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Original Research Article

Prevalence and Susceptibility Pattern of Staphylococcus Aureus in Post-Operative Surgical Wound Infections at Tertiary Care Hospital

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ABSTRACT

Background and Objectives: Wound infection has always been a challenge to surgeons. Staphylococcus aureus is frequently isolated from post-operative surgical wound infections; the most remarkable feature of this organism is its ability to acquire resistance to antibiotics.
Materials and Methods: Wound swabs from patients who had undergone surgery and were suspected of having post-operative infection were collected and inoculated on blood agar and MacConkey agar plates in the department of Microbiology, during the period of one year. After incubation for 24-48 hours, plates were examined for the growth of S. aureus. The antibiotic sensitivity test was performed by CLSI recommended by Kirby-Bauer disc diffusion method.
Results: Out of 134 bacterial isolates Staphylococcus aureus (31.3%) was the predominant pathogen isolated.
Conclusion: Multiple drug resistance of isolates to antimicrobials was alarmingly high. Therefore there is a need for frequent monitoring of susceptibility patterns of the isolates and formulation of a definite antibiotic policy is required.

Key Words: Antibiotic sensitivity test, Post-operative surgical wound infections, Staphylococcus aureus, Multiple drug resistance

INTRODUCTION

Wound infection has always been a challenge to surgeons. It is always a major complication of surgery and trauma. [1] Post-operative wound infection is usually confined to the subcutaneous tissues and it is dependent on many factors. Surgical techniques and the Surgeon is also a crucial factor of wound infection. [2] Most surgical site infections are caused by contamination of an incision with microorganisms from the patient's own body during surgery. Infection caused by microorganisms from an outside source following surgery is less common. [3]

Staphylococcus aureus is an example of normal body bacteria and is found in up to 30% of healthy individuals harmlessly colonising a variety of body sites such as the nose, axillae and groin. However, if transferred from these body sites where they live harmlessly, to vulnerable areas such as open wounds, S. aureus has the ability to cause opportunistic infection. [4] The most significant change in the microbiology of surgical wound infection has been the increased involvement of resistant microorganisms in these infections. [5] The most remarkable feature of S. aureus, however, its ability to acquire resistance to

antibiotics. Many resistance genes are acquired by plasmid-mediated gene transfer, and some may be transferred to the chromosome as mobile genetic elements. Probably, the most significant achievement of S. aureus has been the acquisition of methicillin resistance. [6] Hence the present study was conducted to know the prevalence of S. aureus in surgical wound infections and to analyse its antimicrobial susceptibility pattern.

MATERIALS AND METHODS

A total of 112 wound swabs/pus swabs from patients who had undergone surgery and were suspected of having post-operative infection of the wounds were collected and inoculated on blood agar and MacConkey agar plates in the department of Microbiology, during the period of one year. After incubation for 24-48 hours, plates were examined for the growth of S. aureus. The antibiotic sensitivity test was performed by CLSI recommended by Kirby-Bauer disc diffusion method. [7] Methicillin Resistance in Staphylococcus aureus isolates were tested by using cefoxitin disc diffusion test (30 mcg) [8]

RESULTS

Out of 112 pus samples from surgical wound infections, culture yielded growth from 104 samples and a total of 134 bacteria were isolated. Out of 104 cultures 30(28.8%) were polymicrobials and 74(71.2%) were monomicrobials.The most common microorganism isolated was Staphylococcus aureus 31.3% (n=42). Among Staphylococcus aureus isolates, 88.1% were resistant to Ampicillin, 64.3% to Erythromycin, 64.3% to Doxycycline, 54.7% to Ceftriaxone, 50% to Co-trimoxazole, 47.6% to Ciprofloxacin and Gentamicin, 40.5% to Clindamycin, 38.1% to Amoxyclav and 11.9% to Amikacin.Most of the S. aureus strains isolated were sensitive to Linezolid and Vancomycin (100%), Amikacin 88.1% and Amoxyclav 61.9%.In the present study, cefoxitin disc susceptibility revealed that 28.6% isolates were Methicillin Resistant Staphylococcus aureus (MRSA).In this study, Linezolid and Vancomycin exhibited excellent activity against both MRSA and MSSA. The other antibiotic which was found to be effective against MRSA was Amikacin(90%). (Table.1)

Table. 1: ANTIBIOTIC SUSCEPTIBILITY PATTERN OF STAPHYLOCOCCUS AUREUS (n=42)

ANTIBIOTICS	NUMBER OF ISOLATES (%SENSITIVITY)	NUMBER OF ISOLATES (%RESISTANCE)
Ampicillin	5(11.9)	37(88.1)
Erythromycin	15(35.7)	27(64.3)
Clindamycin	25(59.5)	17(40.5)
Doxycycline	15(35.7)	27(64.3)
Ciprofloxacin	22(52.4)	20(47.6)
Co-trimoxazole	21(50)	21(50)
Gentamicin	22(52.4)	20(47.6)
Amikacin	37(88.1)	5(11.9)
Ceftriaxone	19(45.3)	23(54.7)
Amoxyclav	26(61.9)	16(38.1)
Linezolid	42(100)	00
Cefoxitin	30(71.4)	12(28.6)

DISCUSSION

Staphylococcus aureus, the most virulent of the many staphylococcal species, has demonstrated its versatility by remaining a major cause of morbidity and mortality despite the availability of numerous effective antistaphylococcal antibiotics. S. aureus is a pluripotent pathogen, causing disease through both toxin-mediated and non-toxin-mediated mechanisms. This organism is responsible for both nosocomial and community-based infections that range

from relatively minor skin and soft tissue infections primarily to life-threatening systemic infections. [9] About 10-30% of healthy people carry this organism in their nares. Infections caused by these organisms can also be caused by patients themselves. Bed sheets, instruments, and dressings have also been found to act as reservoirs of Staphylococcus aureus. [10]

In the present study of 112 clinically suspected postoperative wound infection 104 yielded aerobic bacterial growths accounting for a total of 134 organisms. Monomicrobial isolates were encountered in 74(71.2%) of the wounds and 30(28.8%) wounds yielded polymicrobials. According to Giacometti, et al, [11] who isolated 1060 bacterial strains from 614 individuals. A single agent was identified in 271 patients (44.1%). Multiple agents were observed in 343 patients (55.9%).In a study done by Shruthi Malik et al, [12] out of 202 postoperative wound swabs 194 showed bacterial growth on culture and 8 were culture negative. Of the 194, 187 showed mono-microbial growth and 7 showed mixed infections with two bacterial isolates.

In this study, Staphylococcus aureus (31.3%) was the predominant isolate from surgical wound infections from our hospital, which is comparable to other studies from India. [9-14] The predominance of S. aureus seen in this study is most likely associated with endogenous source as the organism is a member of skin and nasal flora of the patients. [15] It also showed that, Staphylococcus aureus was found to be resistant to the commonly used antibiotics. This is a matter of great concern because treatment of such infections warrants newer and costly antibiotics. Staphylococcus aureus was found to be resistant to Ampicillin (88.1%), Erythromycin (64.3%), Doxycycline (64.3%), Ceftriaxone (54.7%). Most of the S. aureus strains isolated were sensitive to Linezolid and Vancomycin (100%), Amikacin 88.1% and Amoxyclav 61.9%.

In the present study, cefoxitin disc susceptibility revealed that 12(28.6%) isolates were Methicillin Resistant Staphylococcus aureus (MRSA), 30(71.4%) were Methicillin Sensitive Staphylococcus aureus (MSSA); predominant isolates were MSSA. 28.6% of isolates were MRSA in our study, which is in consistent with average Indian data. [16] Similar study was conducted by Ranjan KP et al [14] and Jyothi Sonawane et al [17] which show 27.96% and 27.85% respectively.

CONCLUSION

Staphylococcus aureus is the predominant pathogen isolated from the surgical wound infections from our hospital. Multiple drug resistance of isolates to antimicrobials was alarmingly high so that any empirical prophylaxis and treatment needs careful selection of effective drugs. To minimize such infections, adherence of strict aseptic surgical procedures and proper management of wounds is required. Hence, there is a need for frequent monitoring of susceptibility patterns and formulation of a definite antibiotic policy of the isolates.

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