regard with similar studies present with cephalosporins and SBT/CPZ has long half-life (single dose justified within 24 hrs) and also because of its known effectiveness against a wide range of wound pathogens, including obligate anaerobes, at concentrations likely to be present locally. The simultaneous measurement of serum, wound tissue edges, and wound fluid antibiotic concentration of SBT/CPZ in the risk ofinfection patients undergoing surgery has not been reported, to our knowledge.

CONCLUSION

In Group 1, growth was seen in 7 patients. 1 (1.7%) patient was having E. coli, 1 (1.7%) patient was having pseudomonas and 5 (8.3%) patients had staphylococcus MRSA. Whereas in Group 2, only 1 (1.7%) patient had staphylococcus MRSA growth. i.e. larger proportion of patients in Group 1 showed growth of organism in comparison to the Group 2, which was statistically significant (p<0.05).

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