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Original Research Article

Role of prophylactic antibiotics in elective surgeries and postoperative surgical infections

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ABSTRACT

Background: Health care associated infections (HAIs) present a significant source of preventable morbidity and mortality. More than 30% of all HAIS are represented by surgical site infections (SSIs) making them most common sub types between 1.9% and 2.7% of all surgical patients. Joseph Lister "the man who made surgery safe" introduced antiseptic method for safe surgeries. As many are now considering antibiotics "wonder drug" which covers the surgical techniques and having asepsis. Extensive indiscriminate use of antibiotics has resulted in developing resistance.
Methods: Study conducted in about 100 cases in various surgical units having various surgical procedures. Only clean cases are taken. A single stat dose of first generation cephalosporin 1gm given IV at the time of giving anesthesia. Postoperative any signs and symptoms like infections, fever with chills, wound discharge are observed. If any evidence of wound infection is present, accordingly sent for culture and sensitivity and suitable antibiotics are given.
Results: In our study 5 patients had fever with serous discharge 2 patients showed no growth, 3 patients had got growth positive (2- staphylococcus aurous, 1- pseudomonas). Hence our infection rate is 3%.
Conclusions: Single dose prophylaxis has got definite advantage to overcome the postoperative wound sepsis. Prolonged antibiotic therapy should be avoided as it has got no added advantages over single dose antibiotic.

Keywords: Asepsis, Health care associated infections, Prophylaxis, Single dose antibiotic, Surgical site infection

INTRODUCTION

Health care associated infections (HAIs) present a significant source of preventable morbidity and mortality. More than 30% of all HAIS are represented by surgical site infections (SSIs) making them most common sub types between 1.9% and 2.7% of all surgical patients.[1-6] Studies suggested that 40% to 60% of these infections are preventable, despite this many hospitals have yet to implement evidence based best practices.[3-8]

Joseph Lister "the man who made surgery safe" introduced antiseptic method for safe surgeries. Postoperative wound infection is having many obstacles in surgery. The advantage of antibiotics has not raised the hope for permanent solution to this problem, so it has become nightmare of surgeon. As many are now considering antibiotics "wonder drug" which covers the surgical techniques and having asepsis. Extensive indiscriminate use of antibiotics has resulted in developing resistance with various organisms and now hospital infection is alarming to us.[9] Antibiotics given at the time of anaesthesia before surgery, contamination of wound has no influence on infective rate of operative wound, as body has already adequate concentration in blood. Hence infection can be prevented.[10]

Second and third generation antibiotics have not much advantage over cephazolin in surgical prophylaxis because of expense and less broad spectrum against

enterobactereaceae.[13] For all procedures which need anaerobic activity, metronidazole is combined with cephalosporin as a IV bolus.[14] The timing of single dose prophylaxis is important.[15]

METHODS

This was a prospective observational Study conducted in various surgical units of having various surgical procedures conducted in ESIC Medical College and Hospital, Kalaburgi, Karnataka, India from July 2019 to January 2020. Following institutional ethics committee approval of the protocol, 100 patients who undergone elective surgical procedures were selected for the study protocol. All patients participating in the study gave informed written consent. All the cases were elective and patients were healthy and had maintained adequate nutrition. Preoperative workup was done, all the patients were followed from the date of admission till discharge and followed up for 2-4 weeks depending upon various procedures done.

Criteria for classifying surgical wounds

Clean

An uninfected operated wound in which no inflammation is encountered and the respiratory, alimentary, genital or uninfected urinary tract are not entered. In addition clean wounds are primarily closed. And if necessary drained with closed drainage. Operative incisional wound that follow non penetrating (blunt) trauma should be included in this category if they meet the criteria.

Clean contaminated

Operative wounds where the respiratory, alimentary, genital or urinary tracts are entered under controlled conditions and without unusual contamination. Specifically operations involving the biliary tract, appendix, vagina and oropharynx are included in this category. Provided no evidence of infection or major break in technique is encountered.

Contaminated

Open fresh accidental wound. In addition operations with major breaks in sterile techniques. (e.g. open cardiac massage) or gross spillage from the gastrointestinal tract, and incision in which acute, non-purulent inflammation is encountered including necrotic tissue without evidence of purulent drainage (e.g. dry gangrene) are included in this category.

Dirt or infected

Include old traumatic wounds with retained devitalized tissues and those that involve existing clinical infection or perforated viscera, this definition suggested that the organism causing post-operative infection were present in the operative field before the operation.[1]

Pediatric patients, old age patients, diabetic patients and immunocompromised patients were excluded from the study.

Methodology

Only clean, not contaminated cases are taken. Preoperative checkups done thoroughly, like personal hygiene of the patient, BP and cardiac status of the patient to be evaluated. Preventive measures to avoid or reduce exogenous and endogenous contamination. A single stat dose of first generation cephalosporin 1gm given IV at the time of giving anesthesia. If surgery is prolonged for more than 2 hours then 2nd dose of prophylactic antibiotics is given IV. Preoperative any pathological cause and also contamination were observed and further follow up done. Post-operative any signs and symptoms like infections, fever with chills, wound discharge will be observed. All the operative care (wound) is seen in 48 hours and to be inspected every day. Final review will be done after 1 week and 2 weeks. If any evidence of wound infection is present, accordingly sent for culture and sensitivity and suitable antibiotics are given. The post-operative stay in hospital were noted.

Parameter examined under given clause to study morbidity postoperatively

Recording of temperature continuously for 72 hours, pain in the operative site, redness, any discharge or collection and drug administration for any complication.

Additional preoperative surgical site infection prevention strategies

Surgical safety checklist

Checklist use has been associated with improved compliance with antibiotic administration guidelines and significantly lower SSI rate in various global trials.[16-17]

Skin decontamination

Preoperatively patient-applied chlorhexidine scrub may decrease SSI rate as compared to no bathing.[18]

Hair removal

Hair removal is a common preoperative practice. If hair is removed, however electric clipper should be used, razors have been linked to SSI rate.[19]

Surgical scrub

Chlorhexidine scrubs are more effective and long lasting as compared to iodine in decreasing the bacterial count.[20]

Intra operative considerations

Irrigation maintenance of haemostasis

Maintaining the stable hemodynamics throughout the perioperative period and intraoperative hemodynamic control significantly reduces the SSI rates.[21]

A performa was made in each cases and detailed study is done and maintained, the record of investigation done in all cases preoperatively depending upon the age up to 45 years, complete hemogram, RFT, LFT, RBS, urine routine, chest X ray and ECG, the other relevant investigations are done depending upon individual patients as and when required. The complete details of surgical operation, its duration, and any factors which influence contamination or table, instruments were carefully noted and data analyzed using Microsoft excel with frequency distribution.

RESULTS

The study illustrates that out of 100 operations done by elective procedure males were 64% and females were 36%, age ranged between 18 years and 60 years. Average age group was between 20 years and 50 years.

Table 1: Age and gender-wise distribution of study population.

Age (in years)	Male	Female	Total
<40	28	15	43
>40	36	21	57
Total	64	36	100

Table 2: Distribution of cases as per studies operative diagnosis summarised.

Opearative diagnosis	No. of cases
Inguinal hernias	26
Hydrocele	20
Fibroadenomas	18
Thyroid swellings	2
Cholelithiasis	7
Ventral hernias	4
Soft tissue tumors or giant lipomas	11
Others	12
Total	100

Table 2 demonstrated that most common elective operations procedure done were inguinal hernias (26%), followed by hydrocele (20%) and fibroadenomas (18%) respectively. The least common being thyroid swellings (2%).

Table 3 revealed co-morbid condition among elective operations procedure 17% of cases had hypertension followed by 6% COPD, 5% bronchitis, and 2% cardiac diseases.

Table 3: Cases associated with co-morbidities.

Associated conditions along with the primary disease	No. of cases
Hypertension	17
Cardiac diseases	2
Bronchitis	5
COPD	6

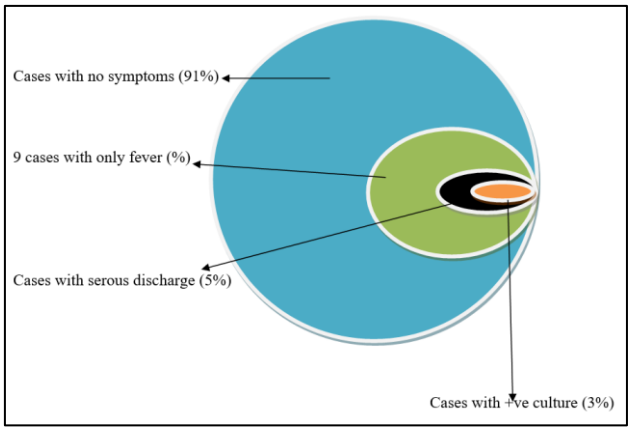

Figure 1: Prevalence of postoperative infections among the cases.

Figure 1 showed out of 100 clean cases 4 (4%) patients had developed fever which subsided within 2-3 days, no antibiotic was administered. 5 patients developed fever with serous discharge, out of 5 patients 2 patients showed no growth in culture and sensitivity so no antibiotic was given. 2 cases showed staphylococcus aureus and 1 case showed pseudomonas growth. Total 3 (3%) cases showed sepsis which had been treated accordingly with antibiotics according to culture and sensitivity reports.

DISCUSSION

The use of prophylactic antibiotics can reduce the rate of surgical infection, providing the right drug is chosen for the right occasion and given at the optimal time. The term prophylaxis is only appropriate when there has been no preoperative contamination or established infection. Many studies showed that properly administered prophylactic antibiotics could prevent postoperative infection.[22,23]

The incidence rate of 3% of the study is well within the infection rates of 2.8% to 17% seen in other studies. The difference in incidence rates may probably due to variations in interpretations of infection. Also, a meaningful single infection rate for all types of wounds is not possible, as the likelihood of infection differs in each type of wound. Cruse and Ford observed that the rate of infection of clean wounds was more useful as an indicator of control of infection of surgical wounds than the overall incidence.[22]

The incidence rate in clean wounds in our study of 3% is almost similar to those of the other studies. As per the National Nosocomial Infection Surveillance Study (NNISS) data the accepted infection rate for clean cases 2.1%, clean contaminated cases 3.3%, contaminated cases 6.4 %, dirty cases 7.1%.[11]

Although the comparative study with NNISS study data showed the infection rate of clean cases is 2.1% whereas in our study compared with NNISS is 3% which is almost near to NNISS. Use of prophylactic antibiotic in clean contaminated and contaminated cases are well advocated but still controversial in clean cases.[12]

In the present study in the clean wound category with no obvious of contamination, the cultured infected wound was *Staphylococcus aureus* predominantly similar pattern of micro flora was observed by Anvikar et al, Olson et al with *Staphylococcus aureus* as most common.[24,25] The pattern of organisms isolated in wound types in various studies suggested skin colonizers to be the main source of SSI in clean procedures.

CONCLUSION

A single bolus dose of cefazolin and added metronidazole in selective cases as it covers anaerobic organism can be used widely in clean surgeries preoperatively. Single dose prophylactic antibiotics reduces the incidences of morbidity post operatively. Drug has no side effects.

Single dose prophylaxis has got definite advantage to overcome the postoperative wound sepsis, one should not forget to have a good and perfect aseptic surgical technique to avoid the postoperative wound infection. However prolonged antibiotic therapy should be avoided as it has got no added advantage over single dose antibiotic.

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