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Bacteriological profile of post surgical wound infections: A one year retrospective study from a government orthopaedic hospital

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Abstract

Post-operative wound infection is a severe problem in the surgical specialization and is an important cause of morbidity and mortality. In most of these wound infections the causative agents arise from the endogenous flora of the patient's skin, mucous membranes or hollow viscera. Advances in the control of infection have not completely eradicated this problem because of development of drug resistance.

Aim: The main objective of this study was to determine the causative aerobic bacteria and their antimicrobial susceptibility from pus specimens of post-operative wound infections.

Materials and Method: The study was conducted using pus culture and sensitivity reports collected retrospectively from the records maintained in the Department of Microbiology over a period of one year from January 2015 – January 2016 in our Hospital. A total of 290 pus samples were received and were processed by doing Gram stain, Culture, Biochemical identification and Susceptibility testing. Out of 290 samples 218 samples were from IPD and 72 were from OPD.

Results: During the study period, 290 pus culture and sensitivity reports were analyzed (99 samples (34.14%) of the samples showed no growth). 191 samples (65.86%) showed growth i.e. culture positive. Pseudomonas aeruginosa was most frequently isolated organism (21.63%) followed by Staphylococcus aureus (14.65%). Pseudomonas species were mostly sensitive to Imipenem (70%) & Meropenem (50%). Staphylococcus aureus were mostly sensitive to Netilmicin (100%), Linezolid (100%) followed by Chloramphenicol (97%), Tetracycline (94%) & Clindamycin (91%). Other gram negative isolates were Enterobacter species, Klebsiella species and Escherichia coli.

Conclusion: Knowledge about the bacteriological profile and their antibiotic susceptibility pattern of post-operative wound infections can serve as a useful tool for the clinicians to start empirical treatment of patients at the earliest, according to local pattern and emerging multidrug resistance and also to give importance to strict infection control practices and periodic surveillance.

Keywords: Bacteriology, Pus culture, Post-surgical wound infection, Sensitivity

Introduction

Post-operative wound infections are one of the most common hospital acquired infections and are an important cause of morbidity and account for 70% – 80% mortality. Development of such infections represent delayed healing, cause anxiety and discomfort for patient, longer stay in the hospital and add to the cost of health care services significantly.(1) Also they are likely to have an important role in the development of antimicrobial resistance. Most of these are superficial and readily treated with a regimen of local care and antibiotics. Determination of etiologic agent is important in choosing the correct antibiotics. A working knowledge of the most likely causative organism and the prevailing antibiotics sensitivity and resistance pattern will be of great help in treating such infections.(2) In most post-operative wound infections the causative pathogens originate from endogenous flora of the patients skin, mucous membrane or hollow viscera.(3) S.aureus, Klebsiella species, E.coli, Proteus speices, Streptococcus species, Enterobacter species, Pseudomonas species and CONS (Coagulase negative Staphylococci) were reported as the most common pathogens.(4) The present study was undertaken to analyze the pattern of pathogens involved in wound infections and their antibiotic sensitivity, isolated from pus sample/culture in a government Orthopedic Centre.

Materials and Method

The study was conducted in the Department of Microbiology, Sanjay Gandhi Institute of Trauma and Orthopaedics, Bangalore, over a period of one year from Jan 2015 – Jan 2016. The study population included patients admitted to different wards in the hospital and also those attending the outpatient department with the mean ages from 1 year to 80 years. Discharge and wound/pus swabs from the wounds of 290 patients presenting either to OPD/IPD were collected with aseptic precautions prior to initiation of empiric antibiotic therapy. Two swabs were collected. One swab was used for smear preparation and gram's stain. The second swab was used for aerobic bacterial culture by inoculation on various culture media like Blood agar, Macconkey agar, Thioglycollate broth etc. The isolates were identified by relevant biochemical tests.(5) The isolates were subjected to antibiotic susceptibility testing by Kirby – Bauer disc diffusion method, as per CLSI guidelines.(6)

Results

In the present study, a total number of 290 pus samples were received for processing to the Microbiology Department among which 218 were from wards (in patient samples) and 72 were from outpatient department. 99 (34.14%) samples showed no growth in culture after 48hrs of incubation. Remaining 191 samples (65.86%) showed growth i.e. culture positive, 7 samples grew 2 types of organisms in culture. Out of 191 (65.86%) samples which showed culture positive, 65 samples (34.03%) samples grew Coagulase negative Staphylococci and few samples grew Diptheroids which were considered as skin commensals and were not considered as pathogens. The main pathogens among gram positive cocci were Staphylococcus aureus among which Methicillin Sensitive Staphylococcus aureus (MSSA) - 13, Methicillin Resistant Staphylococcus aureus (MRSA) – 15 totalling to 28(14.65%), Streptococcus pyogens Group A 3(1.57%) and Enterococcus species 3(1.57%). Among the gram negative bacilli, Pseudomonas aeruginosa constituted 36(18.84%), Enterobacter species 24(12.56%), Escherichia coli 14 (7.32%), Klebsiella Species 10(5.23%), Acinetobactor species 6 (3.14), Citrobacter species 5 (2.61%) and Moraxella species 1(0.52%). Antimicrobial susceptibility testing of the bacterial isolates was done by Kirby Bauer disc diffusion method.

Table 1: Showing the organisms isolated in pus samples

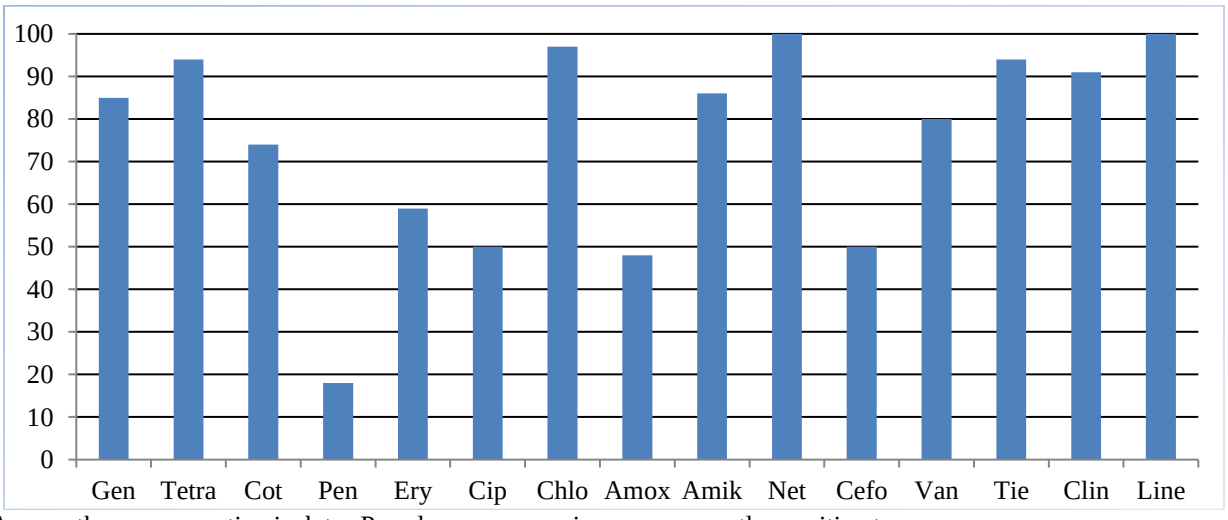
SL. No.			Total
No of samples			290
In patient samples			218
Outpatient samples			72
No growth			99
Coagulase Negative Staphylococcus			65
GPC	Staphylococcus aureus	MRSA	15
		MSSA	13
	Streptococcus pyogens		03
	Enterococcus feacalis		03
GNB	Lactose Fermenters	Citrobacter fruendii	02
		Citrobacter diversus	03
		Enterobacter species	24
		Klebsiella species	10
		Escherichia.coli	14
	Non Lactose Fermenters	Proteus species	03
		Pseudomonas aeruginosa	36
		NFGNB	06

Among the gram positive cocci, Staphylococcus aureus was mostly sensitive to

Table 2: Showing drugs to which Staphylococcus aureus was sensitive

Sl No.	Antibiotic	Sensitive (%)
1	Netilmicin	100
2	Linezolid	100
3	Chloramphenicol	97
4	Tetracycline	94

Antibiotic Sensitivity pattern: Pus – S. aureus n=28



Among the gram negative isolates Pseudomonas aeruginosa were mostly sensitive to

Table 3: Showing drugs to which Pseudomonas aeruginosa was sensitive

Sl No	Antibiotic	Sensitive (%)
1	Imipenem	79
2	Meropenem	63
3	Amikacin	62
4	Piperacillin + Tazobactem	60

Enterobacter species were sensitive to

Table 4: Showing drugs to which Enterobacter species was sensitive

Sl No	Antibiotic	Sensitive (%)
1	Netilmicin	50
2	Meropenem	55
3	Imipenem	63

Escherichia coli were sensitive to

Table 5: Showing drugs to which Escherichia coli was sensitive

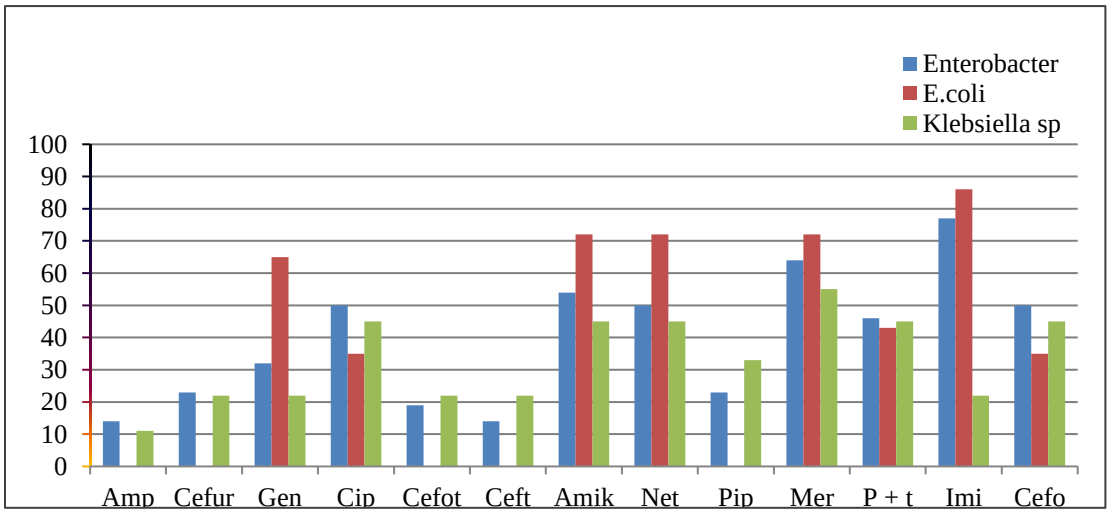
Sl No	Antibiotic	Sensitive (%)
1	Gentamicin	65
2	Amikacin	71
3	Netilmicin	71
4	Imipenem	71
5	Meropenem	71

Klebsiella species were sensitive to

Table 6: Showing drugs to which Klebsiella species was sensitive

Sl No	Antibiotic	Sensitive (%)
1	Amikacin	45
2	Piperacillin + Tazobactem	45
3	Cefoperazone + Salbactam	45

Antibiotic Sensitivity pattern: Pus – Enterobacter spp n =24, E.coli n=14, Klebsiella spp n=10



Most of the isolates were sensitive to Aminoglycoside group of antibiotics. The presence and profile of microorganism in any wound will be influenced by the factors such as wound type, depth, location and quality, the level of tissue perfusion and the antimicrobial effect of the host immune response.[7]

Discussion

The problem of Post-operative wound infections is seen in both developed and developing countries, despite introduction of meticulous antiseptic regimen in surgical practice. It can occur either from exogenous or endogenous source.

Gram negative bacteria such as Pseudomonas, Enterobacter species, Escherichia coli, Klebsiella species and gram positive cocci such as Staphylococcus aureus are the common causative agents of various pyogenic wound infections. The emerging resistant genes in such bacteria by various mechanisms are a matter of concern.

In our study, gram negative bacilli were dominant as the causative agent of pyogenic lesions which was also true, according to Zubair et al.[8]

Staphylococcus aureus 28 (14.65%) was the most common gram positive organism as shown in studies by Tiwari et al[9] and Lee C Y et al.[10] The prevalence of MRSA isolates among Staphylococcus aureus was 15/28 (53.57%) similar to Pramila et al. Pseudomonas aeruginosa 36 (18.84%) was the most common gram negative bacterial isolate which was in accordance both Basu et al.[11]

Many studies have reported Staphylococcus aureus as the commonest isolates from the post-operative wound infections. Other organisms have shown varied preponderance in different studies. Staphylococcus aureus forms the bulk of the normal flora of skin and nails. Hence, it is the commonest organism found in wound infections. High incidence of gram negative organism can be attributed to be acquired from patient's normal endogenous micro flora.[12]

Our study reveals Staphylococcus aureus showing highest sensitivity to Netilmicin (100%) and Lenezolid (100%) followed by Chloramphenicol 97%, Tetracyclin 94% and Clindamycin 91% which was similar to study done by Varsha et. al.[13]

Pseudomonas aeruginosa showed varied degree of sensitivity to Gram negative drugs highest being Imipenem 74%, Meropenem 63%, Amikacin 62% and Piperacillin + Tazobactam 60%, Ceftazadime 59%, this was similar to study conducetd by Vijets Sharma et al.[14]

Among gram negative lactose fermenters belonging to family Enterobacteriaceae predominant organism was Enterobacter species followed by E.coli and Klebsiella species. Most of them were ESBL producers and high degree of susceptibility was shown to Carbapenems and Aminoglycoside group of antibiotics. These studies were compared to other studies like Soumya kaup and Jaya Sankarankutty (2014) and Rajeshwar et al (2014).[14]

Conclusion

This study revealed the presence of Post-operative wound infections caused by various aerobic bacteria. The commonest isolates of Post-operative wound infection being Pseudomonas aeruginosa, Staphylococcus aureus, Enterobacter species, Eshcherichia coli and Klebsiella species. Hence, knowledge of the most common causative agents of infection and their antimicrobial susceptibility pattern in very essential for the judicious administration of empirical therapy before the culture results are available. Antimicrobial susceptibility of microorganism varies from time to time and from place to place. Hence regular monitoring of isolates and their susceptibility pattern is required. Also inappropriate and prolonged use of antibiotics should be avoided as this can lead to development of antimicrobial resistance which is difficult to treat and get rid of.

The information obtained from this study allows better understanding of the microbial etiology of wound infections in our Institute which may have epidemiological and therapeutic implications. Also the study concludes the need of strict infection control practices in order to be bring down such post-operative wound infections.

References

1. Aizza Zafar, Naeem Anwar, Hasan Ejaz. Bacteriology of Infected Wounds – A Study Conducted at Children's Hospital Lahore. Biomedica Jan. – Jun. 2008; Vol.24:71-74.
2. Khyati Jain, Nilesh Shyam Chavan, S.M. Jain. Bacteriological profile of post – surgical wound infection along with special reference to MRSA in central India, Indore. Int J Intg Med Sci 2014;1(1):9-13.
3. Subrata Roy. Bacteriological Profile of Post-Operative Wound Infection. Asian Journal of Biomedical and Pharmaceutical Sciences 2016; 6(53): 44-46.
4. Reiye Esayas Mengesha, Berhe Gebre Slassie Kasa, Muthupandian Saravanan, Derbew Fikadu Berhe and Araya Gebreyesus Wasihun. Aerobic bacteria in post-surgical wound infections and pattern of their antimicrobial susceptibility in Ayder Teaching and Referral Hospital, Mekelle, Ethiopia. BMC Research Notes 2014;7:575.
5. Bailey. Forbes BA, Sahm DF and Weissfeld AS Ed. Bailey & Scotts Diagnostic Microbiology. 12th edition Mosby, USA. Elsevier publishers; 2007.
6. Clinical and Laboratory Standards Institute. Performance Standards for Antimicrobial Susceptibility Testing; Twenty third Informational Supplement. CLSI document M100-S23;2013.
7. S. Madhavi, S. Shazia Parveen; Bacteriological Profile and Antimicrobial Sensitivity of Wound Infections; Int J Curr Microbiol App Sci ISSN: 2319-7706. 2015;4(12):248-254.
8. Zubair M, Malik A, Ahmad J. Clinico-microbiological study and antimicrobial drug resistance profile of diabetic foot infections in North India. Foot 2011Mar; 21(1):6-14. Epub 2010 Dec 4.
9. Tiwari P, Kaur S. Profile and sensitivity pattern of bacteria isolated from various cultures in a Tertiary Care hospital in Delhi. Indian J Public Health.2010Oct-Dec;54(4):213-5.
10. Lee CY, Chen PY, Huang FL, Lin F. Microbiologic spectrum and susceptibility pattern of clinical isolates from the pediatric intensive care unit in single medical center-6 years' experience. J Microbiol Immunol Infect.2009 Apr;42(2):160-5.
11. Basu S, Ramchuran Panray T, BaliSingh T, Gulati AK, Shukla VK.; A prospective, descriptive study to identify the microbiological profile of chronic wounds in outpatients. Ostomy Wound Manage.2009 Jan;5(1):14-20.
12. Naveen Kikkeri ,Hanumantha Setty, Manjunatha Shimoga Nagaraja, Dinesh Halumatthigatta Nagappa, Chandrakumar Seegekote Giriyaiah, Naveen Ramanagaram Gowda, Revathi Devi Mysore Laxmipathy Naik A study on Surgical Site Infections (SSI) and associated factors in a government tertiary care teaching hospital in Mysore, Karnataka International Journal of Medicine and Public Health . Apr-Jun 2014;4(2):171-175.
13. Varsha Shahane, Saikat Bhawal, Upendra Lele. Surgical site infections: A one year prospective study in a tertiary care center. International Journal of Health Sciences, Qassim University. Jan 2012/ Safar 1433H;6(1):79-84.
14. Vijeta Sharma, Geeta Parihar, Vijaylaxmi Sharma, Harshita Sharma. A Study of Various Isolates from Pus Sample with Their Antibiogram from J in Hospital, Ajmer, IOSR Journal of Dental and Medical Sciences (IOSR-JDMS) e-ISSN: 2279-0853, p-ISSN: 2279-0861. Oct. 2015;14(10) Ver VI: 64-68.

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