Research Paper

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A Study on Post Operative Wound Infection Following Emergency Surgeries and Antimicrobial Sensitivity Pattern

Medical Science

KEYWORDS : Surgical site infection; Nosocomial Infection, post operative infection ,multidrug resistant .

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ABSTRACT

Objectives: To study the incidence of post operative wound infection following emergency surgeries, various factors influencing the postoperative wound infection, to isolate and identify the bacterial agents of post operative wound infection as well as to determine their antibiotic sensitivity pattern.

Methods:. The prospective study on 150 emergency surgeries over a period of 18 months. Infected samples from patients were collected by following all aseptic precautions and were processed without delay by the standard microbiological techniques.

Results and Conclusion: The overall infection rate was 10 %. The SSI rate was 5.88% in clean surgeries, 7.14% in clean contaminated ones, and 33.33% in contaminated surgeries. The SSI rate increased with increasing age and it also increased significantly with the increasing duration of pre-operative hospitalization. The infection rate was significantly higher as the duration of the surgery increased. The most commonly isolated organism from surgical site infections was E-coli (34.8%), followed by staphylococci (21.7%), klebseilla (17.4), pseudomonas (13%),MRSA(8.7%) and proteus (4.4%). Most of the organisms which were isolated were multidrug resistant. The high rate of resistance to many antibiotics underscored the need for a policy that could promote a more rational use of antibiotics

INTRODUCTION

Postoperative wound infection can remain a major source of illness in surgical patients. Post operative wound infections are those that occur as a result of a surgical procedure. They are characterized by a breach of anatomic defence barriers and are associated with Greater morbidity, significant mortality, and increased cost of care. Post operative wound infection is the most common nosocomial infection in our population accounting for 38% of all infections in surgical patients. Despite of great advances in surgical sciences, post operative wound infection remains the most common complication which surgeons encounter. This problem if not treated in a timely and proper manner can have significant complication [1.]

Infection is encountered by all surgeons by their crafts , invariably impairing the first line of host defense . The initial requirement for infection are impairment of cutaneous or mucosal barrier and the entrance of microbes into the host tissue [2.]

During the years there has been significant progress in prevention and treatment of surgical site infection . Since Pasteur, Cohn, Lister, Koch and Klebs, there has been constant strove to combat infection. The discovery and confirmation of the relation between microbes and diseases has led to the use of arsenic, mercury and of sulphonamides and after the discovery of penicillin there has been steady development of antibiotics.[2] Remarkable life saving discoveries have been made but infection causing organisms have also been successful in combating antibiotics and the search continues. Advances in infection control practices include improved operating room ventilation, sterilization methods, barriers, surgical technique and availability of antimicrobial prophylaxis . In spite of all these post operative wound infection still remain a major problem in all surgeries.

This study focus on the incidence of post operative wound infection following emergency surgeries and various factors associated with it and the most common organism causing post operative wound infection and its antimicrobial sensitivity in our hospital. This will help better prevention and treatment of post operative wound infection. Infections can double the length of time a patient stays in hospital and thereby increase the costs of health care. The main additional costs are related to re-operation, extra nursing care and interventions, and drug treatment costs. The indirect costs, due to loss of productivity, patient dissatisfaction and litigation, and reduced quality of life. Preventing and managing post operative wound infection in the best way can help reducing burden caused on the patients[1,2.]

AIMS AND OBJECTIVES

Post operative wound infection are among the most common complications of Inpatient admissions and have serious consequences for outcomes and costs. Different risk factors may be involved, including age, sex, nutrition and immunity, prophylactic antibiotics, operation type and duration and secondary infections. This study aimed to determine the incidence of post operative wound infection which Include the superficial incisional SSI and deep incisional SSI and the microorganism associated and their antibiotic sensitivity pattern at ACME, pariyaram.

OBJECTIVES:

To study the incidence of post operative wound infection following emergency surgeries at ACME, Pariyaram.

To study the microbial profile of post operative wound infection and its antimicrobial sensitivity.

METHODOLOGY

SOURCE OF DATA

The present prospective study of 150 patients were done in Department of General Surgery , ACME , Pariyaram for a period of 18 months from October 2012 to March 2014

INCLUSION CRITERIA

All patients undergoing emergency surgery in Department of General Surgery.

Patients who gave consent.

EXCLUSION CRITERIA:

Patients with known preoperative infection including dirty wounds.

Those undergoing elective surgery

Minor wound area infection / stitch abscess / surrounding inflammation without micro-organisms.

Patients who did not give consent

TOOLS AND TECHNIQUES

The clinical study of post operative infection was conducted at ACME, PARIYARAM during the period of 18 months from October 2012 toMarch 2014. An elaborate study was done with regard to date of admission, history, clinical features of wound infection, special investigation, type of surgery, postoperative management . the study was done on 150 patients who underwent emergency surgeries in our hospital in the department of general surgery.patients were followed up till they were discharged from hospital. The wounds were examined for suggestive signs and symptoms of infection in the post operative period, during wound dressing or when the dressings were soaked. In history, presenting complaints, duration, associated diseases, coexistent infections at a remote body site, other co-morbidities were noted. Operative findings which include, type of incision, wound contamination, and duration of operation were studied. Postoperative findings which included, day of wound infection, day of 1st dressing and frequency of change of dressing. Findings on the day of diagnosis of wound infection were noted which included fever, erythema, discharge, type and colour and the exudates was collected from the depth of the wound using sterile cotton swab and was sent to microbiology department for culture and sensitivity

MICROBIOLOGY LAB PROCEDURES;

In case of swabs, one swab will be used for culture and the other for Gram's staining.

Deep seated aspirates/ tissue samples will be directly inoculated into the Robertson's Cooked Meat meadium (RCM) for anaerobic culture.

CULTURE MEDIA :

Aerobic culture: Blood agar, MacConkey agar, BHI broth.

Anaerobic culture: RCM.

CULTURE IDENTIFICATION :

Aerobic and anaerobic organisms will be identified based on Gram's staining, colony morphology, motility and a panel of biochemical tests as per standard guidelines[12,13,14 ,15].

ANTIBIOTIC SUSCEPTIBILITY TESTING: Antibiotic susceptibility testing will be done by Kirby-Bauer disc diffusion method as per standard CLSI guidelines[16].

RESULT

Table 1: Incidence of post operative infection

Total no of cases	Infected cases	Percentage of infected cases
150	15	10

Table2: Incidence in age-group

AGE GROUP	NO.OF CASES	PERCENTAGE	INFECTED	PERCENTAGE
11-20	32	21.33	0	00.00
21-30	35	23.33	0	00.00
31-40	24	16.00	2	13.33
41-50	17	11.33	1	06.66
51-60	16	10.66	4	26.66
61-70	16	10.66	7	46.66
71-80	8	05.33	1	06.66
81-90	2	01.33	0	00.00
TOTAL	150	100	15	100

Table 3: Incidence of DM, Hypopreteinemia, Malignacy, UTI, RTI, Anemia

RISK FACTOR	NUMBER OF CASE	PERCENTAGE	INFECTED	INCIDENCE
Diabetics mellitus	29	19.33%	5	17.24%
hypoproteinemia	5	3.33%	1	20%
malignancy	4	2.66%	1	25%
UTI	10	6.66%	1	10%
Respiratory infection	15	10%	1	6.66%
ANEMIA	10	6.66%	2	20%

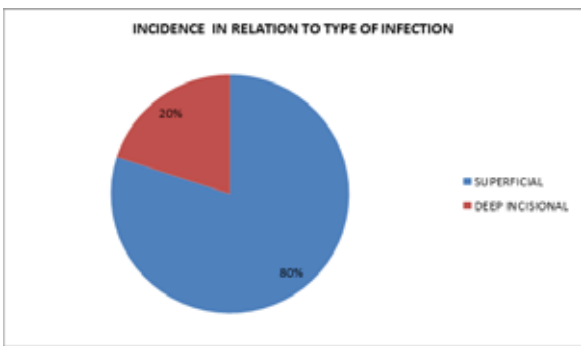

Figure 1: Incidence based on type of postoperative infection

Table 4: Incidence related to diagnosis

DIAGNOSIS	TOTAL CASES	PERCENTAGE	INFECTED CASES	INCIDENCE
ACUTE APPENDICITIS	77	51.3	1	06.66
INSTESTINAL OBSTRUCTION	9	6.0	1	06.66
GASTRIC PERFORATION	11	7.3	0	00.00
SIGMOID VOLVULUS	2	1.3	0	00.00
OBSTRUCTED INGUINAL HERNIA	12	8.0	3	20.00
LOWER LIMB GANGRENE	6	4.0	1	06.66
FORE FOOT GANGRENE	6	4.0	3	20.00
DUODENAL PERFORATION	12	8.0	2	13.33
TORSION TESTIS	6	4.0	0	00.00
CAECAL PERFORATION	1	0.7	1	06.66
BLUNT INJURY ABDOMEN + JEJUNEAL PERFORATION	2	1.3	1	06.66
PENETRATING INJURY ABDOMEN + JEJUNAL PERFORATION	1	0.7	1	06.66
JEJUNAL PERFORATION	1	0.7	1	06.66
APPENDICULAR PERFORATION	1	0.7	0	00.00
BLUNT INJURY ABDOMEN	2	1.3	0	00.00
RECTAL PERFORATION	1	0.7	0	00.00
	150	100.0	15	100.0

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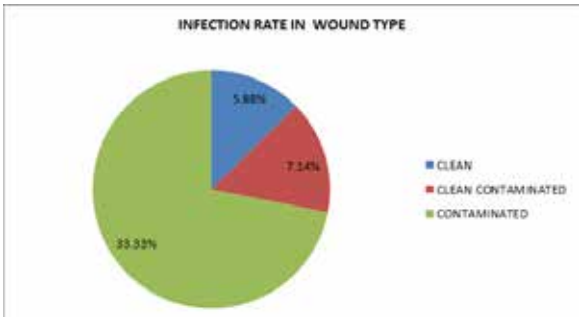

Figure 2: Incidence in wound type

Table 5: Incidence related to duration of surgery

DURATION IN HOURS	NO OF CASES	PER-CENTAGE	INCIDENCE OF INFEC-TION	PERCENT-AGE
1	36	24	2	13.33
2	66	44	2	13.33
3	35	23.33	4	26.66
4	11	7.33	5	33.33
5	2	1.33	2	13.33
TOTAL	150		15	100

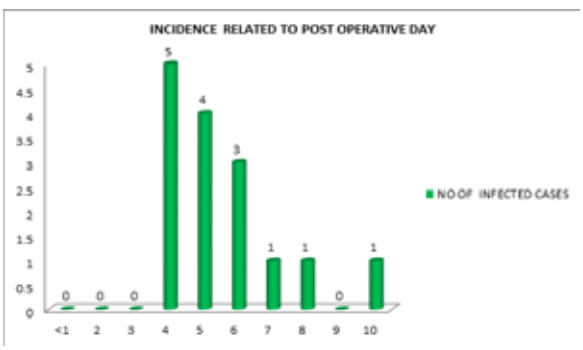

Figure3: Incidence related to post operative day

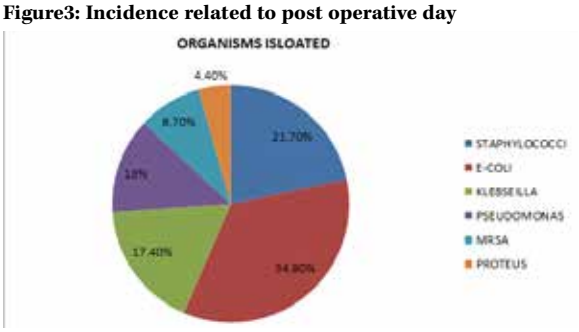

Figure 4: Organisms isolated

Table 6: Type of organism isolated in relation to wound type

Type of organism	Clean	Percentage	Clean contaminated	Percentage	Contaminated	Percentage
STAPHYLO-COCCI	2	40 %	3	60%	0	0%
KLEBSEILLA	0	0%	3	75%	1	25%
E-COLI	1	12.5%	3	37.5%	4	50%
PSEU-DOMONAS	0	0%	1	33.33%	2	66.66%
MRSA	0	0%	1	50%	1	50%
PROTEUS	0	0%	1	100%	0	0%

Table7: Culture and sensitivity of E-coli

antibiotic	Sensi-tivity strains	Resist-ant strains	cumu-lative	Sensi-tivity per-cent-age	Resist-ant per-cent-age	Cumula-tive percent-age
Amikacin	6	2	8	75	25	100
Cef-sulb	5	3	8	62.5	37.5	100
Ceftazi-dime	1	7	8	12.5	87.5	100
Netilmycin	6	2	8	75	25	100
Cefixime	1	7	8	12.5	87.5	100
Pip-tazo	5	3	8	62.5	37.5	100
Chloram-phenicol	4	4	8	50	50	100
Doxicyclin	2	6	8	25	75	100
Imipenem	7	1	8	87.5	12.5	100
Azithro-mycin	5	3	8	62.5	37.5	100
Cefotaxim	2	6	8	40	60	100
Ciprofloxa-cin	1	7	8	12.5	87.5	100
Gentamy-cin	1	7	8	12.5	87.5	100
Ceftriax-one	1	7	8	12.5	87.5	100
Lenezolid	6	2	8	75	25	100
vacomycin	_	_	_	_	_	_
clindamy-cin	–	–	–	–	–	–

Table8: Culture and Sensitivity of MRSA

antibiotic	Sensi-tivity strains	Resist-ant strains	cumu-lative	Sensi-tivity per-cent-age	Resist-ant per-cent-age	Cumula-tive percent-age
Amikacin	0	2	2	0	100	100
Cef-sulb	0	2	2	0	100	100
Ceftazi-dime	0	2	2	0	100	100
Netilmycin	0	2	2	0	100	100
Cefixime	0	2	2	0	100	100
Pip-tazo	2	0	2	100	0	100
Chloram-phenicol	0	2	2	0	100	100
Doxicyclin	0	2	2	0	100	100
Imipenem	1	1	2	50	50	100
Azithromy-cin	0	2	2	0	100	100
Cefotaxim	0	2	2	0	100	100
Ciprofloxa-cin	0	2	2	0	100	100
Gentamy-cin	0	2	2	0	100	100
Ceftriaxone	0	2	2	0	100	100
Lenezolid	2	0	2	100	0	100
vacomycin	2	0	2	100	0	100
clindamy-cin	2	0	2	100	0	100

DISCUSSION

This study was conducted at department of general surgery ACME, Pariyaram for a period of eighteen months from October 2012 to March 2014. This is a prospective study of 150 patients who underwent emergency surgery; these patients were followed up till they were discharged. These patients were watched for post operative wound infection. The cases with post operative wound infection which included superficial and deep incisional wound infection were noted and culture and sensitivity of the pus from wound were done for antibiotic sensitivity.

The post operative infection rate in our study is 10%,out of 150 patients who underwent emergency surgeries only 15 patients had post operative infection(table1) . The post surgical wound infection rate in different studies done in India varies from 6.09% to 38.7% [1]. In our study the infection rate was more common in males than in females, the infection rate in males was 66.7% and females were 33.3% . The significance of this observation is not understood, this could be because the males were more in our study population.

The present study shows that the incidence of post operative wound infection is more among 61-70 yrs age group followed by 51-60 yr group(table2). The younger age groups had lesser incidence of infection. This confirms the understanding that there is a gradual rise in incidence of wound infection as age advances .The high incidence of 46.66% in patients aged 61- 70 years in our study is perhaps due to decreased immunocompetence and increased chances of co-morbid factors like Diabetes Mellitus, Hypertension. Age, obviously is an immutable patient characteristic and even, if it is a risk factor for wound infection.

In our study 19.33% were diabetic , anemia was seen in 6.66% , 2.66% of the patients had malignancy,3.33% had hypoproteinemia,6.66% were having UTI and respiratory infection were seen in 10%. Incidence of post operative wound infection in patients with diabetes mellitus was 17.24%, hypoprotenimia 20%, malignancies 25% , UTI 10%, RTI 6.66%, anemia 20%%(table3). [2] The cause for high incidence of post operative wound infection in patients with co-morbidity could be due to the reduced immunocompetence, wound healing factors, hyperglycemia and pre-existing infections.[3]

In our study most of the post operative infection were superficial type constituting 80% of infected cases while deep incisional were 20%.(figure1)

The incidence of post operative wound infection was highest in patients with obstructed inguinal hernia 20% and fore foot gangrene 20%,followed by duodenal perforation 13.33%(table4). The high incidence of post operative wound infection in obstructed inguinal hernia may be because of bowel manipulation during the procedure. Fore foot gangrene had high incidence of infection due to high incidence of diabetics mellitus among patients with gangrene which is a risk factor for post operative infection.

In this study incidence in relation to the type of surgery, highest incidence of post operative infection were for contaminated which is33.33% followed by clean contaminted7.1 4%,clean surgeries had only 5.88%(figure 2). Our study correlates with most series, incidence among contaminated cases are more due to the fact all cases were performed on emergency bases and most of them constituted bowel perforation cases. The difference in the rates of post operative wound infection between the clean and the clean contaminated wounds showed the effect of endogenous contamination and the difference in the rates of post operative wound infection between the clean contaminated and the contaminated wounds showed the effect of exogenous contamination. The endogenous or the exogenous contamination of the wounds by the organisms had a profound influence on the post operative wound infection.[4]

Out of 150 patients studied 15 patients had infection and single organisms were isolated in 46.66% of patients ,53.33% of patients had two types of organisms isolated . No patients had more than two isolates.

Most common organism isolated in our study is E-Coli 34.8%, followed by Staphylococci 21.7%, Klebseilla 17.4%,Pseudomonas13%,MRSA 8.7% ,Proteus 4.4% (fiigure4). In most cases of SSI the organism is usually patient's endogenous flora. In abdominal surgeries the opening of the gastrointestinal tract increases the likelihood of coliforms, gram negative bacilli which was our finding in this study. This group of Organisms tends to be endemic in hospital environment by being easily transferred from object to object, they also tend to be resistant to common antiseptics and are difficult to eradicate in the long term. This group of organisms is increasingly playing a greater role in the many hospital acquired infections.[5]

Staphylococcus is commonly isolated in clean contaminated 60% cases and 40% of clean wound. 75% of klebseilla was also associated with clean contaminated and 25% with contaminated wound. E-coli was most common with contaminated wound,50% of E-Coli was isolated from contaminated and37.5% of E-coli was isolated from clean contaminated, only 12.5% of E-Coli were isolated from clean wound. In our study Ecoli is most sensitive for imepenem (87.5%), amikacin, linezolid and netilmycin (75%) followed by cefperazone-sulbactum, piperacillin-tazobactum and azithromycin (62.5%) (table 7). Staphylococci is most sensitive for linezolid (100%) followed by imipenem, ceftazidime , cefotaxim and ceftriaxone (80%) . Pseudomonas is most sensitive for imipenem and cefotaxim (100%) followed by piperacillin-tazobactum, amikacin, linezolid and azithromycin(80%).MRSA is most sensitive to vancomycin, linezolid,clindamycin and piperaccilin and tazobactum (100%) (Table 8). Overall imipenem , amikacin and linezolid are the most sensitive antibiotics. E-coli is most resistant to gentamycin, ceftazidime, cefixime,ceftriaxone ,ciprofloxacin 87.5% . 100% of staphylococci is most resistant to cefperazone-sulbactum followed by cefixime, chloramphenicol(100%). Pseudomonas were most resistant to doxycycline(100%), cefperazone-sulbactum, ceftazidime, ciprofloxacin, gentamycin, ceftriaxone 66.7% each.100% of klebseilla were resistant to doxycyclin,cefixime, ciprofloxacin, gentamycin, ceftriaxone, clindamycin. All mrsa 100% were resistant to amikaccin cefperazone-sulbactum, ceftazidime, netilmycin, cefixime, chloramphenicol, doxycyclin, Azithromycin, cefotaxim, ciprofloxacin, gentamycin and ceftriaxone. The proportion of bacteria resistant to all antibiotics for which tested was as high as 63.93% (39/61). Most of the study showed that virtually all of the pathogens were resistant to the commonly prescribed antibiotics such as ampicillin and doxycyclin. The cultured aerobes also demonstrated less than 50% sensitivity to the cephalosporin's tested (ceftaxidine, cefuroxime and ceftriaxone) in over 80% of the infected patients. This finding further supports the well high prevalence of multiple antibiotic resistant nosocomial pathogens in our environment and may reflect the widespread abuse of antibiotics in the general population. The relative frequency of different isolates also varied between different studies. Thus, it can be concluded that the organisms that cause post operative wound infection change from place to place and from time to time in the same place[6]. The antibiotic sensitivity testing of different isolates showed multidrug resistance by most of the isolates. The literatures suggest that there is gradual increase in drug resistance to many antibiotics in most of the organisms which are isolated from surgical patients[7]. Present study reveals that even though post operative wound infection have been widely studied since long time, they still remain as one of the most important causes of morbidity and mortality in surgically treated patients. The steps taken to reduce post-operative infection are still not adequate. In future strict infection control measures and careful antibiotic policies can reduce post operative infection.

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SUMMARY AND CONCLUSION

Incidence of surgical site infection in this study was 10%. The highest number of post operative infection was observed in age group 61-70years. majority of the patients affected were male constituting 73.3% and females 26.7%.The infection rate was 66.7% in males and 33.3% in females.Maximum number of post operative wound infection was detected on 4th day following surgery.Patients with co-morbidities were at higher risk of post operative infection.Longer duration of surgery was associated with increased rate of post operative wound infection. The rate of infection was high in clean contaminated and contaminated wound and lowest in clean wounds. E- coli was the commonest organism isolated.E-coli were isolated maximum from contaminated and clean -contaminated cases. Overall imepenem and amikacin were the most sensitive antibiotics.

Even though the incidence of post operative wound infection has come down significantly with the advent of proper antibiotic usage and aseptic precautions .it is still a burden to the patient as well as to the treating surgeon.We may be able to further reduce the incidence of post operative wound infection by stricter adherence to antibiotic policy as well as proper pre, intra, post operative care.A surveillance programme for post operative wound infection has to be implemented by each hospital a regular review and implementation of guidelines is equally important.

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