(International Print/Online Journal)

SJIF IMPACT FACTOR: 4.617
GADIF IMPACT FACTOR: 1.49

ISSN (Print): 2209-2870
ISSN (Online): 2209-2862

International Journal of Medical Science and Current Research (IJMSCR)
Available online at: www.ijmscr.com
Volume1, Issue 3, Page No: 83-86
September-October 2018

IJMSCR

Bacteriological Profile of Surgical Site Infections and Their Antibiogram At A Tertiary Care Centre

Dr Prathiba 1, Dr Taruni 2

1. Associate Professor, Department of Microbiology, Gandhi Medical College, Secunderabad,Telangana.
2. Assosciate Professor, Department of Microbiology, Government Medical College, Siddipet, Telangana

Corresponding Author:
Dr Taruni
Assosciate Professor, Department of Microbiology,
Government Medical College, Siddipet, Telangana

Type of Publication: Original Research Paper
Conflicts of Interest: Nil

ABSTRACT

Surgical site infections (SSI), one of the most common causes of healthcare associated infections are a common complication associated with surgery. The importance of wound infections, in both economic and human terms, should not be underestimated. This study aims to find out common bacterial isolate and their antibiotic resistance pattern, the incidence of ESBL producers and MRSA in wound infections. Wound swabs from 578 patients were analyzed in the study. The predominant isolate was found to be Gram positive bacteria than Gram negative bacteria.However Staphylococcus aureus was seen as the most common bacterial pathogen followed by Klebsiella pneumoniae and Pseudomonas aeruginosa. By employing standard microbiological techniques meticulously the causative agents can be isolated and antimicrobial sensitivity can be assessed for proper management of wound infection.

Keywords: NIL

INTRODUCTION

Surgical site infections (SSI), one of the most common causes of healthcare associated infections are a common complication associated with surgery, with a reported incidence rates of 2-20% [1]. Surgery has made great advances in last 3 quarters of this century and postoperative wound infection is the most common complication faced by surgeon since the advent of surgery. The importance of wound infections, in both economic and human terms, should not be underestimated [2]. In a study on an average, patients with an infected wound stay about 6-10 days more than if the wounds heal without infections [3]. A number of local factors such as hematomas, seromas, suture material, poor surgical technique, degree of contamination and also age, nutrition, hygiene, and other associated diseases play an important role in the etiology of Surgical site infections. The incidence differs widely between surgical procedures, hospitals, patients and between surgeons [2,3].

The potential wound pathogens are Gram positive cocci (Staphylococcus aureus, Streptococcus species, Coagulase negative Staphylococcus , Enterococcus species), Gram negative bacilli(Escherichia coli, Pseudomonas aeruginosa , Klebsiella pneumoniae, Proteus species, Enterobacter species), anaerobes (Bacteroides, Clostridial species) [4] .Wound infections are mostly due to nosocomial pathogens that differ from country to country and from hospital to another within the same region [5], which remains the major source of postoperative morbidity [6]. This study aims to find out common bacterial isolate and their antibiotic resistance pattern, the incidence of ESBL producers and MRSA in wound infections.

Methodology :

This prospective study from January 2017 to February 2018 at our institute included a total of 578 specimens from clinical samples like pus, tissue material and discharge from the incised lesions or ulcers. They were analyzed for bacteriological profile and antimicrobial susceptibility pattern. Staphylococcus aureus strains were analyzed for MRSA and Enterobacteriaceae isolates obtained were analyzed for ESBL production.

Gram stained preparation was made from one swab for provisional diagnosis. The other swab was inoculated on blood agar and Mac Conkey agar and incubated at 37°C for 48 hours before being reported as sterile. Growth on culture plate was identified by its colony characters & the battery of standard biochemical tests [7]. Antimicrobial sensitivity testing was carried out by Kirby-Baeur disk diffusion method on Mueller Hinton agar as per CLSI guidelines. Methicillin resistance in Staphylococcus isolates was tested by cefoxitin disc diffusion method. Extended spectrum beta lactamases (ESBL) production were detected as per CLSI guidelines [8].

Results :

Wound swabs from 578 patients were analyzed in the study. Male patients constituted 246 (49.48%), Female patients constituted 292 (50.51%), age ranged from 8 years to 80 years. Bacterial isolates were found in 328 (56.74%). The isolation rate was significantly higher in females (51.21%), compared to males (48.78%). The predominant isolates were Gram positive bacteria 192 (58.53%). The most frequently isolated organisms were Staphylococcus aureus 178 (54.26), followed by Klebsiella pneumoniae (24.39%), Pseudomonas aeruginosa 44 (13.41%), Escherichia coli 10 (3.04%), Enterococci 10 (3.04%), Coagulase negative Staphylococcus 4 (1.21%), Acinetobacter 2 (0.60%).

Out of 178 Staphylococus aureus, 50.56% were sensitive to amoxycillin, 64.04% were sensitive to gentamicin, 56.17% sensitive to ciprofloxacin, 40.44% were sensitive to erythromycin, 65.16% were sensitive to cefotaxime, 40.44% were sensitive to cephalexin, 68.53% were sensitive to piperacillin/tazobactum, 91.01% were sensitive to levofloxacin, 92.13% were sensitive to amikacin, and 100% sensitive to vancomycin. Cogaulase negative Staphylococcus were 100% sensitive to amoxycillin, gentamicin, erythromycin, cefotaxime, cephalexin, piperacillin/tazobactum, levofloxacin, amikacin vancomycin, and 50% sensitive to ciprofloxacin. Out of 10 Enterococci, 8 (80%) were sensitive to ciprofloxacin, 6 (60%) were sensitive to amikacin, 4 (40%) were sensitive to gentamicin, erythromycin, cefotaxime, cephalexin, levofloxacin and 100% sensitive to vancomycin.

Out of 80 Klebsiella pneumoniae 72 (90%) were sensitive to amikacin, 68(85%) were sensitive to ciprofloxacin, 20 (25%) were sensitive to cefotaxime, 10 (12.5%) were sensitive to cephalexin, 40 (50%) were sensitive to Piperacillin/tazobactum , 48 (60%) were sensitive to imipenem, 36(45%) were sensitive to gentamicin.

Out of 44 Pseudomonas aeruginosa, 36(81.81%) were sensitive to amikacin, 26(59.09%) were sensitive to ciprofloxacin, 16(36.36%) were sensitive to cefotaxime, 12(27.27%) were sensitive to cephalexin, 24(54.54%) were sensitive to Piperacillin/tazobactum, 44(100%) were sensitive to imipenem, 22(50%) were sensitive to gentamicin.

Out of 20 Escherichia coli , 8(80%) were sensitive to amikacin, imipenem, 6(60%) were sensitive to ciprofloxacin, 4(40%) were sensitive to cephalexin, 2(20%) were sensitive to cefotaxime, piperacillin/tazobactum gentamicin. Acinetobacter is 100% sensitive to imipenem and piperacillin/tazobactum.

All the 178 isolates of Staphylococcus aureus were screened for Methicillin resistance using oxacillin disk (1µg) and out of them 68(38.21%) were found to have inhibition zone less than 10mm. The MRSA isolates were resistant to Amoxycillin(84.4%), Gentamicin(47.3%),Ciprofloxacin(41.7%),Erythromycin(48.4%),Cefotaxime (66.7%),Cephalexin(75%), Piperacillin/tazobactum(72.3%), Amikacin(5.6%) Levofloxacin (2.8%) but not resistant to vancomycin.

Out of 90 Enterobacteriaceae isolates 38 (42.22%) found to be ESBL producers by screening method ,were subjected to further tests and by all methods were confirmed as ESBL producers. Out of 80 Klebsiella pneumoniae isolates, 34 (42.50%) were ESBL producers. Out of 10 Escherichia coli isolates, 4 (40%) were ESBL producers.

Discussion :

Volume 1, Issue 3; September-October 2018; Page No. 83-86

Despite advances, management of surgical site infection is a big challenge. Hospitals serve as a reservoir for SSIs as they harbor a variety of pathogenic microbes [9]. Similar to our study, most of the studies in tertiary care centres of Indian setting has Staph. aureus as majority player for surgical site infection. Data from the national nosocomial infections survelliance system [10] reveals that most common incisional SSI pathogens are Staphylococcus aureus, Enterococcus, Enterobacteriaceae, Pseudomonas aeruginosa . In the present study the prevalence of Klebseilla pneumoniae in surgical site infections were 26.92%.Similar results were observed in a study by Rezwana haque et al [11] in which the prevalence of Klebsiella pneumoniae were 26.76%.

The results in contrast to our study were observed in a study by Prabhat ranjan [12] et al the prevalence of Klebsiella pneumoniae were 16.6%.In a study by Jyoti Sonawarne et al [13] the prevelance of Klebsiella pneumonia were 14.07% . This shows that there is increase in the prevalence of Klebsiella pneumoniae in the present.

The antibiotic sensitivity pattern of Staphylococcus aureus in our study shows: 45(50.56%) sensitive to amoxycillin, 57(64.04%) were sensitive to gentamicin, 50(56.17%) sensitive to ciprofloxacin, 36(40.44%) were sensitive to erythromycin, 58(65.16%) were sensitive to cefotaxime, 36(40.44%) were sensitive to cephalexin, 61(68.53%) were sensitive to piperacillin/tazobactum, 81(91.01%) were sensitive to levofloxacin, 82(92.13%) were sensitive to amikacin. Similar results were observed in the study by Sarita yadav et al [14] sensitivity pattern of Staphylococcus aureus was 48.31% to erythromycin, 93% to cephalexin.

MRSA is a major nosocomial pathogen causing significant morbidity and mortality [15].The important reservoirs of MRSA in hospitals/institutions are infected or colonized patients and transient hand carriage on the hands of health care workers is the predominant mode for patient to patient transmission.[15] The percentage of MRSA isolated in our study was 40.44% similar results were observed . In the study by Arti kapil et al [16] the MRSA was 30%. In the study by Shilpa arora et al [15] which was 46%. In contrast in the study Jyoti Sonawane et al [13] prevalence of MRSA was 27.85%. In a study by Hayath Kowner [17], MRSA isolated was 21.7%.a study by Srinivasan et al [18] 33.33% of staphylococcus isolates was identified as MRSA.

In the study on spectrum of antimicrobial resistance among MRSA, ciprofloxacin resistance was as high as 90% and Qureshi et al [19] had reported the same as 98.9%. In contrast in our study 44% of the strains are resistant to ciprofloxacin. Pulimood [20] had observed only 8% resistance of MRSA to gentamicin as against 44% in our study. Qureshi [19] had reported gentamicin resistance of 97.8% which is high compared to our study. In our study we obtained high percentage of multidrug resistant MRSA .Majumder et al [21] from Assam had reported 23.2% of the MRSA isolated found to be multidrug resistant. Vidhani et al [22] from Delhi reported even a higher percentage of multidrug resistant MRSA. This variation might be because of several factors like efficacy of infection control practices, healthcare facilities and antibiotic usage that vary from hospital to hospital. The percentage of MDR strains among MRSA was found to be in various reports from other parts of the country, the burden of such strains has ranged from 23.2% to 32% to 63.6%.[21-22].

Conclusion :

The predominant isolate was found to be Gram positive bacteria than Gram negative bacteria.However Staphylococcus aureus was seen as the most common bacterial pathogen followed by Klebsiella pneumoniae and Pseudomonas aeruginosa. By employing standard microbiological techniques meticulously the causative agents can be isolated and antimicrobial sensitivity can be assessed for proper management of wound infection. Essential infection control practices including hand washing by hospital personnel and provides better control of antibiotic resistant strains.

References :

1. Hohmann C, Eickhoff C, Radziwill R, Schulz M. Adherence to guidelines for antibiotic prophylaxis in surgery patients in German hospitals: a multicentre evaluation involving pharmacy interns. Infection, 2012; 40(2): 131–37.

2. Sawhney N, Prabhas R, Singh VA. Post operative wound infections: pattern of bacterial pathogens and their antibiotic sensitivity in a tertiary care hospital of

Volume 1, Issue 3; September-October 2018; Page No. 83-86

north India. International Journal of Recent Trends in Science and Technology, 2017; 22(3): 214-217.

3. Forbes BA, Sahm DF, Weissfeld AS. Bailey and Scott's Diagnostic Microbiology. 10th ed. St. Louis, Misssouri, USA: Mosby Inc; 1998.

4. Cooper R, Kingsley A, White R. Wound Infection and Microbiology. : Medical Communications (UK) Ltd for Johnson & Johnson Medical, 2003.

5. Mulu a, Moges f , Tessema b, Kassu a. Pattern and multiple drug resistance of bacterial pathogens isolated from wound infection at university of Gondar teaching hospital, north west Ethiopia. Ethiop med j. 2006; 44 (2); 125-131

6. Nichols rl. Surgical wound infection. Am.J. Med. 1991; 16;91(3b) -6413.

7. Forbes BA, Sahm DF, Weissfeld AS. Bailey and Scott's Diagnostic Microbiology. 10th ed. St. Louis, Misssouri, USA: Mosby Inc; 1998.

8. CLSI: Performance Standards for Antimicrobial Susceptibility Testing; Twentieth Informational Supplement CLSI Document M100–S20. Wayne, PA: Clinical and Laboratory Standards Institute; 2010.

9. Budhani D, Kumar S, Sayal P, Singh S. Bacteriological profile and antibiogram of surgical site infection/ post-operative wound infection. International Journal of Medical Research and Review., 2016; 4(11): 1994-1999

10. SP Lilani , N Jangle, A chowdhary, GB Daver. Surgical site infection in clean and contaminated cases, IJMM, 200523, 249-252

11. Rezwana Haque M.A Salam .Detection of ESBL producing nosocomial gram negative bacteria from a tertiary care hospital in Bangladesh Pak J Med Sci 2010 vol26 no.4 887-891.

12. Prabhat ranjan , Neelima ranjan, Sathish K Bansal, D R Arora. Prevalence of pseudomonas aeruginosa in post operative wound infection in a referral hospital harayana, India Journal of Laboratory Physicians jul-dec 2010,vol2 issue 2.

13. Jyoti sonawane ,Narayan Kamath, Rita Swaminathan, kausal Dhosani. Bacterial profile of SSI and their antibiograms in a tertiary care hospital in Navi Mumbai., Bombay hospital journal 2010, 52, 3:12.

14. Sarita yadav , Aparna Yadav, Madhu Sharma , Uma Chaudhary. Prevalence and sensitivity pattern of Staphylococcus aureus in surgical wound infection, International Journal of Pharma and bio sciences,1, 3, 2010

15. Shilpa Arora,Pushpa Devi, Usha Arora, Bimla Devi. Prevalence of methicillin-resistant Staphylococcus Aureus (MRSA) in a Tertiary Care Hospital in Northern India 2010 | : 2 | : 2 | : 78-81

16. Arti kapil , Benu Dhawan, B K Das, Srujana Mohanty. Bacteriology of orthopaedic wound infections in an Indian tertiary care hospital , Indian Journal of Medical Research, 2005, 121, 784-785.

17. Hayeth Kownhar , Esaki Muthu Shankar, Ramachandran Vignesh,Ramalingam Sekar, Vijayakumar Velu, Usha Anandrao. High isolation rate of staphylococcus aureus from SSI in Indian hospital,, Journal of Antimicrobial Chemotherapy,61, 3, 758-760 2008.

18. Srinivasan S,Sheela D, Shasikala,Mathew R,Bazroy J, Kanungo R. Risk factors and associated problems in the management of infections with MRSA, IJMM, 24, 3, 2006, 182-185.

19. Qureshi AH, Rafi S, Qureshi SM, Ali AM. The current susceptibility patterns of methicillin resistant Staphylococcus aureus to conventional anti Staphylococcus antimicrobials at Rawalpindi. Pak J Med Sci 2004;20:361-4

20. Pulimood TB, Lalitha MK, Jesudson MV, Pandian R, Selwyn JJ. The Spectrum of antimicrobial resistance among methicillin resistant Staphylococcus aureus (MRSA) in a tertiary care in India. Indian J Med Res 1996;103:212-5.

21. Majumder D, Bordoloi JN, Phukan AC, Mahanta J.Antimicrobial susceptibility pattern among MRSA in Assam , IJMM 2001 19 138-140

22. Vidhani S, Mehndiratta PL, Mathur MD. Study of methicillin resistant Staphylococcus aureus isolates from high risk patients. Indian J Med Microbiol 2001;19:87-90

Volume 1, Issue 3; September-October 2018; Page No. 83-86