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Indian Journal of Microbiology Research

Journal homepage: <https://www.ijmronline.org/>

Original Research Article

Use of antibiotics in surgical setup in tertiary healthcare hospital

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ARTICLE INFO

Article history:

Received 15-12-2022

Accepted 18-01-2023

Available online 01-05-2023

Keywords:

Surgical site infections

Antimicrobial prophylaxis

Current trends

Failure rate

ABSTRACT

Surgical antimicrobial prophylaxis refers to brief course of an antimicrobial agent which is initiated just before surgery, to prevent any infections at the surgical site. It is one of the most widely accepted practices in surgery. However, despite the evidence of the effectiveness and the publication of guidelines for the antimicrobial prophylaxis, its use is often found to be suboptimal. However, between 30-90% of this prophylaxis is inappropriate.

Hence, this study was planned in order to examine the prevalent practices in the tertiary care hospital regarding the use of antimicrobials for surgical prophylaxis, with respect to the choice of the antimicrobial agent, the timing of its administration, the intraoperative reposing and the total duration of the prophylaxis, in order to detect any inappropriateness, so that corrective measures could be suggested.

A survey was conducted across the various departments undergoing surgery of 213 patients and was followed till their discharge. The age of patients varied from 5 to 85 years. Following risk factors were also included like anemia, smoking, alcohol, prolonged duration of surgery. All the cases in our study received prophylactic antimicrobials prior to surgery, even though prophylactic systemic antimicrobials are not typically indicated for the patients who underwent clean surgical site operations.

Though, this aspect was also the basis of forming two groups viz. group A and group B; this mode of treatment prior to surgery was found effective. Males are more prone to treatment failure, as suggested by the study. While recovery in females with the preliminary line of treatment continues in a positive way. A 75 cases out of 213 undergoing surgeries which are given planned regimes of antibiotic prophylaxis still end up with surgical site infection which is many a times not notified. To overcome this, change in antimicrobial regime is employed.

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1. Introduction

Surgical Site Infections [SSI] are common complications associated with surgery, reported incidences rates of 2-20%. It is also the second most common cause of nosocomial infections.

Surgical antimicrobial prophylaxis refers to brief course of an antimicrobial agent which is initiated just before

surgery, to prevent any infections at the surgical site. It is one of the most widely accepted practices in surgery.

However, despite the evidence of the effectiveness and the publication of guidelines for the antimicrobial prophylaxis, its use is often found to be suboptimal. Approximately 30-50% of the antimicrobial use in hospitals is now for surgical prophylaxis. However, between 30-90% of this prophylaxis is inappropriate.

Optimal prophylaxis includes an appropriate selection of safe and effective antimicrobials, initial dosing at an

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appropriate time and reposing if required, in order to maintain the effective serum and tissue levels throughout the operation, and discontinuation when the patient is no longer receiving a benefit.¹ Inappropriate usage and prolonged, postoperative doses do not provide any added benefit, and they may increase the incidence of resistant pathogens in the subsequent nosocomial infections.

Once antimicrobial resistance develops, it can have a significant impact on the patients' morbidity and mortality, thereby increasing the health care costs. Available studies bear witness to the widespread concern about the inappropriate use of antimicrobial agents.^{2,3}

The findings strongly suggest the need for antimicrobial drug utilization studies as the basis for a quality control or an audit of the antimicrobial therapy. Since errors in the antimicrobial prophylaxis for surgical patients remain one of the most frequent types of medication errors in hospitals and due to the unavailability of adequate information and standard treatment guidelines for surgical antimicrobial prophylaxis in India, there is a need to generate baseline data on the pattern of the use of prophylactic antimicrobials before recommending any desired modifications.

Poor adherence to the guidelines has been reported by various studies, specifically in the area of the antimicrobial selection, timing and the duration of the antimicrobial prophylaxis.^{4,5}

Hence, this study was conducted in order to examine the prevalent practices in the tertiary care hospital regarding the use of antimicrobials for surgical prophylaxis, with respect to the choice of the antimicrobial agent, the timing of its administration, the intraoperative redosing and the total duration of the prophylaxis, in order to detect any inappropriateness, and corrective measures are suggested.

2. Materials and Methods

A survey was conducted in Maharishi Markandeshwar Medical College and Hospital, Solan along the span of 2 months with prior permission for institutional ethical committee. The data from patients of various departments undergoing surgery such as departments of surgery, gynaecology, obstetrics, paediatric surgery, ophthalmology was collected and analysed. Important and relevant data was collected considering:-

1. Type of surgery
2. Wound class
3. Duration of surgery
4. The name and class of antibiotic given
5. Dose
6. Frequency
7. Duration of treatment before and after surgery
8. Any change in type or course of antibiotic given
9. Any indication of surgical site infection
10. If yes, organism isolated

This data was taken both preoperative and postoperative.

2.1. Number of subjects

The study included two hundred cases, their demographic, surgical and antibiotic usage details was collected. The analysis of these details was carried out leading to conclusive data generation.

2.2. Inclusion criteria

The population of patients were selected for study that underwent any surgery in various departments such as Surgery, Gynaecology, and Obstetrics, Paediatric surgery, Orthopaedics and ENT

2.3. Study

The study is cross-sectional simple descriptive with the statistical data and its analysis for the knowledge of justified usage of antibiotics in both preoperative and postoperative aspects pertaining to surgery.

2.4. Investigation specifically related to project

Identification and isolation of micro-organism: - Patients with surgical site infections were identified and the sample was collected and sent to microbiology lab for further identification.

The sample was inoculated on:-BA, MA, and BHIB for isolation of bacteria. Further identification was made by using biochemical tests and antibiogram was obtained using AST [antibiotic sensitivity testing].

2.5. Results of relevant laboratory test

In case of suspected surgical site infection we isolated the causative organism from the pus or discharge collected from the site. After isolation and identification of the causative organism, certain group of antibiotic specific to that organism were prescribed.

3. Observation and Result

A total 213 patients were selected and observed. It consisted of clean, clean- contaminated, contaminated, dirty wounds. The study conducted was of over a period of two months, where patients were divided into two groups. Group A received a single prophylactic dose of 1 gram of ceftriaxone [third generation cephalosporin] given intravenously one hour before surgery.⁶ Group B included the cases that were given antibiotic other than ceftriaxone.

The age of patients varied from 5 to 85 years. Following risk factors were also included like anaemia, smoking, alcohol, prolonged duration of surgery.

Table 1:

	Group A		Group B	
Total no. of cases	201		12	
Change in post-operative antibiotic	66 [32.83%]		10 [75%]	
Duration of hospital stay [days]	10.6		10.2	
Duration of stay before surgery [days]	3.2		3.5	
Incidence of SSI [reported]	3		None	
Duration of surgery [hrs]	3.7		4	
Age of patient [Avg]	37.1		37.7	
Change in antibiotic regimen post op/gender	Change in antibiotic post op/no. of males	Change in antibiotic post op/no. of females	Change in antibiotic post op/no. of males	Change in antibiotic post op/no. of females
	29/64 [32.8%]	37/137 [27%]	6/7 [85.7%]	4/5 [60%]
Wound class	Clean-uncontaminated	Clean-contaminated	Clean-uncontaminated	Clean-contaminated
	65 out of 65	1 out of 1	8 out of 10	2 out of 10

Table 2:

Group No	Patients with co -morbidity/change in antimicrobial post op	Patients without co -morbidity/change in antimicrobial post op
Group A	20 out of 66 [30.3%]	46 out of 66 [69.69%]
Group B	6 out of 10 [60%]	4 out of 10 [40%]

4. Discussion

Four parameters of the appropriateness of the antimicrobial prophylaxis, such as choice of antimicrobial agent, the timing of administration of the first dose, the intraoperative redosing and the duration of the prophylaxis, were analysed.

1. All the cases in our study received prophylactic antimicrobials prior to surgery, even though prophylactic systemic antimicrobials are not typically indicated for the patients who underwent clean surgical site operations. Though, this aspect was also the basis of forming two groups viz. group A and group B; this prophylaxis prior to surgery was found effective.
2. The intravenous route is ideally recommended. It produces predictable and reliable serum and tissue concentrations. Post operative wound infection still remains the most important cause of nosocomial infection, morbidity and increased duration of hospital stay.
3. Co morbid conditions like anaemia, diabetes and hypertension were significant as reported with p value of 0.000038 and chi square value of 16.9899 after yales correction.
4. Males are more prone to treatment failure, as suggested by the study. But the data did not yield

significant results.

5. The conventional treatment method call for prolonged hospital stay both prior ad post surgery while it is clinically proven that a prolonged hospital stay with exposure to hospital environment increases the risk of surgical site infection. Prolonged preoperative hospital stay leads to colonisation with antimicrobial resistant microorganisms and itself directly affects patients susceptibility to infection either by lowering host resistance or by providing increased opportunity for ultimate bacterial colonisation.
6. It was incidental finding that age of the patient does not significantly alter the response to the line of treatment. Except for the dosage which needs to be titrated as per the age.

5. Conclusion

The actual incidence of SSI is high which is indicated by the change in the antimicrobial prophylaxis post surgery may be with or without any mentioned indication.

The pre-surgical line of prophylaxis is found effective as the research study shows significant difference in post surgery regime due to pre-surgical conventional mode of prophylaxis.

Gender, extreme BMI, diabetes mellitus, and blood transfusion were the most significant co morbid conditions which were the risk factors of SSI. As these co morbid conditions render the patient immunocompromised leading to easy colonisation and development of opportunistic infections.

The current practice of the surgical site infection prophylaxis in the tertiary care hospital seems to be reasonable and in accordance with the standard guidelines,⁷ with respect to time of administration, frequency and dosing.

6. Source of Funding

This study was funded by the STS Programme by ICMR.

7. Conflicts of Interest

None.


Acknowledgments

Authors thank the microbiology and all the surgery related departments of Maharishi Markandheshwar Medical College and Hospital, Solan for assistance in providing necessary data. Also, voluntary participation of individual patients is acknowledged.

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Cite this article: Goswami K, Kumar S, Solanki S, Rana J. Use of antibiotics in surgical setup in tertiary healthcare hospital. *Indian J Microbiol Res* 2023;10(1):39-42.