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Bacterial Profile of Post Operative Wound Infection and Antibiotic Sensitivity Pattern

[1]Meenakshi kante, [2]N.Premanadham, [3]P.Munilakshmi, [4]P.Sreenivasulu reddy

[1]M.Sc Medical Microbiology, Department of microbiology, Narayana Medical College, Nellore, A.P., India
[2]M.D Medical Microbiology, Department of microbiology, Narayana Medical College, Nellore, A.P., India
[3]M.D Medical Microbiology, Department of microbiology, Narayana Medical College, Nellore, A.P., India
[4]M.D HOD, Department of microbiology, Narayana Medical College, Nellore, A.P., India

Abstract*: Post operative wound infection is the commonest wound infection. It occurs if the integrity and protective function of the skin is breached. To identify the bacterial pathogens responsible for postoperative wound infections and determine their antibiotic sensitivity pattern. A total of 200 pus samples collected from surgical sites and immediately inoculated on blood agar and Mac conkey agar plates .Then the culture plates were inoculated at 37 ^{0}c for 24 hours. After incubation, isolates were identified by using gram staining and biochemical reactions. Sensitivity tests were performed on Muller-Hinton agar plate by Kirby-Bauer's disc diffusion technique. This retrospective study was conducted over a period of six months from June 2014 to December 2014, at Narayana medical college and General hospital, Nellore. During this period, a total of 200 samples were collected, among these 136 (68%) showed positive growth. The most frequent isolate was staphylococcus aureus 38 (27.9%) followed by pseudomonas 28 (20.5%), E. coli 26 (19.1%). Antibiotic sensitivity test of the isolates showed that Ampicillin + sulbactam (100%) and vancomycin (95%) were the most effective antibiotics for gram positive bacteria and least effective for ofloxacin (25%). Gram negative isolates were E.coli (100%) , klebsiella (80%), citrobacter (60%), Acinetobacter(60%) were most sensitive to imipenum. Gram negative isolates were E.coli (60%) followed by klebsiella (80%), citrobacter (50%) and Acinetobacter (100%) were highly resistant to co-trimoxazole. Therefore antibiotic policy may help in the prevention and treatment of multidrug resistant pathogens in wound infection.

***Keywords*: Wound infections, staphylococcus aureus, pseudomonas, antibiotic sensitivity.**

1. INTRODUCTION

Wound infection has always been a major complication of surgery and trauma. Inspite of modern standards of preoperative preparation, antibiotic prophylaxis and operative technique, postoperative wound infections remain a serious problem [1], [2], [3]. Surgical infections are the third most commonly reported nosocomial infections and they account for approximately a quarter of all nosocomial infections. They have been responsible for increasing cost, morbidity and mortality related to surgical operations and continue to be a major problem even in the hospitals with modern facilities [4]. Various studies in India have shown that overall postoperative infection rate, following clean surgeries ranged from 3.03% to 4.04%, while in those following clean contaminated surgeries ranged from 10.06 to 22.47%.

For any given type of operation, the development of a wound infection approximately doubles the cost of hospitalization [4], [5], [6]. The factors which strongly predispose to wound infections include preexisting illness, length of operation, wound class and wound contamination. The potential sources of postoperative infections are patient, hospital environment, food, other patients, staff, infected surgical instruments, dressings and even drugs and injections [4], [5], [6]. The pathogens isolated from infections differ depending on the underlying problem, location and type of surgical procedure. Surgical sites infection (SSI) have a significant impact on patients, increasing length of hospital stay, contributing to an overuse of antibiotics and increased associated coast, and contributed increased mortality. They have been responsible for the increase in cost, morbidity and mortality related to surgical operation and continues to be a major problem even in the hospital with the most modern facilities and standard protocols of preoperative preparation and antibiotic prophylaxis [7]. Surgical site infection rate has varied from low of 2.5% to a high of 41.9% [8].

A wide variety of aerobic and anaerobic species of bacteria may be present in surgical site infections (SSI) either singly or in combination, in infections of wounds, are generally associated with the production of pus and the bacteria involved are said to be "pyogenic" (pus producing) [9]. The control of post operative infection has become more challenging due to wide spread bacterial resistance to antibiotics and the knowledge of the causative agents of post operative infection has therefore proved to be helpful in the selection of empiric antimicrobial therapy and on infection control measures in health institutions. The present study deals with the bacteriological profile of postoperative wound infections and their antibiotic sensitivity pattern.

2. MATERIALS AND METHODS

This was a retrospective study of pus samples from post operative infections over a period of 6 months from june 2014 to december 2014. A total of 200 samples were collected from patients visiting Narayana medical college and General hospital, Nellore. Pus samples were collected with the help of two sterile disposable cotton swabs. One swab was used to make smear for detection of pus cells and microorganims [10]. Other swab was used to inoculate onto Blood agar and Mac conkey agar media and incubated at 37^0 C for 24 hours. After incubation, identification of bacteria from positive cultures was done with standard microbiological technique which included gram staining and biochemical reactions [11]. The antibiotic sensitivity test of all isolates was performed according to CLSI guidelines by modified Kirby Bauer's disc diffusion method on Mueller Hinton agar or blood agar medium using antibiotic discs of Hi media laboratories Pvt. Limited, India [12].

3. RESULTS

During the study period extending from June 2014 to december 2014, 200 samples collected from various clinical Departments at Narayana General Hospital, nellore, A.P. The work was done at Department of Microbiology, Narayana Medical College, Nellore, A.P.

Among 200 cases, 136 having wound infection were included in this study, out of which 156 (78%) were males among them positive cases were 114 (83.8%) and 44 (28.2%) were female patients among them positive cases were 22 (16.1%). [Table-1].

Out of 128 bacterial isolates, staphylococcus aureus 38 (29.6%) was the most frequently isolated species among the gram positive bacteria followed by CONS 10 (7.8%), streptococcus 8 (6.2%) and enterococci 6(4.6%). Among gram negative bacteria pseudomanas 28 (21.8%) was the most frequently isolated species followed by E.coli 26 (20.3%), citrobacter 6 (4.6%), Acinetobacter 4 (3.1%) and klebsiella 2 (1.5%) [Table-2].

The sensitivity pattern showed that the most effective antibiotic for gram positive bacteria was Ampicillin + sulbactam(100%) followed by vancomycin (95%), Amoxicillin + clavulinic acid (90%), linezolid (80%), azithromycin(70%), cefixime (50%), ciprofloxacin (50%), cotrimoxazole (50%), amikacin (40%) and the least effective antibiotic was ofloxacin (25%). [Table-3]

For pseudomonas species, imipenum (100%), was most effective antibiotic and least effective was ceftazidime (30%). For E.coli, the most effective antibiotic was Imipenum (100%) and least effective was cefotoxime (20%). For klebsiella the most effective antibiotic was imipenum (85%) and the least effective antibiotic was gentamycin (10%). For citrobacter the effective antibiotic was ciprofloxacin (75%) and least effective was cefotoxime (10%). For Acinetobacter the effective antibiotic was netilline (80%) and the least was co-trimoxazole (0%). [Table-4]

4. DISCUSSION

In this study, total 136 patients suffering form post operative infections were included. Out of which 114 (83.8%) were males and 22 (16.1%) were females. The incidence of post operative infection was more common in males than in females. A study carried out in 3 hospitals (federal medical center, Owerri, Imo state University teaching hospital, Orlu and general hospital, Okigwe) by Ohalete et al also supported the result who reported that the males (59.3%) were more prone to wound infection than females (40.7%).[13]. Among the % of total isolates most commonly isolated organism was Staphylococcus aureus 38 (29.6.%) followed by Pseudomonas species 28 (21.8%) and E.coli 26 (20.3%). A similar study conducted in teritary hospital in Benin city, Nigeria by christopher Aye Egbe et al supported the result, as staphylococcus aureus was the most commonly isolated bacteria.[14]. Another similar study carried out in Nigeria by

Akinjogunla, O.J et al showed that most commonly isolated bacteria was staphylococcus aureus (37.8%) followed by pseudomonas species (27%) and E.coli (14.9%) [15]. In vitro sensitivity testing of this study showed that Ampicillin + sulbactam (100%) was the most effective antibiotic against the gram positive bacteria followed by vancomycin (95%). The high incidence of gram-negative organisms in the postoperative wound infections can be attributed to be acquired from patient's normal endogenous micro flora [16]. For pseudomonas the most effective was highly sensitve to Imipenum (100%) followed by ciprofloxacin (80%). This result was reinforced by Rajalakshmi et al [17]. For E.coli the most effective antibiotic was imipenum (100%) and the least effective was cefotoxime (20%).

5. CONCLUSION

Staphylococcus aureus, Pseudomonas species were most common isolates found in wound infection. Most of the gram negative isolates were multi drug resistant; therefore antibiotic policy may help in the prevention and treatment of multi drug resistant pathogens in wound infection.

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APPENDIX - A

LIST OF TABLES:

Table 1: Sex wise distribution

No. of Cases	Males	Females
Total cases (200)	156(78%)	44(28.2%)
Positive cases (136)	114(83.8%)	22(16.1%)

Table 2: Distribution of isolated organisms

S.no	Organism	No. of isolates	% among total isolates.
1	Staphylococcus aureus	38	29.6%
2	CONS	10	7.8%
3	Streptococcus pyogenes	8	6.2%
4	Enterococci	6	4.6 %
5	Pseudomonas	28	21.8 %
6	E.coli	26	20.3 %
7	Klebsiella	2	1.5 %
8	Citrobacter	6	4.6 %
9	Acinetobacter	4	3.1 %
TOTAL		128	

Table 3: Antibiotic sensitivity pattern of gram positive bacteria [n=38]

S. no	Antibiotics	Staphylococcus aureus (%)
1	Ampicillin + sulbactam	S-100 R-0
2	Cefixime	S-50 R-50
3	Ciprofloxacin	S-50 R-50
4	Azithromycin	S-70 R-30
5	Ofloxacin	S-25 R-75
6	Amikacin	S-40 R-60
7	Vancomycin	S-95 R-5
8	Amoxicillin + clavulinic acid	S-90 R-10
9	Co-trimoxazole	S-50 R-50
10	linezolid	S-80 R-20

Table 4: Antibiotic sensitivity pattern of gram negative bacteria

Antibiotics	E.coli [n=26]	Klebsiella [n=11]	Citrobacter [n=4]	Acinetobacter [n=3]	Pseudomonas [n=28]
Imipenum	S-100 R-0	S-85 R-15	S-60 R-40	S-60 R-40	S-100 R-0
Amoxicillin+ clavulinic acid	S-40 R-60	-	S-20 R-80	-	-
Co-trimoxazole	S-40 R-60	S-20 R-80	S-50 R-50	S-0 R-100	S-60 R-40
Gentamycin	S-60 R-40	S-10 R-90	S-20 R-80	-	S-40 R-60
Amikacin	S-90 R-10	S-75 R-25	S-60 R-40	S-20 R-40	S-70 R-30
Ciprofloxacin	S-40 R-60	S-50 R-50	S-75 R-25	S-10 R-90	S-80 R-20
Ofloxacin	S-70 R-30	S-40 R-60	S-35 R-65	S-30 R-70	-
Ceftazidime	S-60 R-40	S-60 R-40	S-70 R-30	S-40 R-60	S-30 R-70
Cefoperazone	S-40 R-60	S-50 R-50	S-40 R-60	S-20 R-80	-
Cefotoxime	S-20 R-80	S-40 R-60	S-10 R-90	-	S-70 R-30
Netilline	S-90 R-10	S-80 R-20	S-60 R-40	S-80 R-20	-