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Retrospective Study on Prescribing Pattern of Antibiotics in Surgical Antibiotic Prophylaxis in a Tertiary Care Hospital

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Abstract:- Surgical site infection are infections that occur among surgical patients. Appropriate administration of surgical prophylaxis reduces the rate of surgical site infection by providing an adequate level of antimicrobial agents at the surgical site and tissue at the time of incision and during surgery. Objective: This study is to evaluate the prescribing pattern of antibiotics in surgical prophylaxis in tertiary care hospitals. Method: This study has been conducted in Tertiary Care Hospitals. During the six months, we collected data of around 100 surgical patients. Our research has included clean and clean-contaminated wound surgery cases of all age groups with multi-department, and dirty/infected surgical wound class has been excluded. Results: A total of 100 patients were in this study, out of which 35% were female and 65% male. In the department of general surgery, the most commonly used antimicrobial agents were inj. Cefoperazone sodium + sulbactam and Ceftriaxone (38%%) followed by inj. Amoxicillin + Clavulanic acid (14%). The majority of the Cefoperazone sodium+ sulbactam were used in the Urology surgical cases i.e., 12% and ceftriaxone was used in the Neurological surgical cases i.e., 13% respectively. In surgeries, 92% patients were with the category of Clean wound class, 6% of patients were under the category of clean-contaminated wound class, 1% of patients were under the category of contaminated wound class. Conclusion: In this study, majority of the patients were on at least one antibiotic. The most commonly used class of antimicrobial were found to be cephalosporin (cefoperazone sodium+sulbactum and Ceftriazone) and Penicillin (Amoxicillin and Clavulanic acid). Three adverse drug reactions were reported which were found to be mild in severity and recovered. Majority of the cases were under Orthopedics with antibiotics Cefoperazone sodium+ sulbactam (Cephalosporins). Overall, the study illustrates appropriate antibiotics were utilized as prophylactic in surgical cases depending upon the type of surgery from various specialties.

I. INTRODUCTION

SURGICAL SITE INFECTION are the most common nosocomial infections among surgical patients and they may increase the rate of postoperative mortality and morbidity, cost of hospitalization, and length of hospital stay. Surgical site infections are a global priority also because 20% -35% of them are caused by antibiotic-resistant strains. Appropriate administration of surgical antibiotic prophylaxis reduces the rate of surgical site infections by providing an adequate level of an antimicrobial agent at the surgical site and tissue at the time of incision and during surgeries. On the opposite hand, inappropriate surgical antibiotic prophylaxis like overuse, misuse, or wrong administration time, and therefore the insufficient dose may result in the emergence of antibiotic resistance, adverse drug reactions, therapeutic failure, and increased treatment costs. Surgical antibiotic prophylaxis is critical in preventing infections that may lead to sepsis, organ failure, and death during a hospital stay. When it involves administering prophylactic antibiotics before and after major surgery "timing is everything'. Surgical antibiotic prophylaxis has been recognized as one of the major factors and essential tools in combating and decreasing surgical site infections.

ANTIMICROBIAL STEWARDSHIP has been defined as "the optimal selection, dosage and duration of antimicrobial that leads to the simplest clinical outcome for the treatment or prevention of infection with minimal toxicity to the patient and minimal impact on subsequent resistance".

SURGICAL ANTIBIOTIC PROPHYLAXIS: Surgical antibiotic prophylaxis is a significant factor in preventing "surgical site infections. Antibiotic prophylaxis aims to make sure effective serum and tissue levels of the drug for the duration of Surgery. one of the aims of rationalizing surgical antibiotic prophylaxis is to reduce the inappropriate use of antibiotics, thus minimizing misuse. Appropriately administered antibiotic prophylaxis lowers the Incidence of surgical wound infection. Prophylaxis has uniformly recommended for all clean-contaminated, contaminated, and dirty procedures. It is considered optional for most clean methods. Antibiotic resistance occurs when inappropriately antibiotics prophylactic has been used and occurs adverse drug reactions. The preventive regime in patients undergoing Surgery should include an agent effective against the most likely infecting organisms but need not eradicate every potential pathogen. Patients should receive prophylactic antibiotics appropriate for the specific process.

Indications:

Antibiotic prophylaxis should have administered to patients who are undergoing the following Surgery

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a. **Clean Surgery**
b. **Clean – contaminated Surgery**
c. **Contaminated Surgery**

- **Prevention** should not have used for patients undergoing dirty or contaminated procedures. They generally do not require antimicrobial prophylaxis because they already receiving specific antibiotic treatment for an established infection.

Timing of administration:

1) The risk begins at the time of opening/incision, so effective tissue concentration must be reached at that time.
2) It depends on the pharmacokinetics of the drug and the route of administration.
3) Preferably 30 minutes within the induction of anesthesia.

Administration:

- Intravenously; produce rapid, reliable, and predictable serum and tissue Concentration.
- Orally
- Topically

II. OBJECTIVES

1. To evaluate prescribing pattern of antibiotics for surgical prophylaxis.
2. To know selection of antibiotics, duration as well as appropriate route of administration.
3. To understand how antibiotics are prescribing rationally.
4. To assess and evaluate the current practice of surgical antibiotic prophylaxis.

III. STUDY METHODOLOGY

Single-center Retrospective observational study in a tertiary care hospital conducted after obtaining Institutional Ethics Committee approval.

Sample size: 100
Study duration: 6 months [June 2020- December 2020].

IV. STUDY CRITERIA

Inclusion criteria:

- Clean and clean-contaminated wound type of Surgery has included.
- Patients who were undergoing surgeries have been included.
- Both genders of all age groups have been included in this study.

Exclusion criteria:

- Dirty-infected wound contamination type of Surgery.

V. STUDY PROCEDURE

Study procedure: Data collection forms have been designed to collect the required details of the patients. The data regarding the history of any recent use of antibiotics surgeries wound classes like pre-operative, intra-operative, and postoperative antibiotics will collect clinical data. It will study the prescription pattern of surgical antibiotics, analyzed and reported.

Primary Outcome:

- It is to evaluate the percentage of antibiotics are utilized in surgical prophylaxis.
- To know selection of antibiotics, duration as well as appropriate route of administration.
- To know the percentage usage of antibiotics as per the surgical wound class.

Secondary Outcome:

- To assess the safety usage of antibiotics.

Statistical Analysis: Data has been analyzed by Microsoft Excel software. Data has been summarized by mean ± SD for continuous data and percentages for categorical data.

VI. RESULTS

A total of 100 patients was in this study, out of which 35% were female and 65% male. In the department of general surgery, the most commonly used antimicrobial agents were inj. Cefoperazone sodium + sulbactam and Ceftriaxone (19%) followed by inj. Amoxicillin + Clavulanic acid (14%). The majority of the Cefoperazone sodium+ sulbactam were used in the Urology surgical cases i.e., 12% and ceftriaxone was used in the Neurological surgical cases i.e., 13% respectively. In surgeries, patients with clean surgical wound class were 77%.

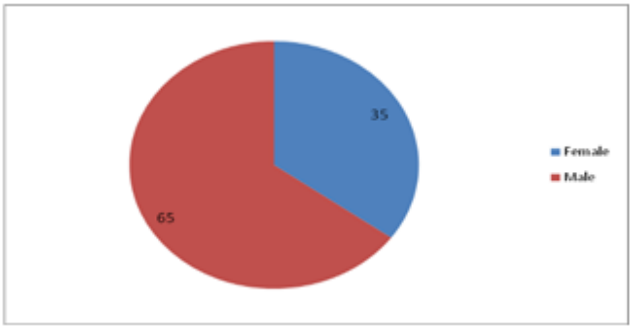

Figure-1: Pie diagram for the gender distribution of all subjects

SURGICAL PROCEDURE IN VARIOUS SPECIALTIES:

In our study, among 100 patients we analyzed surgical procedures in a multi-department. The majority of surgeries were under the department of orthopedics (27%), Neurology & Podia logy (15%), Oncology 12%), Gastroenterology (11%), ENT(3%),Cardiology (3%),Plastic Surgery (3%), Gynaecology(3%),Endo Vascular Surgery (2%) and Endocrinology(1%).

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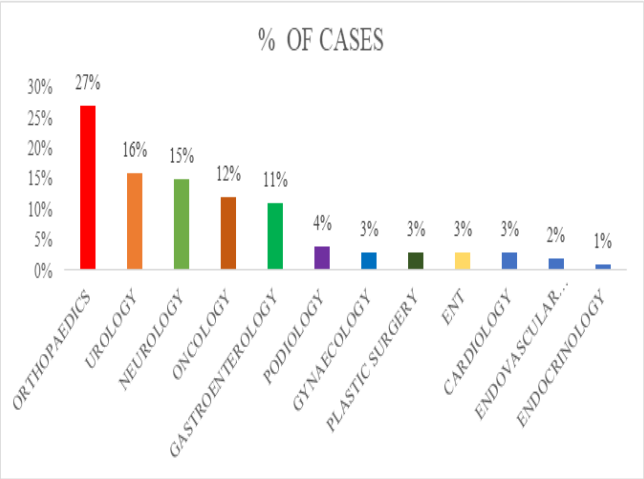

Figure-2: Simple bar diagram for surgical procedures in various specialties of all subjects

INVESTIGATIONS:

In this observational study, we analyzed the investigations like serum creatinine, Procalcitonin, TLC, CRP value, as well as cultures. Most of the patient's TLC values are between 6.4 to 9.6 is 43%, 28% of patients have TLC values in between 0 – 3.2, 18% of patients have TLC values in between 9.6 – 12.8, 9% of patients have TLC values in between 3.2 – 6.4 and 2% of patients have TLC values in between 12.8 to 16. Most of the patients have serum creatinine values are in between 0.59 to 0.67mg/dl is 48%, 23% of patients have serum creatinine value between 0.2 to 0.58, 17% of patients have serum creatinine value between 0.98 to 1.36 and 2% of patients have serum creatinine value in between 1.37 to 1.75mg/dl. Among 100 patients, 98% of patients have not done CRP test, whereas 2% of patients have tested, and the result is " negative". Not even a single patient underwent a procalcitonin test. Overall, the mean investigations-TLC is 9353.9, and the standard deviation is 8937.8, The mean investigation - SERUM CREATININE (mg/dL) is 0.74, and standard the deviation is 0.29.

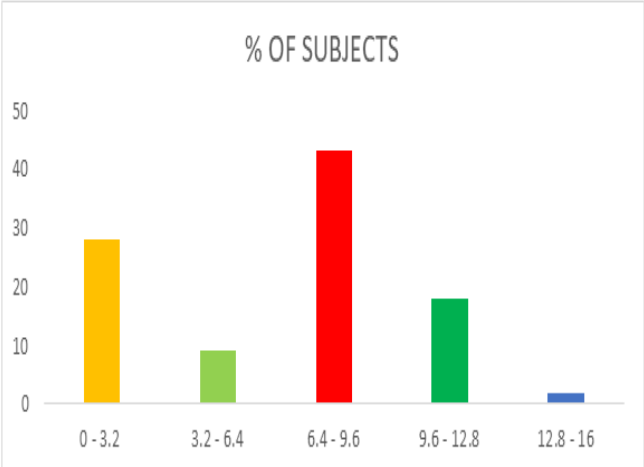

Figure-3: Simple bar diagram for the investigations-TLC distribution of subjects

Investigations-SERUM CREATININE (mg/dL)	No. of Subjects	% of subjects
0.2 to 0.58	23	23%
0.59 to 0.97	48	48%
0.98 to 1.36	17	17%
1.37 to 1.75	2	2%

Table-2: The investigations-serum CREATININE (mg/dL) distribution of subjects

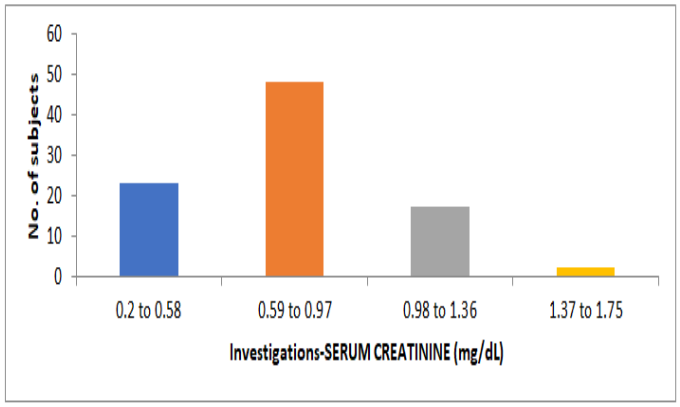

Figure-9:Simple bar diagram for the investigations-serum CREATININE (mg/dL) distribution of subjects

SURGICAL WOUND CLASS: As we all knew, wound class is dependent on different types of surgeries have been done in hospitals. So in this study, we included surgical wound classes like clean, clean-contaminated, contaminated wound classes. As per the data analysis of surgical wound class out of 100 patients, 92% patients were with the category of Clean wound class, 6% of patients were under the clean-contaminated wound class, 1% of patients were under contaminated wound class. We excluded dirty/infected wound class in our study.

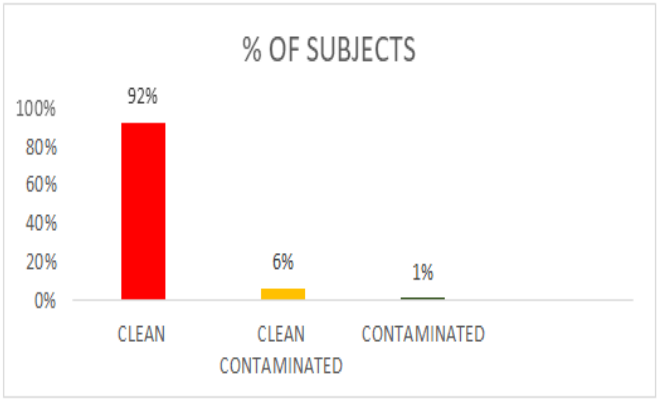

Figure-4: Simple bar diagram for the clean surgical wound class distribution of all subjects

CULTURES AND ITS SENSITIVITY: In this study, we collected culture and sensitivity data to observe the growth of microorganisms, and after analyzing the data of Culture and sensitivity, 24% of the patient's cultures have been sent out of which 12% was blood culture, 5% tissue culture, 3 % urine culture, and other cultures like sputum, pus, bone and wound swab were 4%. All the blood cultures, urine cultures, pus culture and wound swab sent has shown no growth of

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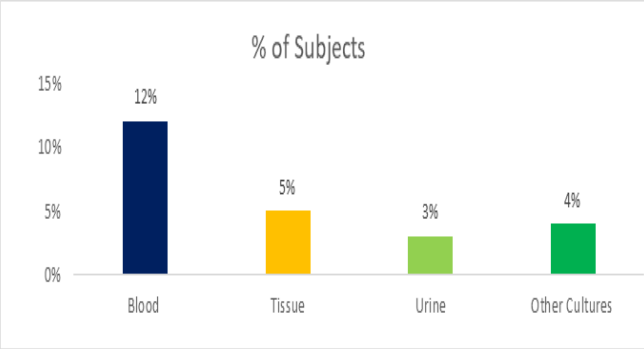
micro-organism. Among 4% of Tissue culture sent has shown no growth but in 1 % of tissue culture observed the growth gram negative Escherichia coli which was sentitive to Gentamicin, Amikacin, Ceftriaxone, Ceftazidime, Ciprofloxacin, Cefotaxime, Piperacillin+Tazobactum, Cefoperazone sodium+Sulbactum, Meropenem, Cifipime, Imipenem. 1% Bone culture has revealed Extended-spectrum beta-lactamases Escherichia coli which was sensitive to Gentamicin, Amikacin, Clotrimazole, Meropenem, Imipenem, Ertapenem, 1% Sputum of the culture observed the growth of Klebsiella which was sensitive to Gentamicin, Amikacin, Ceftazidima, Cefutriazone, Ciprofloxacin, Tobramycin, Netilimycin, Clotrimazole, Piperacillin.



VII. CONCLUSION

In this study, majority of the patients were on at least one antibiotic. The most commonly used class of antimicrobial were found to be cephalosporin (cefoperazone sodium+sulbactum and Ceftriazone) and Penicillin (Amoxicillin and Clavulanic acid). Three adverse drug reactions were reported which were found to be mild in severity and recovered. Majority of the cases were under Orthopedics with antibiotics Cefoperazone sodium+ sulbactam (Cephalosporins). Overall, the study illustrates appropriate antibiotics were utilized as prophylactic in surgical cases depending upon the type of surgery from various specialties.

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