

ANTIMICROBIOLOGICAL PROFILE AND EPIDEMIOLOGY OF ORGANISM ISOLATED FROM SURGICAL SITE INFECTION

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ABSTRACT

BACKGROUND

Infection that occurs in the wound created by a surgical procedure is generally called as surgical site infection.⁽¹⁾ Surgical site infection is a frequent complication of surgery and its incidence varies from 0.5 to 15% depending upon the type of surgery and status of the patient.

MATERIAL AND METHODS

This study was conducted over a period of 16 months and sample was collected from various surgical departments of Konaseema Institute of Medical Science, Amalapuram. Standard operating procedures for sample collection, transport, culture and susceptibility testing for isolated organisms were followed to ensure procedural quality. Swab samples were plated on nutrient agar, blood agar, and MacConkey agar medium.

RESULT

Staphylococcus was the most common organism isolated. But Gram-negative organism was more common organism resistant to commonly used antibiotic.

CONCLUSION

Idea about the antimicrobial sensitivity pattern is essential for selection of drugs. Every institution should have an antimicrobial use policy as per the resistance pattern of organism. So a longterm and large scale study is required to have the idea and detail of resistance pattern.

KEYWORDS

Surgical Site Infection, Epidemiology, Antimicrobiological Profile.

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INTRODUCTION: Infection that occurs in the wound created by a surgical procedure is generally called as surgical site infection.⁽¹⁾ Surgical site infection is a frequent complication of surgery and its incidence varies from 0.5 to 15% depending upon the type of surgery and status of the patient. These are significant problems which will decrease the benefit of surgical procedure. The impact on hospital cost and postoperative length of stay is considerable.^(2,3,4,5) It is defined as purulent discharge around the wound or the insertion site of the drain or spreading cellulitis from the wound.^(6,7) Various microorganisms have been isolated from surgical site infection. Pattern and sensitivity of microorganism varies. In some studies, Staph aureus is the common organism, but in some study E. coli is common. Sensitivity of isolated organism also varies. The objective of present study was to know the pattern of bacteria and antimicrobial sensitivity pattern of bacteria isolated from surgical site infection.

MATERIAL AND METHODS: This study was conducted over a period of 16 months and sample was collected from various surgical departments of Konaseema Institute of Medical Science, Amalapuram. Before start of the study, permission was obtained from Institutional Ethics Committee. Standard operating procedures for sample collection, transport, culture and susceptibility testing for isolated organisms were followed to ensure procedural quality. Swab samples were plated on nutrient agar, blood agar, and MacConkey agar medium. Identification of microorganisms growing on the agar plates was performed by conventional methods (Gram-staining, motility test, oxidase testing and catalase testing). The Kirby-Bauer disc diffusion method on Mueller–Hinton agar (MTIA) plates was used for susceptibility test. CLSIS (Clinical and Laboratory Standards Institute) criteria for susceptibility and resistance was followed.

RESULT: During 16 months of study, eighty-four samples were collected for analysis from various surgical departments. Out of 84 samples, 61 were from male patients and 23 were female patients. Mean age of the patients was 45.64. 15 samples were found sterile, two samples have growth of mixed pathogen, but single pathogen was isolated in 67 samples. Out of 67 samples, 51 were Gram-negative and 20 were Gram-positive.

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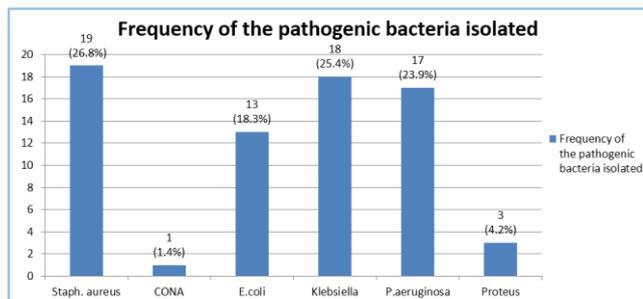


Table 1

Regarding frequency of individual pathogen isolated 19 were staphylococcus aureus, followed by Klebsiella. Out of 84 samples 17 were pseudomonas aeruginosa, 13 isolates

were identified as E. coli. 3 samples were Proteus and only one was coagulase-negative staphylococci.

Age	Male	Female	Total
0 to 10	0	2	2
11 to 20	6	1	7
21 to 30	10	4	14
31 to 40	6	2	8
41 to 50	15	4	19
51 to 60	15	4	19
61 to 70	6	6	12
>70	3	0	3
Total	61	23	84

Table 2

Drug resistance pattern of Gram-positive organisms (S. aureus)				Drug resistance pattern of Gram-positive organisms (CONA)	
Amoxiclav	6	Ceftriaxone	3	Clindamycin	1
Amikacin	1	Cefotaxime	5	Co-trimoxazole	1
Ampicillin /Sulbactam	2	Ceftazidime	2	Ceftriaxone	1
Azithromycin	6	Erythromycin	9	Gentamicin	1
Chloramphenicol	1	Gentamycin	1	Lomefloxacin	1
Clindamycin	4	Lomefloxacin	8	Norfloxacin	1
Cefixime	4	Norfloxacin	4		
Ciprofloxacin	5	Ofloxacin	12		
Co-trimoxazole	7	Piperacillin/Tazobactam	4		

Table 3

Drug Resistance Pattern of Gram-negative Organisms (E. coli)			
Amoxiclav	7	Ceftriaxone	6
Amikacin	3	Cefotaxime	11
Ampicillin /Sulbactam	5	Ceftazidime	8
Azithromycin	1	Gentamycin	1
Cefixime	4	Lomefloxacin	8
Ciprofloxacin	5	Norfloxacin	4
Co-trimoxazole	1	Ofloxacin	5
Tobramycin	1	Piperacillin/Tazobactam	5

Table 4

Drug Resistance Pattern of Gram-negative Organisms (Klebsiella)			
Amoxiclav	10	Ceftriaxone	10
Amikacin	4	Cefotaxime	7
Ampicillin /Sulbactam	8	Ceftazidime	13
Azithromycin	2	Gentamycin	5
Chloramphenicol	1	Lomefloxacin	9
Clindamycin	1	Nalidixic acid	2
Cefixime	10	Norfloxacin	3
Cefixime	1	Ofloxacin	10
Ciprofloxacin	2	Piperacillin/Tazobactam	2
Co-trimoxazole	7	Teicoplanin	1
Tobramycin	5		

Table 5

Drug Resistance Pattern of Gram-negative Organisms (P. aeruginosa)			
AMC	9	Ceftriaxone	7
Amikacin	1	Cefotaxime	5
Ampicillin/Sulbactam	11	Ceftazidime	12
Chloramphenicol	3	Gentamycin	6
Cefixime	10	Lomefloxacin	4
Ciprofloxacin	3	Linezolid	1
Co-trimoxazole	6	Nalidixic acid	2
Erythromycin	1	Norfloxacin	1
Levofloxacin	1	Ofloxacin	5
Nitrofurantoin	1	Piperacillin/Tazobactam	2
Tobramycin	2	Teicoplanin	1

Table 6

Drug Resistance Pattern of Gram-negative Organisms (Proteus)			
Clindamycin	1	Lomefloxacin	2
Co-trimoxazole	2	Nitrofurantoin	1
Cefotaxime	2	Norfloxacin	1
Ceftazidime	1	Ofloxacin	2
Erythromycin	1	Piperacillin/Tazobactam	1
Clindamycin	1	Lomefloxacin	2

Table 7

Drug Resistance Pattern of Organism Staphylococcus

Aureus: Out of 19 isolates, maximum number of samples were resistant to quinolones followed by cephalosporin, and macrolides, staphylococcus aureus was also resistant to sulphonamide. Out of 18 Klebsiella isolated, most of them were resistant to quinolones and cephalosporin. Five samples of Klebsiella were resistant to tobramycin, two samples were resistant to teicoplanin also. Next, common organism isolated was pseudomonas aeruginosa that are 17 in number. Most of them are resistant to β -lactam. Antibiotic resistance to tobramycin, teicoplanin was also observed. They have variable resistance to quinolones, like 5 isolates were resistant to ofloxacin, three isolates were resistant to ciprofloxacin.

E. coli was also resistant to cephalosporin and quinolones. Their isolates were resistant to Amikacin also. Coagulase-negative Staphylococcus aureus was resistant to clindamycin, co-trimoxazole, ceftriaxone, gentamycin, lomefloxacin and ofloxacin. Proteus was found to be resistant to clindamycin, co-trimoxazole, ceftriaxone, ceftazidime, erythromycin and ofloxacin.

DISCUSSION: Total 84 specimens were collected from various surgical departments for study. Out of that 18% samples were sterile. Age and Sex distribution of samples shows that infection was very common in 40 to 60 years of age and frequency was more in males than females. Out of all, the organisms isolated 60.71% of the sample were Gram-negative and 29.30% of the sample were Gram-positive which is similar to the study of Amutha et al.⁽⁸⁾ Out of all organisms isolated, Staph aureus was the most common organism isolated and E. coli and Pseudomonas were the next common organisms isolated which is similar to the work of other authors.^(9,10) But Alisa et al found that E. coli was the most common organism present in SSI in a study of Pakistan University,⁽¹¹⁾ may be due to variation in sample collection or type of surgery.

Regarding drug resistance pattern of organism isolated it was found that bacteria isolated was resistant to most of the frequently used antimicrobial agents. Frequency of resistance was different for different group of drugs and also it varies in different organisms. Staphylococcus aureus was resistant to quinolones and β -lactam antibiotic. Pseudomonas was resistant to cephalosporin, but it was sensitive to linezolid and teicoplanin, only one isolate was resistant to that which is similar to the study of various authors.^(12,13)

CONCLUSION: Postoperative infection is still a major complication of modern surgery across the globe. It increases the mortality and morbidity and also the cost of health services. In addition to that the resistance of organism towards commonly used drug is also a major problem. So judicious use of antimicrobial agent is required, both preoperatively and postoperatively. Idea about the antimicrobial sensitivity pattern is essential for selection of drugs. Every institution should have an antimicrobial use policy as per the resistance pattern of organism.

So a longterm and large scale study is required to have an idea and detail of resistance pattern.

REFERENCES

1. Smyth ET, McIlvenny G, Enstone JE, et al. Four country healthcare associated infection prevalence survey 2006: overview of the results. *Journal of Hospital Infection* 2008;69(3):230-248.
2. Brachman PS, Dan BB, Haley RW, et al. Nosocomial surgical infections: incidence and cost. *Surg Clin North Am* 1980;60(1):15-25.
3. Fabry J, Meynet R, Joron MT, et al. Cost of nosocomial infections: analysis of 512 digestive surgery patients. *World J Surg* 1982;6(3):362-365.
4. Prabhakar P, Raje D, Castle D, et al. Nosocomial surgical infections: incidence and cost in a developing country. *Am J Infect Control* 1983;11(2):51-56.
5. Kirkland KB, Briggs JP, Trivette SL, et al. The impact of surgical-site infections in the 1990's: attributable mortality, excess length of hospitalization and extra costs. *Infect Control Hosp Epidemiol* 1999;20(11):725-730.
6. Prevention of Hospital-Acquired Infections: a Practical Guide. 2nd edn, WHO/CDS/CSR/EPH/2002.12.
7. Clinical and Laboratory Standards Institute. Performance standards for antimicrobial susceptibility testing: eighteenth informational supplement. Clinical and Laboratory Standards Institute, Wayne, PA, USA 2008;28(1):M100-S18.
8. Amutha B, Viswanathan T. A retrospective study on the pattern of pathogens isolated from surgical site wound infection in tertiary care hospital in Coimbatore, India. *International Research Journal of Medical Science* 2014;2(10):1-6.
9. Vidyadhar B Bangal, Sai K Borawake, Kunaal K Shinde et al. Study of surgical site infections following gynaecological surgery at tertiary care teaching hospital in Rural India. *International Journal of Biomedical* 2014;5(2):113-116.
10. Dinda Victor, Gunturu Revathi, Kariuki Sam, et al. Pattern of pathogens and their sensitivity isolated from surgical site infections at the aga khan university hospital, Nairobi, Kenya. *Ethiop J Health Sci* 2013;23(3):141-149.
11. Cantlon CA, Stemper ME, Schwan WR, et al. Significant pathogens isolated from surgical site infections at a community hospital in the Midwest. *Am J Infect Control* 2006;34(8):526-529.
12. Ali SA, Tahir SM, Memon AS, et al. Pattern of pathogens and their sensitivity isolated from superficial surgical site infections in a tertiary care hospital. *J Ayub Med Coll Abbottabad* 2009;21(2):80-82.
13. Aniruddha S Mundhada, Sunita Tenpe. A study of organisms causing surgical site infections and their antimicrobial susceptibility in a tertiary care Government Hospital. *Indian Journal of Microbiology and Pathology* 2015;58(2):195-200.