Original Article

Bacteriological profile of post-surgical wound infection along with special reference to MRSA in central india, indore

Khyati Jain*[1], Nilesh Shyam Chavan [2], S.M. Jain [3].

[*1, 2] Asst. Professor, Department of Microbiology, Index Medical College, Hospital & Research Center, Indore (Madhya Pradesh), India.
[3] Professor & Head, Department of Microbiology, Index Medical College, Hospital & Research Center, Indore (Madhya Pradesh), India.

ABSTRACT

Post operative wound infections have been found to pose a major problem in the field of surgery. Advances in control of infection have not completely eradicated this problem because of development of drug reistance. The present study was carried out in Index Medical College hospital, one year study. 100 patients were recruited who underwent surgery in the orthopedic, obstetrics and gynecology and surgical departments. Gram positive organisms were more prevalent than gram negative bacteria accounting for 47(67.14%) and 23(32.85%) of isolates respectively. The three most commonly isolated bacterial species were S. aureus 41(58.6%) ,Pseudomonas aeruginosa 10(14.3%) and E.coli 06(8.6%). Out of 41 Coagulase positive Staphylococcus aureus, 20 (48.78%) were Methicillin resistant and 21 (51.21%) were methicillin sensitive strains. MRSA were found to be highly resistant to many antibiotics showing only intermediate sensitivity to cefazollin (50%) and chloramphenicol(55%).

KEYWORDS: Post Surgical wound infection, MRSA- Methicillin Resistant Staphylococcus aureus.

Address for correspondence: : Dr. Nilesh Shyam Chavan. Asst. Professor, Department of Microbiology, Index Medical College, Hospital & Research Center, Indore (Madhya Pradesh), India.
E-Mail: nilesh.chavan005@gmail.com

Online Access and Article Informtaion

Quick Response code

International Journal of Integrative Medical Sciences
www.imedsciences.com

Received: 25-10-2014 Accepted: 10-11-2014
Reviewed: 25-10-2014 Published: 17-11-2014

Source of Funding: Self Conflicts of interest: None

INTRODUCTION

Surgical Site Infections [SSIs] have plagued surgeons since time immemorial [1]. Infection is encountered by all the surgeons; by nature of their craft, they invariably impair the first line of host defenses, the cutaneous or the mucosal barrier[2].

Surgical site infections are the second most common cause of nosocomial infections. It has been estimated that surgical site infection develop in at least 2% of hospitalized patients undergoing operative procedures, although this is a likely under estimate because of incomplete post discharge data, other data indicate that surgical site infections develop following 3-20% of certain procedures [3].

Wound infections are a common type of infections that may contribute to longer hospital stay, significantly increase the cost of medical care and are likely to have an important role in the development of antimicrobial resistance. Most of these infections are superficial and readily treated with a regimen of local care and antibiotics. Determination of the etiologic agent is vital in the final choice of antibiotics. A working knowledge of the most likely causative organism and the prevailing antibiotic sensitivity/

resistance pattern will be of great help [1].

Each hospital has its own unique bacterial flora to which patients are at risk for acquiring infection during hospitalization. In such situations; microorganisms exhibit unique patterns of antimicrobial activity during a certain period of time. Only when such epidemiologic data are available can the surgeon employ a logical approach towards Surgical Site Infection control and also resistance to antimicrobials has become a serious problem necessitating the in-depth study of Surgical Site Infection to prevent the future complications in operated cases [1].

Staphylococcus is the most common organism causing wound infections. The incidence of MRSA in India ranges from 30-70% [5]. The incidence of nosocomial infections which are caused by MRSA continues to increase; therefore, the importance of their detection, especially for treatment and epidemiological purposes arises.

This study was carried out in terms of 1) Providing up-to-date information on frequently isolated aerobic bacterial species from patients with post surgical wound infection. 2) Providing clinicians with the best antimicrobial agents to which the organisms are susceptible. 3) Providing baseline information for further detailed and large epidemiological and drug resistance investigations in attempt to develop comprehensive treatment protocol.

MATERIALS AND METHODS

The study will be carried out in the department of Microbiology, Index Medical College Hospital and Research center. It is a cross sectional study of bacteriology of surgical site infection which includes 100 consecutive pus samples from surgical site infections from various surgical specialties of Index Medical College ,Hospital &Research Center, Indore during period of Jan 2012- 2013.

INCLUSION CRITERIA: Patients of all age groups except neonates, presence of post-operative SSIs and giving informed consent to participate.

EXCLUSION CRITERIA:

a. Neonates

b. Infection occurring 30 days after operation if no implant is in place

c. Infection on episiotomy

d. Burn injuries and donor sites of split skin grafts

e. Procedures in which healthy skin was not incised such as opening abscess

f. Refusal to give consent for participating in the study

Sampling technique

All patients with clinical evidence of sepsis were included during the study period. Samples were taken from the patients during the period of surgical wound dressing before the wound was cleaned with antiseptic solution. Every day new patients were enrolled until all sample size was attained.

Patient data collection

Structured questionnaires were used to extract data from the patients case note, the information included were demographic data, existing chronic disease (such as diabetes mellitus), past medical history, current drug use such as steroid, smoking, and antimicrobial prophylaxis.

Specimen collection

The specimens were collected aseptically on the first day when patients presented with clinical evidence of infection (purulent drainage from incision or drain) before the wound was cleaned with antiseptic. Using sterile cotton wool, swabs were obtained from surgical site without contaminating with skin commensals and transported to the laboratory immediately.

METHODS

A total of 100 wound swabs were collected from patients with post operative wound infections and were processed according to the standard procedures.

Direct Microscopy

The smear was screened for pus cells, the Gram reaction, morphology, arrangement and number of types of the organisms was noted.

Culture for Aerobic Organisms

The 2nd swab was inoculated onto plates of MacConkey agar and 5% Sheep blood agar by rolling the swab over the agar and streaked.

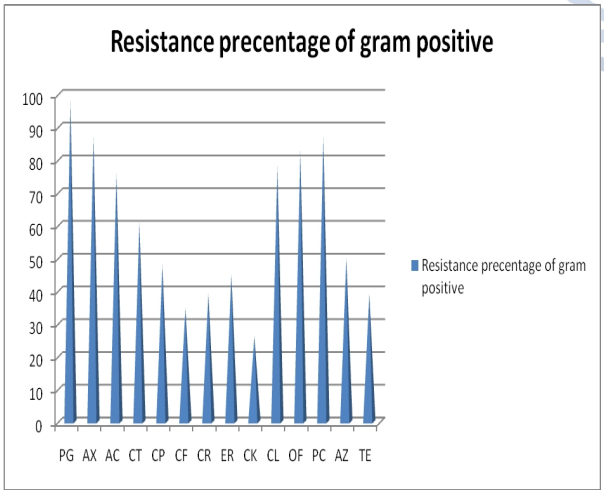
These plates were incubated at 37° C for 24-48hours.

RESULTS AND TABLES

Organisms Isolated	Frequency	Percent
Acinetobactor spp.	1	1.4
Citrobacter spp.	2	2.9
CONS	3	4.3
Diphtheroids	1	1.4
E.coli	6	8.6
Enterococcus	2	2.9
Klebsiella	4	5.7
P.aerugenosa	10	14.3
S.aureus	41	58.6
Total	70	100

This table shows the number of bacterial isolates from culture. Among these, 65% had bacterial growth within 24hours of incubation.

60(92.30%) were monomicrobial and 5(7.6%) were polymicrobial. The cultures that were positive yielded a total of 70 aerobic bacteria. Gram positive organisms were more prevalent than gram negative bacteria accounting for 47(67.14%) and 23(32.85%) of isolates respectively. The three most commonly isolated bacterial species were S. aureus 41(58.6%) Pseudomonas aeruginosa 10(14.3%) and E.coli 06(8.6%).



Among the *S. aureus* isolates, all are resistant to penicillin (100%); some are highly resistant to amoxicillin, amoxclavulanic acid, ciprofloxacin, ofloxacin and piperacillin; some had low to moderate resistance to co-trimoxazole, cephalexin, erythromycin, and azithromycin; mostly are sensitive to cefazolin, cefuroxime, chloramphenicol and tetracycline.

Among CONS isolates, majority resistant to penicillin, amoxicillin, amoxclavulanic acid, ciprofloxacin, ofloxacin, co-trimoxazole, cefazolin, cefuroxime and piperacillin; while mild to moderate sensitive to cephalexin, erythromycin, chloramphenicol and tetracycline; and is sensitive to azithromycin.

DISCUSSION

Post-operative wound infections have been found to pose a major problem in the field of surgery for a long time. Advances in control of infections have not completely eradicated this problem because of development of drug resistance [4]. The surveillance of nosocomial infections with an emphasis on antimicrobial audit will reduce the risk of postoperative wound infections [5].

In the present study samples taken from patients with surgical site infection, we found 65% culture positivity. It is much higher than reports by Taye, 2005 [6]; Tesfahunegn et al, 2009 [7] and Biadglign et al, 2009 [8] with culture positivity of 14.8%, 44.1% and 53.0% and it is lower than studies conducted by Jonathan et al., 2008 [9] and Adegoke et al., 2010 [10] (98.5%- 100%).

The three most commonly isolated bacterial species were S. aureus 41(58.6%) Pseudomonas aeruginosa 10 (14.3%) and E.coli 06 (8.6%). Similar rate of staphylococcal wound infection has been reported by Siddiqi et al [11] [46%], Mohanty et al [38.5%] [12] and by Vidhani et al [13] [41.8%].

Predominance of Staphylococcus aureus in surgical site infection is also consistent with reports from Lilani et al in [2001-2002] [14] reported that Staphylococcus aureus was the commonest isolate from the postoperative wound infections.

In the present study, out of 41 COPS, 20 [48.78%] were methicillin resistant and 21 [51.21%] were methicillin sensitive. A lesser rate of 28.5% and 27.3% has been reported by Manian et al [15] and Cerveira et al [16] respectively. The chance of post operative wounds being infected by MRSA is dependent on the duration of Surgery, type of Surgery and the nasal carriage rate among the attending personnel.In the present study, 70% of MRSA isolates were resistant to

erythromycin. Higher resistance rate was observed in studies of Anvikar et al [17] [95.9%], Hanumanthappa et al [18] [93.02%] and Gupta et al [5] [100%].

All the methicillin resistant staphylococci were resistant to penicillin and amoxicillin [100%]. 57[98.3%] MRSAs were highly resistant [80-95%] to co-amoxiclave, co-trimoxazole, cephalexin, ciprofloxacin, ofloxacin and piperacillin. MRSA isolates were resistant [60-75%] to cefuroxime, erythromycin, azithromycin and tetracycline while 45-50% resistance shown to cefazolin and chloramphenicol.

Out of 21 methicillin sensitive S.aureus, all [100%] strains were resistant to Penicillin. The resistance rate of MSSA to amoxicillin, co-amoxiclave, ciprofloxacin, ofloxacin and piperacillin was 76.19%, 66.66%, 71.42%, 76.19% and 80.95% respectively while low level of resistance fond against co-trimoxazole[42.85%], cephalexin[14.28%], cefazolin[9.52%], cefuroxime[9.52%], erythromycin[19.04%], chloramphenicol[4.76%], azithromycin[38.09%] and tetracycline[4.76%].

Thus in the present study, strains of MRSA were found to be highly resistant to many antibiotic showing only intermediate sensitivity to cefazolin[50%] and chloramphinicol[55%], while MSSA strains showed considerable sensitivity to co-trimoxazole[57.15%], cephalexin[85.72%], cefazolin[90.48%], cefuroxime[90.48%], erythromycin[80.96%], chloramphenicol[95.24%], tetracycline[95.24%] and azithromycin[61.91%]

CONCLUSION

Despite the recent reports that gram negative bacteria have overtaken staphylococci as the leading cause of nosocomial infections, MRSA continues to be the main threat in the health care setting.

Single and multiple drug resistance to the commonly used antibiotics in the study area was found to be very high, leaving clinicians with a very few choices of drugs for the treatment of post surgical wound infection.

Antimicrobial resistance is an unavoidable consequence of the selective pressure of antibiotic exposure. Minimizing the antibiotic pressure is essential to control the emergence of resistant strains in the hospital and in the community.

The high level resistance pattern of methicillin resistant staphylococci observed in the present study may be due to the fact that IMCH&RC is a tertiary care hospital with widespread usage of broad spectrum antibiotics leading to selective survival advantage of pathogens. The difference in susceptibility pattern in various studies is perhaps due to the differential clonal expansion of drug pressure in the community.

LIMITATIONS OF THE STUDY

1. Inappropriate use of antibiotics prior to specimen collection may have affected the rate of the isolations.

2. Due to small number of the isolates in some instances statistical test were not done.

3. Due to financial constraints and limited laboratory facilities it was not possible to do the culture anaerobes & genotypic tests for confirmation of MRSA.

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How to cite this article:

Khyati Jain, Nilesh Shyam Chavan, S.M. Jain. Bacteriological profile of post-surgical wound infection along with special reference to MRSA in central india, indore. Int J Intg Med Sci 2014;1(1):9-13.