

SINGLE DOSE ANTIBIOTIC PROPHYLAXIS VERSUS CONVENTIONAL ANTIBIOTIC THERAPY IN CLEAN AND CLEAN-CONTAMINATED SURGERIES

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ABSTRACT

Background- Antibiotics play an important role in the post-operative management of surgical patients due to high incidence of surgical site infection [SSI]. SSIs impact both the patient and health care system through increased mortality and morbidity, prolonged hospital admission and additional treatment cost. This study aims to prove that single-dose antibiotic prophylaxis is as effective as conventional antibiotic therapy in reducing SSIs in clean and clean-contaminated surgeries

Material and Methods: A total of 140 patients were divided into two groups with 70 patients in each group. All patients planned for surgery were given Inj. Ceftriaxone 1gm+sulbactam 500mg ,30 min before surgery. In the control group, the patients were given an additional injection of ceftriaxone 1g + Sulbactam 500mg twice a day for the first 3 postoperative days followed by oral cefixime 200mg twice a day for the next 5 days. The outcome in terms of post-op fever, surgical site infection and other related complications were studied.

Results: In This study, 47.8% of patients were female, and 52.1% of patients were male. In Group-A, patients having post-operative seroma, fever, SSI and leucocytosis were 7.14%, 4.2%,2.8% and 2.8% respectively. In Group B, patients having post-operative seroma, fever, SSI and leucocytosis were 1.4%, 7.14%,1.4% and 2.8% respectively. There is no statistically significant difference between the two groups regarding postoperative seroma, fever, SSI and leucocytosis.

Conclusion: Prophylactic single-dose antibiotic is effective in prevention of surgical site infection and is cost-efficient for patients undergoing clean and clean-contaminated surgeries.

Keywords: Antibiotics, Conventional Therapy, Prophylaxis, Surgical Site Infection.

INTRODUCTION

Preoperative antibiotic prophylaxis is administering antibiotics before surgery to decrease the risk of postoperative infections. Infectious complications range from mild to severe, and sometimes fatal. These include fever, surgical site infection, urinary tract infection, thrombophlebitis, sepsis, and septic shock.

Having therapeutic tissue levels of antibiotics is the aim of the administration of preventive antibiotics, Instead of sanitizing the tissue.

Antibiotic therapy before the skin incision is intended to reduce the intraoperative microbial load, allowing the host immune response to control the admission of a lesser load of potential microorganisms. To do this, broad-spectrum intravenous antibiotics are administered prior to surgery so that peak serum and tissue concentration are reached within 30 minutes [1].

The benefit of prophylaxis is diminished or eliminated by delayed administration. To maximize tissue and blood concentrations at the surgical site, antibiotic administration 20–30 minutes prior to the surgical incision seems ideal.

This study was conducted to assess whether single-dose pre-incision antibiotic prophylaxis can be as effective as multiple doses for clean and clean-contaminated surgeries in a tertiary care center catering to rural patients with low socioeconomic status.

MATERIALS AND METHODS

The current study is a prospective comparative study conducted in XXXXXXXX, DEPARTMENT OF GENERAL SURGERY, from JANUARY 2022 TO JUNE 2022. Patients were selected as per inclusion and exclusion criteria and divided into 2 groups.

INCLUSION CRITERIA

- Age > 13 Years
- Clean And Clean-Contaminated Cases
- Informed Consent

Exclusion Criteria

- Age < 13 Years
- Immunocompromised State
- Dirty Cases
- Emergency Cases
- Patients With Diabetes Mellitus
- Patients With A History Of Recent Infections.
- Malnutrition.

A total of 140 patients who were planned for clean and clean-contaminated surgeries eg. Open hernioplasty, laparoscopic cholecystectomy, and laparoscopic/open appendectomy are divided into two groups. All were operated on by a single surgeon with a similar technique.

Group a – single dose antibiotics group,70 patients

Group b – multiple-dose antibiotics group,70 patients

Approval for the study was taken from the institutional ethical committee. Patients were informed in their mother tongue about the procedure and its risks and benefits, and written informed consent was obtained from the patients

Group A received a single-dose antibiotic injection of ceftriaxone 1 gram+ sulbactam 500mg given intravenously 30 minutes before the surgery since it is a broad-spectrum antibiotics. Group B received an injection of ceftriaxone 1g + sulbactam 500 milligrams intravenously 30 minutes before the surgery, followed by an injection of ceftriaxone 1g + Sulbactam 500mg twice a day for the first 3 postoperative days followed by oral cefixime 200mg twice a day for the next 5 days

Before the surgery, the operative site was clipped with aseptic, all patients were asked to take a bath with soap on the day of surgery, Standard surgical scrub for 5-10 min was given.

Ryles tube and urinary catheter were placed in patients in whom general anesthesia was administered and was removed within 6 hours after surgery, and patients were observed for any complications such as fever and surgical site infection. The temperature was recorded daily two times a day and check dress was done on post-op days 3,5 and 7. Suture removal was done on post-op day 7.

Complete blood count was done for all the patients on post op day 3. patients having leukocytosis were recorded.

Table 1: Spectrum Of Surgeries

PROCEDURES	GROUP A	GROUP B
Ventral Hernia – Mesh Repair	10	10
Laparoscopic Cholecystectomy	10	10
Lichtenstein Hernioplasty	26	26
Open Appendicectomy	10	10
Jaboulay's Procedure For Hydrocele	8	8
Nissen Fundoplication	1	1
Thyroidectomy	1	1
Lipoma Excision	4	4

STATISTICAL TOOLS

Data was compiled using MsExcel and analysis was done with the help of IBM SPSS software version 20. Observed parameters were analysed using Pearson's Chi-square test/Fisher's exact test. P value of less than 0.05 was considered as significant.

RESULTS

Distribution of age and gender

In our study, 47.8% of patients were female, and 52.1% of patients were male. the mean age of patients was 52.24 years and the maximum number of patients belongs to age between 51-60 years of age. The Association of Age in years with the group was not statistically significant [p=0.89] and the association of gender with the group was also not statistically significant [p=0.3006].

Table 2: Association between age with study groups

Age in years	Group A	Group B	Total	P value
≤30	6	5	11	
>30-40	9	7	16	0.89
>40-50	15	18	33	
>50-60	22	25	47	
>60-70	12	8	20	
>70	6	7	13	

Table 3: Post-operative morbidity

Parameter	Study group(n=70)		Control group(n=70)		P value
	frequency	percentage	frequency	percentage	
Seroma formation	5	7.14	1	1.4	0.09
Post op fever	3	4.2	5	7.14	0.46
Superficial SSI	2	2.8	1	1.4	0.55
Post op leukocytosis (>11000/cumm)	2	2.8	2	2.8	1.0

In Group-A, 7.14% of patients and in Group B, 1.4% of patients had seroma formation. The Association of post-operative seroma formation between group A and group B was not statistically significant [p=0.09].

In group A 4.2% of patients and 7.14% of patients in group B had post-operative fever. The Association of post-operative fever between group A and group B was not statistically significant [p=0.46].

In group A 2.8% of patients and 1.4% of patients in group B had superficial surgical site infection. The Association of superficial surgical site infection between group A and group B was not statistically significant [p=0.55].

In group A 2.8% of patients and 2.8% of patients in group B had post-operative leukocytosis. The Association of post-operative leukocytosis between group A and group B was not statistically significant [p=1.0].

DISCUSSION

With this study we desire to prove that single-dose pre-incision antibiotic prophylaxis is equally effective as conventional multiple-drug therapy. Preoperative systemic prophylactic antibiotics is administered to have a high antibiotic concentration in the tissue at the start and during surgery.

The most common organisms implicated as causes of surgical site infections include[2]:

- Staphylococcus aureus
- Staphylococcus epidermidis

- Aerobic streptococci
- Anaerobic cocci

Preoperative antibiotics are chosen based on the-

- Cost
- Safety
- Pharmacokinetics
- Bactericidal activity
- Spectrum
- Type of surgery
- Hospital resistance patterns.

Apart from prophylactic antibiotics,

- Proper skin preparation
- Clipping of hair
- Operating room discipline
- Clean air in the operating room
- Clean instruments

Play a major role in preventing surgical site infection [3]

The route of administration is intravenous in most of antibiotics.

Antibiotics should be given 30 -60 min before the incision. Redosing should be done in case of long surgeries after 4 hours of the first dose. Weight-based dosing is recommended.

Unless it is indicated, prophylactic antibiotics should be discontinued within 24 hours to avoid alteration of hospital and patient bacterial flora. As per the guidelines from the CDC additional prophylactic antibiotics should be avoided after the surgical incision is closed in clean and clean-contaminated procedures.

All antibiotics are to be given after sensitivity testing to avoid any allergic reaction, patient's allergy history and drug contraindications should always be kept in mind before administration

This study proves that single-dose pre-incision antibiotic prophylaxis is equally effective as multiple drugs.

In a study by Bhattachan et al in Nepal which included both elective and emergency caesarean sections, wound infection rate was 1% and 0% in a single dose and multiple doses respectively with post-op fever 2% and 6% in single versus multiple doses respectively.[4]

In our study post, op fever in single and multiple dose were 4.2% and 7.14% respectively, the higher febrile morbidity in multi-dose group can be possibly explained by the prolonged use of intravenous cannula which acts as a source of infection or can lead to phlebitis. [5]

Jogdand S et al. studied 183 clean surgical procedures with single dose antibiotics and found that the multiple-dose antibiotics requirement after surgery was reduced. [6]

Borade S et al.in his study used Single dose antibiotic prophylaxis in elective surgery to prevent surgical site infection and reported 3% of superficial surgical site infections implying that single preoperative dose of antibiotic Cefuroxime is sufficient to prevent surgical site infection in elective case[7]. In our study superficial surgical site infection is 2.8% and 1.4% for single and multi-drug group with an insignificant p value.

LIMITATION

- All varieties of clean and clean-contaminated surgeries were not included in this study.
- Only IV ceftriaxone+ sulbactam was used as a prophylactic drug before surgery. This was a single-centre study whereas the choice of antibiotics may vary from center to center according to their infection control committee and resistance pattern.
- Patients were not followed up post discharge for infection related morbidities.
- Emergency surgeries were not included.

CONCLUSION

In our study, there is no significant difference between single dose and multiple dose antibiotic prophylaxis in prevention of SSI in patients for elective clean and clean contaminated surgery. Single dose can be of great help to decrease the antibiotic resistant, along with proper aseptic precautions during surgery and proper sterilization of the operation theatre.

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