Original Article

Sensitivity of Micro-Organism

Frequency and Sensitivity of Micro-Organism in Post-Operative Wound Infections: A Quest for Microbes

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ABSTRACT

Objective: To determine the frequency of common organisms involved in post- operative wound infection. To determine the sensitivity of micro-organism for different antibiotics.

Study Design: prospective cross-sectional descriptive study.

Place and Duration of Study: This study was conducted in 3 Surgical Units of Civil Hospital Karachi from April to September 2010.

Materials and Methods: 72 swab samples were collected from patients who had undergone operations in 3 Surgical Units of Civil Hospital Karachi during a period of 6 month from April to September, 2010. Samples were obtained from the hospital and processed in Civil hospital Karachi lab (Microbiology Department).

Results: Out of 72 bacterial isolates found in post-operative wound infection, 30 (41.66%) were E.Coli, followed by Klebsiella species 14 (19.44%), pseudomonas aeruginosa 13 (1.38%), staphylococcus aureus 6 (9.72%), providentia species 1 (1.38%), proteus mirabilis 1 (1.38%), Actinobacter 1 (1.38%) and no growth 6 (9.72%). The result showed that the occurrence of infection was higher in the age group between 20 -40 than any other group. There is no significant difference between male and female sexes in the occurrence of infection. Infection was more in the operation done under emergency circumstance than the elective ones. There was no significant association between infection, and co-morbidities and past history of wound infection. The sensitivity pattern of 4 main bacteria, Frequently found in the study i.e. E.coli, klebsiella, pseudomonas aeruginosa and s.aureus isolates, suggested that the organisms was more sensitive to imipenem, Amikacin sulphate, Ceftazidime, Cefperazone/Sulbactum and Pipercillin/Tazobactum than other groups of drugs.

Conclusion: The most causative organism was E.coli, infection higher among the patients operated in emergency and imipenem, Amikacin sulphate were found to be more sensitive.

Key Words: post-operative, wound infection, sensitivity, antibiotics

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INTRODUCTION

Infection is one of the leading causes that are responsible for high percentage of morbidity and mortality in surgical patients. Infection of a wound may be defined as invasion of organism through tissues following a breakdown of local and systemic host defenses[1].

post-operative wound infection after surgical operation may originate during the operation (primary wound infection) or may occur after the operation from sources in the ward or as a result of some complication (secondary wound infection)[2]. Wound infections are the commonest and most troublesome disorder of wound healing[3].

The introduction of antibiotics/antimicrobials and antiseptic techniques are considered to be an important and valuable success on the path leading to safe surgery. The antimicrobial agents also enable us to perform in many conditions that were thought to be unavoidable and impossible in the era that lacked the factors of antibiotics and antiseptics.[4]The discovery of effective antibiotics and the adoption of antiseptic techniques and measures has been an important milestone in order to prevent infections. Even with all the development and advancement, post-operative wound infection have not been eliminated and is still a burning issue in Pakistan like certain other developing and also developed countries.

Wound infections after contaminated operations are usually caused by normal bacterial flora on the opened and incised mucus membranes. [4, 5]

Infection in a wound is basically a manifestation of unbalanced see-saw played between host and bacteria in which the plank leans on the bacterial equilibrium is in favor of bacteria.[6]

The absolute prevention of surgical wound infections seems to be an impossible goal. Nosocomial infection is the second commonest cause of post-operative wound infection[7] and cause discomfort, prolonged hospital stay, more day off work and increment cost of therapy for the patient.[8]

This study has been designed to determine the different factors and variables that have impact on producing post-operative wound infection and to analyze the antimicrobial sensitivity of commonly used antibiotics in the hospital.

MATERIALS AND METHODS

This is a prospective cross-sectional descriptive study conducted in 3 surgical units of Civil hospital Karachi from April to September 2010. Each surgical unit is a 40 bedded unit with admitting once a week.

All patients of more than 12 years of age were admitted. All patients with surgical site infection or a discharging wound post-operatively were included. Wound infection developed within 25 days of surgery were included. Wound infection was diagnosed and labeled with the presence of at least one of the signs and symptoms of infection i.e. fever, itching, pain and soreness, purulence and localized swelling around the area of wound, a rising a total leukocyte count and bacterial growth on blood cultures.

Patients not giving an informed consent, or having a wound infection but not have been operated in Civil hospital Karachi were excluded.

A pretested questionnaire was used to enter the information which included age, gender, co-morbid conditions such as diabetes mellitus, hypertension, tuberculosis etc., past history of wound infection, type of surgery, characteristics of wounds and organisms isolated with antibiotic sensitivity were recorded.

The statistics were reported after calculation by SPSS version 17.0 version on computer.

The specimens of pus were collected from the patients by following the aseptic techniques with sterile cotton wool swab.

Several media and tests were used for the isolation, identification and testing the susceptibility of the isolates for common used antibiotics. The media used were Blood agar, MsConkey agar, chocolate agar, nutrient agar, Mannitol salt agar, Simmons citrate agar, kligler iron agar, Mueller-Hinton agar Sulfide formation indole production, motility test, thioglycollate broth, coagulase, catalase, urease, oxidase tests.

After overnight incubation (37^0 C in ambient air 16-18 hours; upto 24 hours), the culture plates were examined for growth. Identification was performed both microscopically and macroscopically by using standard biochemical techniques.

RESULTS

A total of 72 samples were obtained from the patients of 3 general surgery units suffering from the post-operative wound infection and the specimens were sent to the microbiology lab for culture and sensitivity report. The most common surgical procedure was exploratory laprotomy, followed by appendectomies.

The age groups were divided into 3 categories as shown in table-1. Majority patients (48.6%) were between 12-31 years of age. Gender distribution was almost equal. There were 37 (51.3%) males.

Fifty six (77.7%) patients with wound infection did not have any co- morbidities while 16 (22.2%) had co-morbidities. Out of these 16 patients, 9 had diabetes mellitus, 5 had hypertension, one had hepatitis C, 2 patients had hepatitis B and 2 had tuberculosis.

Out of 72, 67 (93.05%) had no past history of wound infection. Among the 72 surgeries which developed post operative wound infection, 26 (36.11%) were elective surgeries and 46 (63.88%) were emergency surgeries.

Table No.1: Age Distribution

Age	Frequency (%)	Percent
12-31	35 (48.6)	48.6
32-51	28 (38.8)	13.88
52-71	9 (12.5)	5.55
Total	72	100.0

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Table No.2: Sensitivity Pattern of Micro-Organism for Different Antibiotics

Antibiotics	Micro-organisms			
	E.coli (n=30)	Klebsiella Species (n=14)	Pseudomonas aeruginosa (n=13)	Staphylococcus aureus (n=6)
Imipenem	20	8	10	5
Amikacin	16	17	5	3
Augmentin	0	0	0	5
Ceftazidime	15	7	1	1
Oflaxacin	3	5	0	2
Sparfloxacin	5	5	7	2
Cefperazone/Sulbactum	19	9	13	0
Ceftizoxime	9	7	0	1
Ciprofloxacin	5	5	3	2
Pipercillin/Tozabactum	13	4	9	0
Ceftriaxone	2	1	3	1

The most common causative organism was Escherichia coli 30 (41.66%), followed by by Klebsiella species 14 (19.44%), Pseudomonas areuginosa 13 (1.38%), Staphylococcus aureus 6 (9.72%), providentia species 1 (1.38%), proteus mirabilis 1 (1.38%), Actinobacter 1 (1.38%) and no growth 6 (9.72%). Organism sensitivities is shown in table-2.

Following drugs are used as prophylaxis due to easy availability and economic conditions of our patients. Ceftriaxone, Amoxicillin clavulanate, Ciprofloxacin, Gentamycin and Metronidazole are given. This study shows that Imipenem and Amikacin were the most sensitive antibiotics.

DISCUSSION

Our study found E. Coli to be the commonest causative organism followed by Klebsiella, pseudomonas and staphlococcus respectively. Similarly study conducted on 200 patients in Islamabad showed 70 (30%) were e.coli, followed by klebsiella species 50 (25%), cloacae 30 (15%) and proteus mirabilis 20 (10%). Infection was found to be most common among age group b/w 50-60 years.[9] While another study conducted in the same hospital on 11 patients found Staph. aureus as the commonest organism followed by E. coli, streptococcus and Pseudomonas.

According to study held in civil hospital Karachi, Pakistan (Dow university of health sciences) in the year 2006; out of 11 infection wounds. 5(45.5%) were S.aureus, followed by E.Coli 3 (27.7%), S.pyogens 1(9.1%), E.coli and pseudomonas asruginosa 2 (18.2%).[10]

A study conducted in Hyderabad on 112 infected wounds, found E. Coli to be the commonest organism followed by klebsiella species and staphylococcus epidermidis.[11] Penicillin derivatives (pipercillin and tazobactum) and Carbapenem (imipenem and meropenem) were the most sensitive antibiotics covering all the organism isolated in this study. Cephalosporins were found to be ineffective against the common pathogens.[11] In contrast our study found that Imipenem and Amikacin sulphate were the most sensitive antibiotics.

In Nigeria 60 infected wounds were examined, in 20 (33.3%) patients pseudomonas was isolated followed by staphylococcus aureus 13 (21.7%), klebsiella species 10 (16.7%).[12] According to study held in Jordan conducted on 115 infected wound, 20 (27.8%) were pseudomonas, aeruginosa, Ecoli 18 (15.6%) and , staphylococcus aureus 17 (14.7%) and 15 (13%) Acinetobacter calcoaceticus.[13]

In Mymensingh Medical College Hospital, total 74 clinical sample were taken. Bacterial growth was yielded in 43 samples and the distribution of isolates was as follows: Pseudomonas spp 16, Esch.coli 13, Staphylococcus aureus 08, Klebsiella spp. 03 and others 03. All the Esch.coli and Klebsiella isolates were resistant to amoxicillin.[14] Ceftriaxone (65.6% and 100% respectively) and ciprofloxacin (71.4% and 100%) still appeared to be highly sensitive for both species. Over 93% strains of Pseudomonas were sensitive to Ceftazidime and aztreonam. Whereas, 100% of those strains were sensitive to cloxacillin. Over 50% of all isolates were sensitive to gentamicin but resistant to cefalexin and cotrimoxazole.[14]

In another study 516 bacterial isolates were obtained from 502 pus samples, collected from post operative wound infections. Staphylococcus aureus was the most frequently isolated bacteria followed by Escherichia coli than Pseudomonas aeruginosa and Klebsiella pneumoniae. Majority of the isolates were resistant to ampicillin, ampicillin-clavulanic acid, cefuroxime, cefotaxime, fluoroquinolones and cotrimoxazole.[15]

CONCLUSION

This study concludes that despite of modern Surgical and antiseptic techniques and prophylactic use of antibiotics, post-operative wound infection is still a major contributory factor of patient's morbidity. E.coli was found to be the most common causative organism. Type of surgery (elective and emergency) was an important factor.

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