

Study of Epidemiology and Antimicrobial Sensitivity of Osteoarticular Infection in Tertiary Care Hospital

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Abstract

Osteoarticular infection is difficult to treat and increases considerably expenditure and morbidity to the patient. Osteoarticular infection includes osteomyelitis, septic arthritis, wound infection and infected implant. Bacteria responsible and their antimicrobial sensitivity vary from site to site and study to study. Present study was conducted in tertiary care hospital were 397 cases of osteoarticular infection were treated in 9 months. Among 397 cases, 162 were pin tract infections, 117 were wound infection, 47 were chronic osteomyelitis, 40 were acute osteomyelitis, and 31 were infected implants. Bacterial culture was positive in 80 % of cases, most common organism isolated was Methicillin sensitive Staphylococcus aureus (MRSA) in 148 cases, followed by Methicillin Resistant Staphylococcus aureus (MSSA) in 48 cases, Pseudomonas Aeruginosa in 28, Escherichia Coli in 15 cases, Acinetobacter in 10, Streptococci in 6, Coagulase negative staphylococci in 6, Enterobacter in 6, klebsiella in 5, Proteus in 2 cases and mixed growth was isolated in 49 cases. MRSA isolates were resistant to commonly used prophylactic antibiotics like cefazolin and cefuroxime but were sensitive to vancomycin, linezolid and clindamycin.

Key Words

Osteoarticular Infection, Prevalence, Bacteriology, Drug Resistance

Introduction

Osteoarticular infection is a big challenge for treatment by orthopaedic surgeon as well as infection disease consultant as it increases considerably the morbidity and mortality (1,2,8). Osteoarticular infection includes osteomyelitis, septic arthritis, wound infection and infected implant. The unethical use of antibiotic and emergence of multidrug resistant bacteria is a major concern (3,4). The epidemiology of infective agents as well as their sensitivity to various antimicrobial agents vary from hospital to hospital (5,6,7). The purpose of this study is to find the prevalence of various bacteriological agents responsible for osteoarticular infection in tertiary care hospital and their antimicrobial sensitivity pattern which may be helpful in guiding presumptive antibiotic prophylaxis for future.

Material and Methods

This retrospective study was done in tertiary care government hospital and includes all the patients who were admitted in orthopaedic ward for treatment of osteoarticular infection and the patients who developed osteoarticular infection during hospital stay for treatment

of other orthopaedic conditions from June 2014 to march 2015, which include acute osteomyelitis, chronic osteomyelitis, wound infection, pin tract infection and infected implant. Swab from pus and deep wound, as well as infected implant and infected bone chips were sent to microbiology department and organism were isolated by standard conventional methods and antibacterial sensitivity was done by disc diffusion method.

Our study does not include mycobacterial, fungal and other infections having different clinical presentation and requiring special culture technique.

Results

Among 397 clinically suspected osteoarticular infection patients, bacterial culture was positive in 311 cases and negative in 86 patients. Among 397 cases, 162 were pin tract infections, 117 were wound infections, 47 were chronic osteomyelitis, 40 were acute osteomyelitis, and 31 were infected implant cases (Table 1). Bacteria isolated in each sub group of osteoarticular infection are shown in table 2

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Pin tract infection; was most common site of infection in our study accounting for 162 of total 397 clinical infected cases, among 162 culture reports from the swabs collected from pin site discharge 147 were culture positive. From 125 swab cultures single etiological agent was cultured and 22 grow more than one bacteria. The most common bacteria grown (71) was Methicillin Sensitive staphylococcus aureus (MSSA), 18 isolates were methicillin resistant staphylococcus aureus (MRSA). 22 cultures grow multiple bacteria, in 80% of polymicrobial culture isolates staphylococcus aureus was one of the organism isolated.

Wound infection; was second largest proportion of our study including 117 cases with positive culture for single bacteria in 81 cases and multiple bacteria in 18 cases, and culture was negative in 18 cases. MSSA was isolated in 39 cases, MRSA in 20, pseudomonas in 11, Escherichia coli in 3, Streptococci species in 3, Proteus in 1, Klebsiella in 1, Acinetobacter in 1, Enterobacter in 1, Coagulase negative staphylococcus in 1 and mixed growth was isolated in 18.

Acute osteomyelitis; 33 of 40 cases of acute osteomyelitis were culture positive. From 26 among 33 Cultures positive cases of acute osteomyelitis (AOM), MSSA was isolated, enterobacter in 2, Pseudomonas in 2, Escherichia coli in 1, Coagulase negative staphylococci was isolated in 1, and Streptococci species in 1. Chronic osteomyelitis; Unlike AOM only 19 out of 47 patients treated for chronic osteomyelitis (COM) were culture positive, MSSA was found in 6, mixed growth in 5, Pseudomonas in 4, MRSA in 3, and Proteus in 1. Infected implant; Among the 31 of infected implants 21 were positive for culture, single most common bacteria isolated was MRSA in 7, other bacteria isolated were Pseudomonas in 3, Coagulase negative Staphylococci IN 3, MSSA in 2, Enterobacter in 1, Streptococci species in 1 and mixed growth was found in 4.

Discussion

Osteoarticular infections are difficult to treat and cause considerable morbidity and mortality to patients (1, 2, 8). Prevalence, bacteriology and microbial sensitivity of these infections vary from hospital to hospital (5, 6, 7). In our study out of 397 clinically suspected cases of infection in orthopaedic department 319 were positive for microbial culture.

Literature available shows wide variation in percentage of culture positive infective cases, Khosravi (9) 93.4%, Treasha n peel (10) 93%, Zimeli (11) 89% from infected implants, Sukswai P (12) 80% of cases and Gomez et al (13) in 60% cases culture was positive.

Our study includes five subgroup of patients, pin tract infection (n=162), wound infection (n=117), chronic osteomyelitis (n=47), acute osteomyelitis (n=40) and infected implant (n=31).

The prevalence of bacteria responsible from each group varies but methicillin sensitive staphylococcus aureus (MSSA) was most common agent. MSSA was isolated in 48% (n=71) of pin tract infection, 39% (n=39) of wound infection, 79% (n=26) of acute osteomyelitis and 32% (n=6) of chronic osteomyelitis and 10% (n=2) of infected implant, overall MSSA was isolated in 45% (n=144) of total culture positive cases (319). MSSA was most common bacteria isolated in poly microbial infections, these results are in accordance with, Treasha n peel et.al. (2012), they isolated single organism from 61% and more than one organism in 39% of microbiological culture positive cases in prosthetic joint infections, and staph aureus was most common isolate for both monomicrobial and polymicrobial infection, and approximately half were methicillin-resistant isolates.

Various other studies which have found that staphylococcus as most common isolate from wound infection include Onchne 71.4% (14), Mbamali 60% (15), Sonawane et al. 29.26% (16).

Staphylococcus was found most common bacterial isolate from infected implant of orthopaedic surgery accounting for 67% in Tago IA (17) and 50% in Muhammad SK (18).

Our results differ from Oguachuba (19) in which Proteus species was most common isolate (41.9%) followed by Staphylococcus aureus (25.6%), and Gayne et al. (20) who found that Pseudomonas species had the highest prevalence of 33.3%.

The less percentage of Methicillin sensitive staph aureus in infected implants comparing from other orthopaedic infections can be attributed to sensitivity to antibiotic prophylaxis cefazolin used in our hospital.

The major concern in present day is increasing prevalence of MRSA, in our study from all culture positive cases MRSA was responsible in 12.2% (n=18) of pin tract infection, 20.20% (n=20) of wound infection, 15.78% (n=3) of chronic osteomyelitis and 33% of (n=7) of infected implant, overall MRSA was isolated in 15% (N=48) of culture positive infections, MRSA were resistant to antibiotics commonly used for prophylaxis of orthopaedic infections like beta-lactams and cephalosporins. 100% MRSA isolates in our study were sensitive to vancomycin and linezolid.

Methicillin resistant staphylococcus (MRSA) are resistant to many commonly used antibiotics, prevalence

Table 1. Shows Percentage of Culture Positive Cases In Various Sub Groups of Osteoarticular Infection

Number	Clinical diagnosis					Total
	Pin tract infection	Wound infection	Acute osteomyelitis	Chronic osteomyelitis	Implant infection	
Culture reports received	162	117	40	47	31	397
Positive cultures	147	99	33	19	21	319
Percentage	90.74	84.61	82.50	40.42	67.74	80.35

Table 2 Shows Bacterial Organism Isolated in Each Sub Group Of Osteoarticular Infection

Organism isolated	Pin tract	Wound infection	Acute osteomyelitis	Chronic osteomyelitis	Implant infection	Total
MSSA	71	39	26	6	2	144
MRSA	18	20	0	3	7	48
Pseudomonas aeruginosa	8	11	2	4	3	28
Escherichia coli	11	3	1	0	0	15
Acinetobacter	9	1	0	0	0	10
Klebsiella	4	1	0	0	0	5
Enterobacter	2	1	2	0	1	6
Streptococci species	1	3	1	0	1	6
Proteus	0	1	0	1	0	2
Coagulase negative Staphylococci	1	1	1	0	3	6
Multiple	22	18	0	5	4	49
Total	147	99	33	19	21	319

of MRSA varies from place to place. Voss et al (21) found that percentage of methicillin resistant staph aureus constitutes between less than 1 % in Scandinavia and more than 30% in Spain, France and Italy. According to Sukswai P et al (14) MRSA was most common organism causing osteoarticular infection in neonatal age group and second most common organism (17.5 %) following Methicillin sensitive staph aureus in all age groups causing pediatric osteoarticular infections. Similarly Mohanty et al. (22) reported 38.56%, Jones et al. (23) also reported 32.4% to 44.4%, Pulimood et al. reported 24% (24) and Tahnkiwale et al. (25) reported 19.56%. Staphylococcus aureus isolates were methicillin-resistant.

Gram negative bacteria was also responsible for significant number of orthopaedic infection, singly as well as part of polymicrobial infection. Pseudomonas is a part of normal flora of skin, was the commonest gram negative organism isolated in our study. Among all culture positive cases Pseudomonas aeruginosa was singly isolated from 11% (n=11) in wound infection, 5.4% (n= 8) of pin tract infection, 6 % (n= 2) of AOM, 21 % (n=4) of COM and

14.2% (n= 3) of infected implant. Overall Pseudomonas aeruginosa was isolated as single causative agent in 8.77 % (n=28) of 319 culture positive cases. Furthermore Pseudomonas aeruginosa was second most following Staphylococcus agent isolated in polymicrobial infection.

Anti microbial sensitivity of pseudomonas aeruginosa varies from the organism isolated from infected implant from rest of sources. Isolates from infected implants were resistant to Amikacin were as from other sources they were sensitive to Amikacin. Pseudomonas aeruginosa from both the groups were sensitive to Piperacillin + tazobactam, ceftazidime and Polymyxin B.

Other gram negative bacteria present in significant number were Escherichia coli (n=15), Acinetobacter (n= 10), klebsiella (n=5), enterobacter (n=5).

Poly microbial infection was most common in wound infection 18 of 99 (18%), followed by pin tract infection 22 of 147 (15%), COM 5 of 19 (26.31%), infected implant 4 of 21 (19%) in that order, none of our patient of AOM was infected by more than one bacteria.

Conclusion

Most common bacteria isolated from osteoarticular infection in our study was Methicillin sensitive Staphylococcus aureus (MSSA), which was isolated in 45.14% (144) of microbial culture positive patients. It was isolated from 48 % (n=71) of pint tract infection, 39% (n=39) of wound infection, 79% (n=26) of AOM, 32% (n=6) of COM and 10% (n=2) of implant infection culture positive patients as a single isolate. However the major concern is MRSA which was isolated in 33% of infected implants, 20 % of wound infection, 16 % of COM and 12 % of pin tract infection. MRSA isolates were resistant to commonly used prophylactic antibiotics in orthopaedic practice like cefazolin and cefuroxime. MRSA in our study were sensitive to vancomycin, linezolid and clindamycin. Gram negative organisms were also isolated in significant percentage of infected osteoarticular infection. Our emphasis are antibiotic prophylaxis should be individualized based on bacterial profile and sensitivity of hospital and strategy should be worked out to decrease the prevalence of multidrug resistant organism.

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