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RESEARCH ARTICLE

A STUDY OF MICROBIAL FREQUENCY AND ANTIBIOTIC RESISTANCE PATTERN IN ORTHOPAEDIC PATIENTS

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ABSTRACT

The rapid emergence of more and more resistant strains of microorganisms is a matter of concern for the scientists world over. As the advances in science are coming up with better and better antibiotics, the irrational use by the clinicians for fast relief makes them ineffective and resistant as the organisms mutate in their genetic process. The emergence of MRSA and multidrug resistant strains of most bacteria such as Superbug's has become an utmost challenge to mankind. Bone infection is resistant to treatment due to multiple reasons inherent to bone itself. Therefore, before the infective organisms make deep inroads in the bone, it's important to recognise these microbes early when they are superficial and put the patients on appropriate bactericidal drugs to which they are sensitive, for adequate length of time so as to ensure complete recovery. The present study gave us overall insight to the prevalence of various microorganisms and their sensitivity and resistance pattern, in our region. The study highlighted that Staphylococcus aureus was more prevalent in bone infections (29.1%) and MRSA formed 35.7% of it. Another factor to take care was high prevalence of Gram negative organisms with high percentage of resistant strains (14%).

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INTRODUCTION

The rate of RTA is fast growing due to fast mechanised life style, resulting in very high rate of compound fractures. Orthopaedic infections can be devastating and are one of the most common which coccur in approximately 1% of all orthopaedic operations (http://www.houstonmethodist.org/basic.cfm?id=36831). Disease carrying bacteria, viruses, and parasites that get into the body can destroy healthy tissue, multiply and spread through blood. Infection of skin and other soft tissue can lead to infection of bones (osteomyelitis) and joints (septic arthritis) (Mader, ?). In orthopaedics, it's a time old dictum, once an osteomyelitis, mean an osteomyelitis for life time. Without prompt treatment, orthopaedics infections can become chronic. Thus, even a small scratch on the fingertip has the potential to permanently disable your hand, or worse (Zhang, 2016).

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Situation gets further complicated by blast injuries, militancy and border cross firing in our state due to its geographical location. Many of such compound fracture patients reach late due to hilly terrains and transportation difficulties and many of them are contaminated by the time they reach our hospital. Most of the fracture cases are to be treated by open reduction internal / external fixation which further adds to load of routine surgical postoperative infection (0.8% to 13%). Due to the use of implants orthopaedic wounds are at increased risk of microbiological contamination and infection (Viswajith, 2014). Bone infection, at sites of relatively poor vascularity, can be difficult to treat, often requiring prolonged courses of antimicrobial therapy in association with surgical drainage or debridement. Delayed or ineffective treatment causes significant morbidity in terms of pain, loss of function and the need for further surgery and antibiotics antimicrobial resistance makes orthopedic infections a challenge for both the patient and clinician (Vasundhara Devi, 2017). In addition to the irrational use of broad spectrum antibiotics, the changing pattern of microbial etiology and increasing. The main aim of

this study was to isolate the causative organism and culture, sensitivity report, resistance frequency to enhance the antibiotic policy so as to help the surgeons to plan and make standard protocols for management of such cases in their wards.

MATERIAL AND METHODS

The prospective study was conducted by the department of Microbiology in collaboration with orthopaedics department of Government Medical College, Jammu over a period of three months from January 2018 to March 2018. Various samples in the form of swabs from operation wounds, raw surfaces of compound fractures, draining sinuses, abscesses, aspirates, catheters, bedsores and tips of drainage tubes ,in addition to blood samples of acute osteomyelitis /septic arthritis patients, was collected by trained technicians from the Department of Microbiology under all aseptic precautions on daily basis from orthopaedic ward patients. The samples were subjected to culture sensitivity tests for pyogenic, gram testing, aerobic or nonaerobic organisms. Smear and Gram staining was done as and when required. Antibiotic sensitivity testing was done by (Kirby-Bauer) disc diffusion method. The final results of culture sensitivity and area of inhibition were recorded after 48h-72h to incubation.

Table 1. Antibiotics tested

Pencillin	Ceftazadimeclavilnate Amoxy-clav	Netilmycin Imipenem
Cefipime	Azithromycin	Amikacin Tobramycin
Cefoxitin	Ciprofloxacin	Clindamycin
Cefoperazone	Levofloxacin	Gentamycin
Piperacillin-Tazobectum	Colistin	Doxycyclin
sulbactum	Vancomycin	Linezolid
Oxacillin	Tetracyclin	Polymyxin B
Erythromycin		
Ceftriaxone	Meropenum Aztreoman	Cotriamexazole-Chloremphenicol

Table 2. Percentage of different organisms obtained from the Orthopaedic Infections

Bacterial isolates	N (%)
Staphylococcus	28(12) 29.0% (35.7%) (MRSA)
Pseudomonas	14(14.5%)
Klebseilla	9(9.2%)
E-coli	7(7.2%)
Acinetobacter	14(14.5%)
Enterobacter	6 (6.2%)
Streptococcus	4 (4.1%)
Citrobacter	4 (4.1%)
Proteus mirabilis	10 (10.2%)
Total	96 (100%)

**Staphylococcus aureus* was commonest 29%.

DISCUSSION

Deep established infections in orthopaedics used to be a catastrophe earlier. Thanks to sound surgical principles of asepsis, early detection of the offending microorganism, knowing their virulence and sensitivity to the list of available drugs, the clinician can choose a drug ie. most lethal to the microbes and at the same time has minimum of side effects and is affordable, many a precious life's and limbs have been saved (Schlich, 2012). The present study clearly indicates that *Staphylococcus aureus* is still the commonest organism causing infections in bones, postoperative joint replacements, open reduction and internal fixations, compound fractures and acute osteomyelitis/ septic arthritis. In our study *Staphylococcus aureus* infection rate was (29.1%) MRSA was highly prevalent in 35.7% cases and matched well with most of studies done worldwide (Norton, 2014). The organism has been seen to be highly sensitive to Linezolid, Vancomycin and Clindamycin and similar figures have been reported earlier also (Norton, 2014). Our series had a sensitivity of 100% for Vancomycin, followed by Amikacin, Azithromycin and Gentamycin.

Table 3. Senstibity Resistance Pattern

ORGANISM	SENSTIVITY	RESISTANCE
Staph aureus	Vancomycin(28)	Cephlosporin (28)
	Gentamycin(12)	Pencilin (28)
	Clindamycin(26)	Ciplox (24)
	Azithromicin(14)	Gentamicin (16)
	Linzolid (28)	Amoxyclav (16)
	Amikacin(17)	Vancomicin (0)
Pseudomonas	Piper+tazo(4)	Imipenm (11)
	PolymixinB(8)	Colistin (9)
	Colistin(4)	Gentamycin (12)
	Ciplox(4)	Cefopime (11)
	Cefotaxim(4)	Ceftzadim (12)
E . Coli	PipraTazo(7)	AmoxClav(7)
	Gentamicin(5)	Cefepime(7)
	Ciproflox(5)	Azetrionam(6)
	Cefotaxim(7)	Tobramicin(4)
	Imipenum(7)	
Klebsiella	Tobramicin(6)	Tobramcin(4)
	Imipenum(8)	Amoxclav(8)
	PolymixinB(6)	Pipr.Tazo(8)
	Ceftotaxmim(9)	Cefepime (8)
		Azetronam (8)
		Gentamicin(8)
		Colistin(4)
		Ciplox(4)
Enterobacter	PolymyxinB(6)	Pipr.Tazo(6)
		AmoxClav(6)
		Ciproflox(5)
		Amikacin(4)
		Gentamicin(4)
		Aztreonam(4)
		Cefipime(4)
		Imipenum(5)
		Cefuroxime(4)
Proteus	CefperzonSalbctm (2)	PipraTazo(3)
	Gentamicin(2)	AmoxClav(7)
	PiproTazo(6)	Ceftazdime(7)
	Tobramicin(3)	Cefepime (4)
	Ciproflox(3)	Ceftazidime(3)
	Cefoperazon(3)	Cefaprazon(2)
	Imipenum (5)	
Acinetobacter	Netilmycin(14)	Cefipime (12)
	PolymyxinB(7)	PipraTazo (14)
	Cefotaxim(5)	Cefipime (12)
	Gentamicin(6)	Cefosalbctm (12)
	ciplox(5)	Taxobectum(13)
	Imipenum(12)	Meropenum (3)
	Linzolid(4)	Gentamycin(4)
	Vancomycin(4)	Pencilin G (4)
	Amoxycilin(4)	
	TicarclinTazo(4)	
	Amikacin(4)	
	PipraTazo(4)	
Citrobacter	Amikacin(4)	Tobramicin(4)
	Amoxclav (4)	
	Cefuroxime(4)	
	Cefotaxim (4)	
	Ceftriazone(4)	
	Ciplox (4)	
	Gentamycin(4)	

Next common microorganisms isolated were *Pseudomonas* and *Aerobacter* followed by *Proteus mirabilis*, *Klebseilla*, *E.Coli*, *Streptococcus*, *Citrobacter* in diminishing order of frequency. Multidrug resistance was a prominent feature in all the Gram

negative infections particularly in *Pseudomonas* and *Acinetobacter*. Our results are identical to most studies reporting a varying incidence of 15-30% Gram negative infection rates (Exner, 2017; Manchanda, 2010 and Paterson, 2006) (second common). *Pseudomonas* showed resistence to drugs like Ceftazadime, Cefepime, Imipenum, Gentamicin, Ciprofloxacilin and Aztreonam, and showed sensitivity to Cefotaxime, Pipercillin, Tazobectum, Ciproflox, Cefperzone in two isolates each and to polymyxinB in four isolates. In case of acnetobacter it showed sensitivity to Netilmycin in four isolates and two isolates to polymyxinB, pipera. Tazo, Cefotaxim, Gentamicin and Ciprofloxacin. Multidrug resistance was prevalent in other gram negative organisms like *E.coli* and *Klebsiella* too. Gram negative organisms are GIT commensals and their spread to orthopaedic bedridden patients come from their soiled linen during perineal cleaning, enema and indwelling urinary catheters acting as the source and nosocomial spread for *Pseudomonas*. *S. aureus* being the commonest microbe especially as the causative agent of acute osteomyelitis (haematogenous) comes from infected superficial lesion like boils, cuts, wounds, or sore throat etc. Mostly, the organism was isolated from blood sample of such patients obtained before starting antibiotcs and sent for culture sensitivity. About 37.5% of these microbes were MRSA. They showed resitance in high number of isolates (100%) to Cephalosporins and Penicillin and showed sensitivity in highest number of isolates (100%) for Linezolid, vancomycin and clindamycin, followed by azithromycin, amikacin and Gentamycin.

Conclusion

In the present study *S. aureus* (MRSA) was reported to be the commonest infection in orthopaedic patients with high incidences of multi drug resistance. Furthermore, incidences of Gram negative infections were high in orthopaedic patients and most of them have multidrug resistance. At the end, a word of warning, the speed with which newer bugs are emerging, the day won't be far when we will be in post antibiotic era and helpless in front of these invisible microbes.

Conflict of Interest – nil

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REFERENCES

Exner M, Bhattacharya S, Christiansen B, Gebel J, Goroncy-Bermes P, Hartemann P et al. Antibiotic resistance: What is so special about multidrug-resistant Gram-negative bacteria? *GMS Hygiene and Infection Control* 2017, Vol. 12, ISSN 2196-5226.

Mader JT and Calhoun J. Bone, Joint, and Necrotizing Soft Tissue Infections in Medical Microbiology. 4th edition.

Manchanda V, Sanchaita S, and Singh NP. Multidrug Resistant Acinetobacter. *J Glob Infect Dis.* 2010 Sep-Dec; 2(3): 291–304

Norton TD, Skeete F, Dubrovskaya Y, Phillips MS, Bosco JD, Mehta SA. Orthopedic surgical site infections: analysis of causative bacteria and implications for antibiotic stewardship. *Am J Orthop* (Belle Mead NJ). 2014 May; 43(5):E89-92

Orthopedic Infections: Current Concepts. Available from: http://www.houstonmethodist.org/basic.cfm?id=36831

Paterson DL. The Epidemiological Profile of Infections with Multidrug-Resistant Pseudomonas aeruginosa and Acinetobacter Species. Clinical Infectious Diseases, Volume 43, Issue Supplement 2, 1 September 2006.

Schlich T. Asepsis and Bacteriology: A Realignment of Surgery and Laboratory Science. Med. Hist. (2012), vol. 56(3), pp. 308–334. c The Author 2012. Published by Cambridge University Press 2012 doi:10.1017/ mdh.2012.22.

Vasundhara Devi P, Reddy PS, Shabnum M. Microbial profile and antibiotic susceptibility pattern of orthopedic infections in a tertiary care hospital: A study from South India. *International Journal of Medical Science and Public Health* 2017 | Vol 6 | Issue 5

Viswajith, Anuradha K, Venkatesha D. Evaluation of aerobic bacterial isolates and its drug susceptibility pattern in orthopedic infections. *JMSCR.* 2014;2(6):1256-62 6.

Zhang S, Wang H, Zhao J, Xu P, Shi H and Mu W Treatment of post-traumatic chronic osteomyelitis of lower limbs by bone transport technique using mono-lateral external fixator: Follow-up study of 18 cases. *J Orthop Sci.* 2016 Jul;21(4):493-499.

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