

INCIDENCE OF POST OPERATIVE WOUND INFECTIONS BY AEROBES WITH SPECIAL REFERENCE TO METHICILLIN RESISTANT STAPHYLOCOCCUS AUREUS

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ABSTRACT

Aims: To identify aerobic cultural isolates from post operative infected wounds, to study drug sensitivity pattern of the isolated aerobes, to study Methicillin resistance pattern of isolated strains of *Staphylococcus aureus* and to study the source of flora, whether exogenous or endogenous.

Material and Methods: *Collection of sample* - 4 sterilized swabs were used. 2 from pus, 1 from adjoining skin and 1 from nasal cavity. *Processing of the sample*- 1 swab from pus was used for culture on Blood Agar and Mac Conkey Agar and the other one for smear making. The swabs from skin and nasal cavity were used for culture. After aerobic incubation growth was identified from colony characters, Gram's staining and biochemical reactions. *Drug sensitivity*-Nutrient Agar was used and antimicrobial sensitivity was studied by Disc diffusion method as described by Kirby and Bauer. Various drugs used were:-Penicillin 10 units/ disc, Ampicillin 10 micrograms/ disc, Cloxacillin 10 micrograms/ disc, Gentamicin 10 micrograms/disc, Vancomycin 30 micrograms/ disc, Ceftriaxone 30 micrograms/ disc, Clindamycin 30 micrograms/ disc. *Methicillin resistance*- 2 microgram Oxacillin disc on Nutrient Agar medium supplemented with 5% Sodium chloride was used. Plates were incubated at 30°C instead of 37°C for 24-48 hours.

Results: The overall infection rate was 27%. The most common isolate was *Escherichia coli* and the least common was *Enterobacter* and *Streptococcus faecalis*. The incidence of Methicillin resistant *Staphylococcus aureus* was 50%. The maximum sensitivity of the organisms was to ceftriaxone. The incidence of infection was maximum in the age group between 60-69 years. Infection rate was more in males than females. Incidence was more in diabetics and patients with malignancy.

Keywords: Wound infections Aerobes MRSA.

INTRODUCTION

Infection of the wound is the successful invasion, and proliferation by one or more species of microorganisms anywhere within the body's sterile tissues, sometimes resulting in pus formation.[1]

The incidence of surgical site infections has varied from a low of 2.5% to a high of 41.9%.[2]

Staphylococcus aureus has been reported as a major cause of community and hospital acquired infections. Due to development of Methicillin resistance amongst *Staphylococcus aureus* isolates (MRSA); treatment of these infections has become problematic. Indiscriminate use of multiple antibiotics, prolonged hospital stay, intravenous drug abuse, carriage of MRSA in nose are few important risk factors for MRSA acquisition.[3]

Aims

To identify aerobic cultural isolates from post operative infected wounds, To study drug sensitivity pattern of the isolated aerobes, To study Methicillin resistance pattern of isolated strains of *Staphylococcus aureus*. and to study the source of flora, whether exogenous or endogenous.

MATERIAL AND METHODS

100 cases of post operative wound infections from surgical wards of Rajindra Hospital, Patiala were studied..

Selection of case

Patient with serous/ non purulent discharge, with purulent discharge, non purulent discharge with signs of inflammation.

Collection of sample

four sterilized swabs were used.

- 1) two from pus
- 2) one from adjoining skin
- 3) one from nasal cavity

Processing of the sample- one swab from pus was used for culture on Blood Agar and Mac Conkey Agar and the other one for smear making. The swabs from skin and nasal cavity were used for culture. After aerobic incubation growth was identified from colony characters, Gram's staining and biochemical reactions.

Drug sensitivity

Nutrient Agar was used and antimicrobial sensitivity was studied by Disc diffusion method as described by Kirby and Bauer. Various drugs used were:-

Penicillin 10 units/ disc

Ampicillin 10 micrograms/ disc

Cloxacillin 10 micrograms/ disc

Gentamicin 10 micrograms/ disc

Vancomycin 30 micrograms/ disc

Ceftriaxone 30 micrograms/ disc

Clindamycin 30 micrograms/ disc

Methicillin Resistance

Two microgram Oxacillin disc on Nutrient Agar medium supplemented with 5% Sodium chloride was used. Plates were incubated at 30°C instead of 37°C for 24-48 hours.

RESULTS AND DISCUSSION

The incidence of post operative wound infection was 27%. This is in agreement with the overall infection rate of 13.6%. [4]

The incidence of post operative wound infection in males was 27.86% and in females was 25.64% which was in concordance with study by Subramanian et al (1973)[5] which showed % age of infection 30.1% and 13.2% in males and females respectively.

The incidence of post operative wound infections was 25% in diabetics which was in concordance with study of Study by Chowdhury MAM, Ferdous A. [6], 2009 showed that 15 patients (4.9%) were diabetic. Among them 4 (26.7%) developed post

operative wound infection. Diabetes increases post operative wound infection due to diminished resistance of the patients to trauma and presence of sugar in the tissues. Diabetic arteriosclerosis also impairs the circulation.

In the present study, out of the 7 patients with malignancy, 3 developed post operative wound infection (42.8%). So, malignancy increases wound infection rate. Study by Subramanian et al, 1973 [5] showed that out of 27 patients with malignancy, 13 developed post operative wound infection (48%). So the results are consistent with the present study. Patients harbouring malignancy develop wound infection more often because of associated malnutrition with consequent protein depletion and poor antibody response.

In the present study out of the 4 cases suffering from *S. aureus* infection, 2 were MRSA (50%). Vidhani S et al. [7], 2001 reported that

out of 188 *S. aureus* isolates, 97 were MRSA (51.6%) Anupurba S et al. [8], 2003 reported that out of the total 549 strains of *S. aureus* isolated from different clinical samples, 301 (54.85%) were found to be methicillin resistant. So other studies also support the same results.

The 2 isolates of MRSA showed 100% sensitivity to vancomycin. Both of them were resistant to penicillin. Out of the 2, 1 was sensitive to cloxacillin and clindamycin. Study by Assadullah S et al. [9], 2003 showed that all strains of MRSA were susceptible to vancomycin by disc diffusion method (30µg/ disc). Antimicrobial susceptibility testing of other drugs, also done by disc diffusion method showed varied results with co- trimoxazole and ampicillin showing a very high percentage of resistance followed by gentamicin, cefotaxime and ciprofloxacin.

Percentage of MRSA- 50%

Table 1: Relation of sex with the infection

Sex	No. of cases	Infected	Percentage (%)
Males	61	17	27.86
Females	39	10	25.64

Table 2: diabetes and malignancy related incidence of wound infection

Factor	No. Of Cases	No. Infected	Percentage (%)
Diabetes	8	2	25
Malignancy	7	3	42.8

Table 3: Relation between preoperative antibiotic prophylaxis and wound infection

Preoperative antibiotic Prophylaxis	Total No.	No. Infected	Percentage (%)
Received	70	14	20
Not Received	30	13	43.3

Chi square=5.801 at d.f.=1; * p=0.016, hence significant

Table 4: Preoperative steroid intake and infection rate

Preoperative Steroid Intake	Total No.	No. Infected	Percentage (%)
Received	40	16	40
Not Received	60	12	20

Chi square=4.762 at d.f.=1; * p=0.029, hence significant

Table 5: Drainage and Infection rate

Wounds	Total no.	No. Infected	Percentage (%)
With Drains	67	23	34.3
Without Drains	33	5	15.2

Chi square=4.033 at d.f.=1; * p=0.044, hence significant

Table 6: Relationship of number of bacterial isolates from wound site to that of normal bacterial flora of skin and nose

S. No.	Number of isolates from wound site	Bacterial flora of adjoining skin	Bacterial flora of nose
1.	3 <i>E. coli</i>	3 <i>E. coli</i>	3 <i>S. epidermidis</i>
2.	1 <i>E. coli</i>	1 <i>E. coli</i>	1 <i>S. aureus</i>
3.	1 <i>E. coli</i>	1 <i>E. coli</i>	-
4.	1 <i>E. coli</i>	-	1 <i>S. aureus</i>
5.	1 <i>E. coli</i>	1 <i>S. epidermidis</i>	1 <i>S. epidermidis</i>
6.	1 <i>K. pneumonia</i>	1 <i>S. aureus</i>	-
7.	3 <i>K. pneumonia</i>	-	-
8.	1 <i>S. aureus</i>	1 <i>S. epidermidis</i>	1 <i>S. epidermidis</i>
9.	1 <i>S. aureus</i>	-	1 <i>S. aureus</i>
10.	2 <i>S. aureus</i>	-	-
11.	2 <i>Ps. aeruginosa</i>	-	-
12.	1 <i>P. vulgaris</i>	-	-
13.	1 <i>P. mirabilis</i>	-	-
14.	1 <i>S. epidermidis</i>	1 <i>S. epidermidis</i>	1 <i>S. epidermidis</i>
15.	1 <i>S. epidermidis</i>	-	1 <i>S. epidermidis</i>
16.	1 <i>Enterobacter</i>	-	-

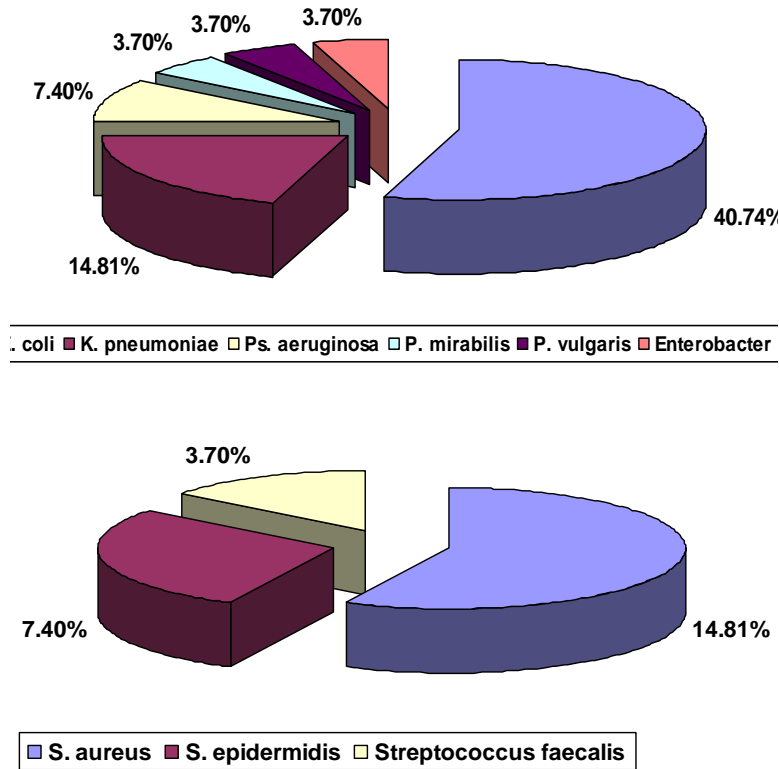


Fig. 1: Aerobic bacterial isolates found in pus samples

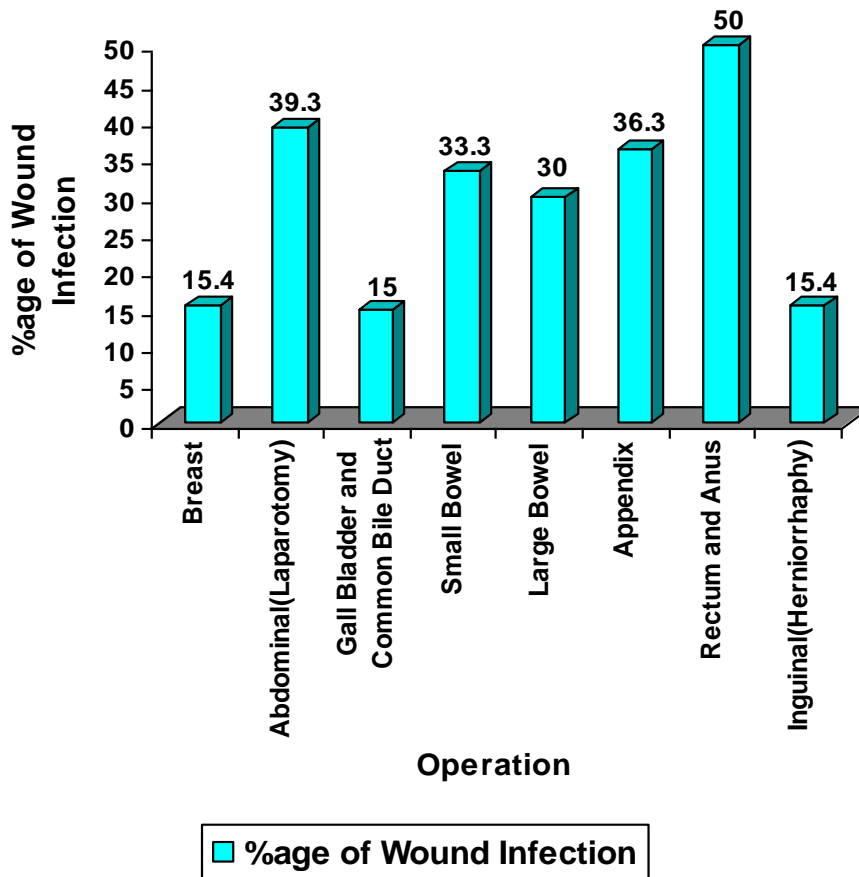


Fig. 2: Infection rate in various surgeries

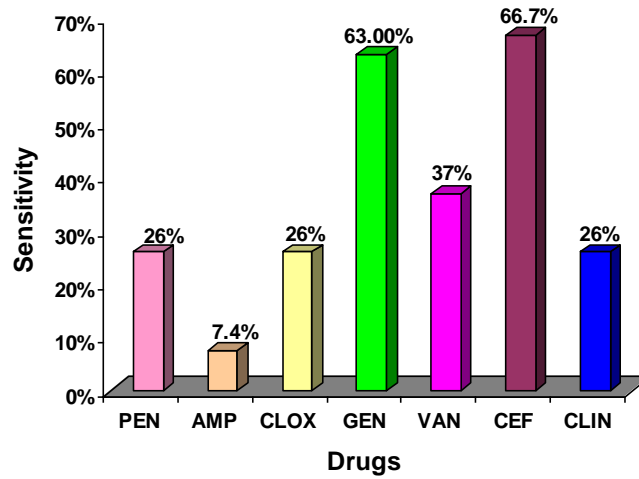


Fig. 3: Antibiotic sensitivity pattern in percentage(%)

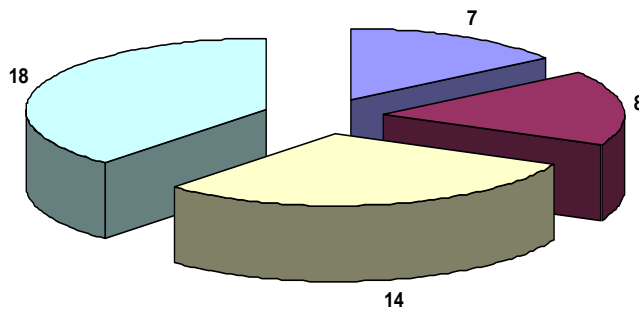


Fig. 4: Identification of mrsa from Staphylococcus aureus isolates on the basis of diameter of zone of inhibition around Oxacillin disc (1µg)

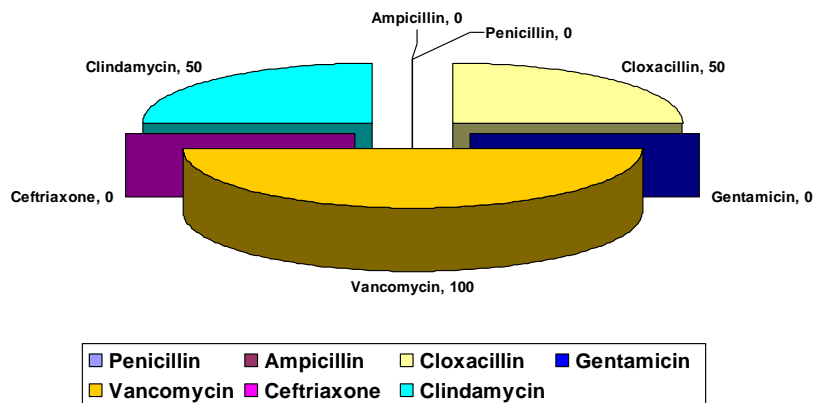


Fig. 5: Sensitivity pattern of MRSA in percentage (%)

CONCLUSION

The incidence of post operative wound infection can be minimized by taking into consideration the hygiene of the patient, the disinfection of the hospital environment, use of preoperative antibiotics and minimizing the use of steroids. To reduce the prevalence of MRSA, regular surveillance of hospital associated infection, monitoring of antibiotic sensitivity pattern and formulation of definitive policy may be helpful.

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