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Dr. Soundara Rajan
Professor and HOD,
Department of General
Surgery, Sree Mookambika
Institute of Medical Sciences,
Kulasekharam, Kanyakumari,
Tamil Nadu, India

Aswathy Harikumar
Junior Resident, Department
of General Surgery, Sree
Mookambika Institute of
Medical Sciences,
Kulasekharam, Kanyakumari,
Tamil Nadu, India

Sreelekshmi
Junior Resident, Department
of General Surgery, Sree
Mookambika Institute of
Medical Sciences,
Kulasekharam, Kanyakumari,
Tamil Nadu, India

Corresponding Author:
Dr. Soundara Rajan
Professor and HOD,
Department of General
Surgery, Sree Mookambika
Institute of Medical Sciences,
Kulasekharam, Kanyakumari,
Tamil Nadu, India

To assess the efficacy of single dose prophylactic antibiotics in preventing SSI after clean elective surgery

Dr. Soundara Rajan, Aswathy Harikumar and Sreelekshmi

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Abstract

Background: The role of prophylactic antibiotics in preventing surgical site infection (SSI) after surgeries like gastrointestinal, Orthopedics, and plastic surgical procedures are quite well known, although their efficacy in clean, elective major surgeries are still debatable. An effective antimicrobial prophylaxis that providing coverage throughout the entire procedure, not only reduces the risk of surgical site infections, but also of complications associated with it. Various studies have shown that appropriately-timed “single shot” antibiotic prophylaxis is as effective as multiple-dose prophylaxis.

Aim: To assess the efficacy of single dose prophylactic antibiotics in preventing SSI after clean, elective surgery.

Materials and methods: Patients planned for clean, elective surgeries were included in a prospective study which was conducted for a year in a tertiary centre. Post operatively, the patients were then assessed.

Results: Of the total 100 cases, 55 patients belonged to the female gender and 45 cases belonged to male gender. In this study, maximum number of patients belonged to the age group of 26 to 50 years, 48 cases belonged to 51 to 75 years, and single case belonged to the age group less than 25 years. Regarding the complication developed post surgically 7 cases were observed to develop purulent discharge from the surgical site and about 7 other cases developed seroma and discharge. Of the 100 cases, 4 cases were discharged on the first postoperative day, 86 patients were discharged on second or third post operative day. The rest were discharged on subsequent days.

Conclusion: Recent developments in the antibiotic prophylaxis, including the initial time of antibiotic administration, proper choice of antibiotic agent that cover all possible infective agents, the short duration of antibiotic treatment have proved to improve the efficacy of these drugs in surgical settings. A systemic regimen of a single dose of an appropriately selected cephalosporin given during the immediate preoperative period is safe and effective in clean elective surgeries.

Keywords: Surgical site infections, prophylactic antibiotics, single dose regimen

Introduction

One of the major source of illness in post operative patients are the surgical site infections, which often are the leading cause of death after surgical procedures. These often causes an increase in the morbidity and mortality of the patients. Moreover these infections result in longer duration of hospital stays and higher costs ^[1]. The advent of antibiotics did raise the hope of a permanent solution, though inadvertent usage of these have lead to the emergence of antibiotic resistant strains. The main objective of preoperative antibiotic prophylaxis is to prevent postoperative infections and further complications ^[2]. Rational use of antibiotic at the correct time, preferably at the time of induction of anesthesia, the appropriate choice of antibiotic agents have definitely played a pivotal role in preventing infections peri and post surgically ^[3].

Materials and Methods

A total of 100 patients, who attended the Department of Surgery, Sree Mookambika Institute of Medical Sciences, Kulasekharam who were planned for clean elective surgeries were included in this prospective study.

All the patients were examined clinically in detail, once a proper history was attained. Any comorbidities and risk factors associated were noted. History of previous surgeries if any was recorded. Once the clinical diagnosis was attained, patients were subjected to radiological examination and histopathological examinations if required, for the confirmation of the diagnosis.

They were then explained regarding the diagnosis and the need for surgery. Once the consent was obtained, all the preoperative investigations including the hematological investigations such as complete hemogram, blood profile, renal function tests, pre anesthetic check up was done and was planned for elective surgery. Post-surgery, the specimens were fixed in 10% buffered formalin and sent for histopathological examination. Patients were then followed up postoperatively for 5 days and the results were recorded. Statistical analysis was done using SPSS 23.0.

Results

Of the total 100 cases, 55 patients belonged to female gender and 45 cases belonged to male gender.

Gender	Major cases
Male	45
Female	55
Total	100

In this study, maximum number of patients belonged to the age group of 26 to 50 years, 48 cases belonged to 51 to 75 years, and single case belonged to the age group less than 25 years.

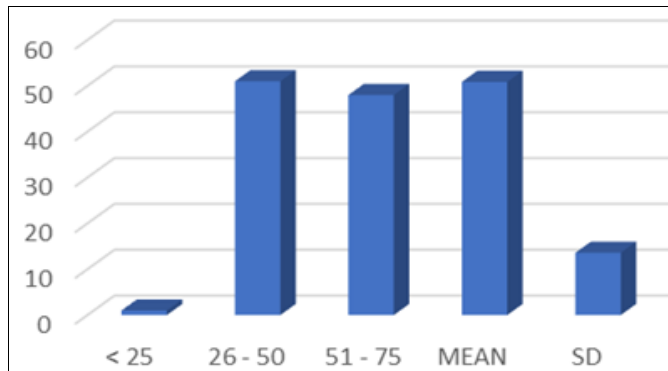


Fig 1: Major cases

Procedure	Major cases
Amputation	7
Appendectomy	2
Incisional hernia	4
Excision biopsy	7
Haemorrhoidectomy	9
Laparoscopic cholecystectomy	11
Fistulectomy	2
Inguinal hernioplasty	8
Rt modified radical mastectomy	13
Total thyroidectomy	12
Webster's procedure	4
Mesh repair	13
Others	8

Out of 100 cases, 13 cases of modified radical mastectomy, 13 cases of hernia mesh repair, 12 cases of total thyroidectomy, 11 cases of laparoscopic cholecystectomy, 9 cases of hemorrhoidectomy, 8 cases of inguinal hernioplasty, 7 cases of excision biopsy, 7 cases of amputation, 4 cases of incisional hernia, 4 cases of male gynaecomastia, 2 cases of appendectomy and fistulectomy each.

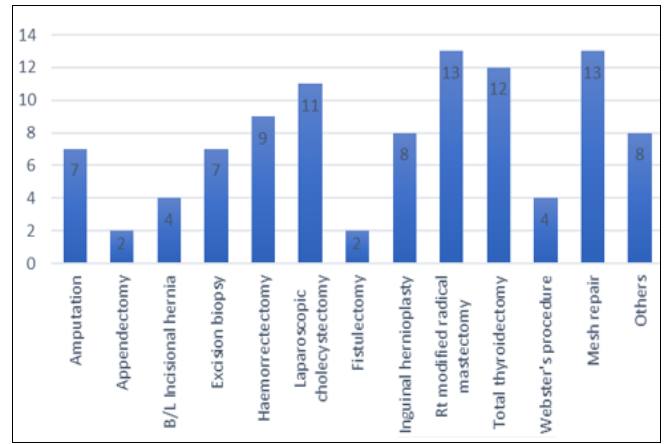


Fig 2: Major cases

Complications	Major cases
Pus Discharge POD	7
Seroma & discharge	7
Nil	86

Of the total 100 cases included in this study, 7 cases were observed to develop purulent discharge from the surgical site and about 7 other cases developed seroma and discharge post operatively. The remaining 86 patients were observed to have no infective episodes or any complications related to it.

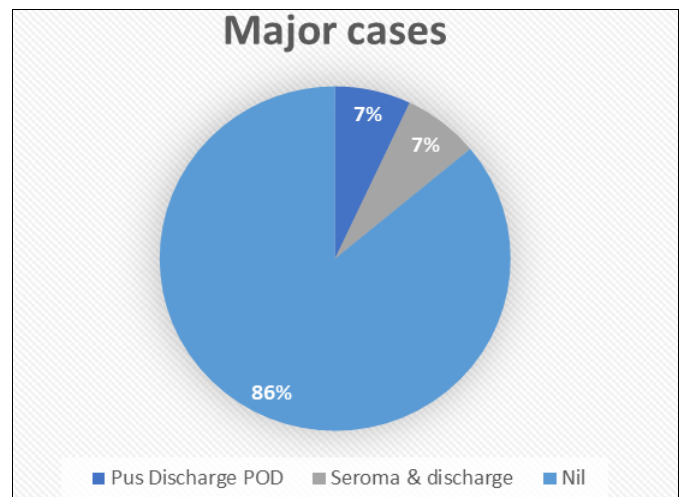


Fig 3: Show the pus and Seroma discharge

Hospital stay in days	Major cases
1	4
2 - 3	86
> 3	10
Mean	2.3

Of the total number of cases, 4 cases were discharged on the first postoperative day, 86 patients were discharged on second or third post-operative day. Around 10 patients were discharged on a later date due to development of infections, fever and for further follow up.

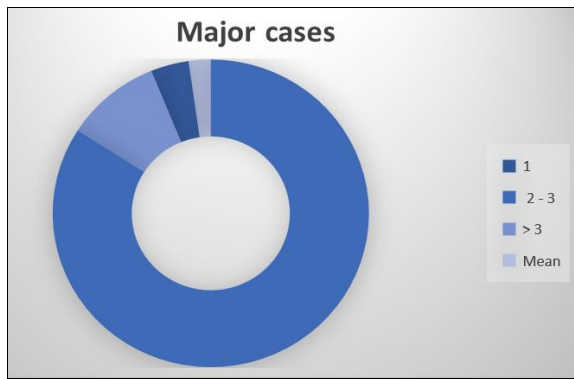


Fig 4: Show major cases

Discussion

In this study about 55 percent of the total population were of female gender. Elbur AI *et al.* [4] in 2013 in a study assessing the efficacy of prophylactic antibiotics, in order to identify risk factors for the occurrence of post-operative wound infection in general surgery found that out of the total of 540 patients recruited, 73.7% were females.

In this study, the maximum number of patients belonged to the age group of 26 to 50 years and with a mean age of 50 years. The youngest patient in the study was 20 years who underwent appendectomy and the oldest was 70 years who underwent Hernioplasty. In a study done by Ali SM *et al.* [5], the highest number of patients were found in to be in the age group of 3rd, 4th and 5th decade.

The maximum number of patients in this series were diagnosed with carcinoma breast and ventral hernias. Only about a small percentage of patients underwent appendectomy, inguinal hernioplasty, and Webster's procedure.

On postoperative follow ups, 14 percent of the total study group developed signs of infection. Of them 7 percent developed purulent discharge whereas the other 7 percent developed Seroma collection and discharge. In a similar study performed by Leuva HL *et al.* [6] reported 8% incidence of SSI postoperatively. All the patients in this study were followed up and 86 percent of the patients were discharged on second or third post operative day. Borade SV *et al.* [7] in their study reported that all the patients were discharged by 4 to 9 days post-operative.

In multiple different studies there has been enough evidence showing the effectiveness of single prophylactic antibiotic. Various studies have found no significant variances in surgical site infection rates after major surgeries with single-dose preoperative antibiotic compared with extended-duration regimens lasting from single day upto five days post operatively [8]. A study conducted by Bratzler DW *et al.* [9] suggested that for surgeries such as hernioplasty and herniorrhaphy, that a single dose regimen of a first-generation cephalosporin is sufficient. Another study performed by Zelenitsky SA *et al.* [10] showed that significantly fewer superficial SSIs were found in the single dose group compared with the multidose group in procedures lasting longer than 3.5 hours.

There are studies suggesting that the antimicrobial prophylaxis should be given only for a short duration possible to prevent surgical site infections [11, 12, 13].

Conclusion

Surgical site infections invariably increase the burden of the

disease that the patient is suffering from, even though with proper precautions and care it can be avoided to an extent. Various studies have shown that a single dose prophylaxis can reduce the financial burdens, the emergence of resistant strains and to avoid the side effects of these drugs. Moreover a single dose prophylactic antibiotic is efficient in reducing the surgical site infections in clean elective surgeries.

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