Original Research Article

Microbiological characteristics of septic arthritis. A study from a tertiary care hospital.

Abstract

Background: To determine the epidemiological characteristics, etiological profile, and antimicrobial susceptibility of isolates from patients with primary septic arthritis at a university hospital.

Methods: A retrospective study was performed between 2016 and 2017. A review of records was done in the Microbiology Department, and patients with clinical suspicion of septic arthritis whose aspirates were received in the lab were selected for the study.

Results: Out of total 216 samples reviewed, 86 showed bacterial growth. Higher joints like knee and hip were more commonly involved and elderly persons were mainly involved (mean age 55 years). *Staphylococcus aureus* was the most common organism isolated (72%) and Vancomycin and Linezolid showed highest sensitivity. Among gram negative bacteria colistin and meropenem showed highest sensitivity.

Conclusions: Septic arthritis in our hospital was primarily acute, and monomicrobial; usually affected higher joints, and *S. aureus* was main causative agent, and adult patients were usually predisposed to this diseases.

*Keywords: [*Septic arthritis, microbiology, SKIMS, antibiogram}

1. INTRODUCTION

Infections of joints are caused by bacteria, fungi or viruses. Amongst these, infections caused by bacteria are considered the most serious problem because of their increased frequency. In around 50% of children under the age of 20 septic arthritis is caused by Bacteria [1].

Joint infections are a medical emergency which requires immediate medical attention [2]. Increased age in particular is a risk factor for a higher incidence and many of the etiologies

involved are associated with a significant disability or even death [3]. Within days of the onset of symptoms cartilage destruction can occur and is associated with a considerable mortality rate (up to 11%) [4].

Despite the advances in management and antibiotic therapy techniques, many complications can occur which includes bone erosion, osteomyelitis, fibrous ankylosis, joint stiffness, sepsis and even death. A recent series reported, complications in 10% of cases; however, some authors have reported joint damage in 33% of cases and death in 11% of patients [5, 6, 7].

Many centres have increasingly reported infectious agents which are resistant to multiple antibiotics, as well as the increased frequency of microorganisms not previously associated with septic arthritis. Thus a descriptive knowledge of the epidemiological characteristics of populations in each region is required for planning a proper therapeutic regimen. Gram-positive bacteria, particularly Staphylococcus aureus, are the most common infectious agents reported worldwide, accounting for more than 90% of cases in some [6, 8, 9].

This study was aimed to determine the frequency of bacterial isolates from aspiration specimens of septic arthritis and study their antimicrobial resistance patterns in a tertiary care hospital in India.

2. MATERIAL AND METHODS

This retrospective study was conducted in Dept of Microbiology SKIMS Medical College Srinagar, and included all samples received from admitted patients with a diagnosis of septic arthritis from 2016 to 2017.

A comprehensive retrospective review of records of the department was done from 2016 through 2017 and all relevant information of patients with positive bacterial cultures of synovial fluid or synovial biopsies was collected. All aspiration specimens of joint infections were cultured and the bacteria were processed according to standard microbiology methods. A gram stain was performed first, and after that the samples were inoculated onto 5% sheep blood agar and MacConkey agar. Identification of the isolates was performed using commonly recommended biochemical tests [10].

Antimicrobial Susceptibility Test

The antimicrobial susceptibility test was performed according to Kirby-Bauer (disk diffusion) technique, using Muller-Hinton agar and antimicrobial discs supplied commercially (Hi-Media, India) including: Levofloxacin, Amikacin, Gentamicin, Linezolid , Tigecycline, Ampicillin, Erythromycin, Vancomycin, Cefoxitin, Clindamycin, Piperacillin/Tazobactam, Cefoperazone sulbactam, Ofloxacin, Ciprofloxacin, Imipenem, penicillin G and Trimethoprime-Sulphamethoxazole [11].

Inhibition zones developed around the discs were measured in millimeter (mm) using a metric ruler according to Clinical Laboratories Standards Institute in effect at that time

3. RESULTS

A total of 216 patients samples were included (130 male and 86 female). Mean age of subjects included was 55 years (20 to 80 years). Out of these 216 samples, bacterial growth was observed in 86 (40%) samples. The distribution of infected joints involved is shown in Table 1.

S. aureus was the most common organism isolated from aspirated specimens followed by *Acinetobacter baumanii*, *Citrobacter* spp, *Enterococcus* spp *& Pseudomonas aeruginosa*. Seventy six percent (*n* = 66) were Gram-positive (GP) and Twenty four percent (*n* = 20) Gram-negative bacteria (GNB). The prevalence of *S. aureus* was 62 (72%), *Acinetobacter baumanii* 8 (9.35%), *Citrobacter* spp 8 (9.35%), *Enterococcus spp* 4 (4.65%) and *Pseudomonas aeruginosa* 4 (4.65%) Table 2

Among 62 isolates of *Staph aureus*, 20 (32%) isolates were MRSA. Resistance was not seen for Vancomycin and linezolid. Among others higher sensitivity was seen for Amikacin (72%) and Gentamicin (78%). Fig 1 Among 20 isolates of Gram negative bacteria, Colistin and meropenem showed no resistance. Imipenem and Tigecycline also showed good sensitivity ie 90% and 95%. Fig 2

Table 1

Infected Joints	Total samples	Sterile	Culture positive
Knee	170	100	70 (41%)
Hip	18	10	8 (44%)

Elbow	17	9	8 (47%)
Ankle	6	6	0 (0%)
Shoulder	5	5	0 (0%)
Total	216	130	86 (40%)

Table 2

Organism	Knee joint	Hip joint	Elbow joint	Total
Staphylococcus aureus	52	4	6	62 (72%)
Acinetobacter baumanii	6	0	2	8 (9.35%)
Citrobacter spp	4	4	0	8 (9.35%)
Enterococcus spp	4	0	0	4 (4.65%)
Pseudomonas aeruginosa	4	0	0	4 (4.65%)

Fig 1. Antibiotic sensitivity pattern for *Staphylococcus aureus*

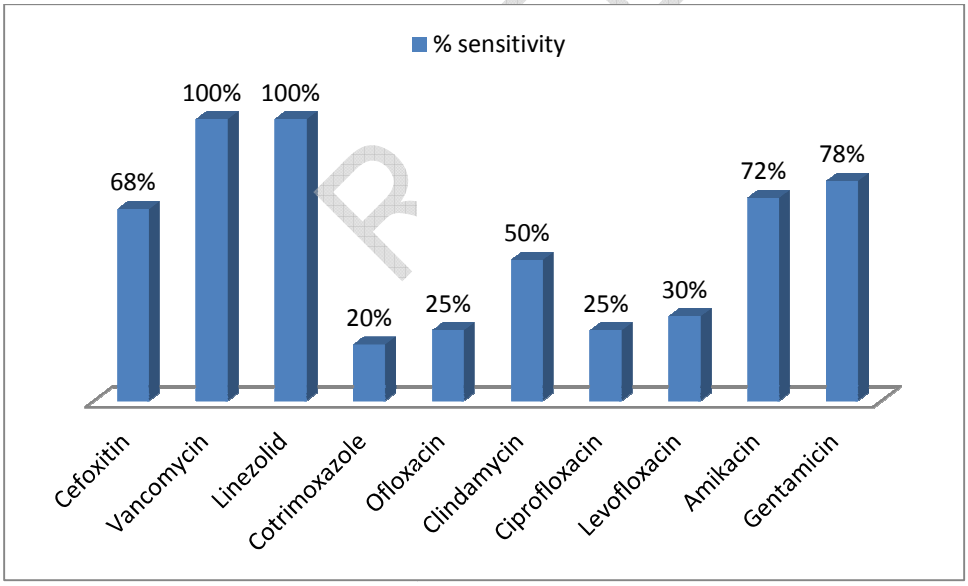
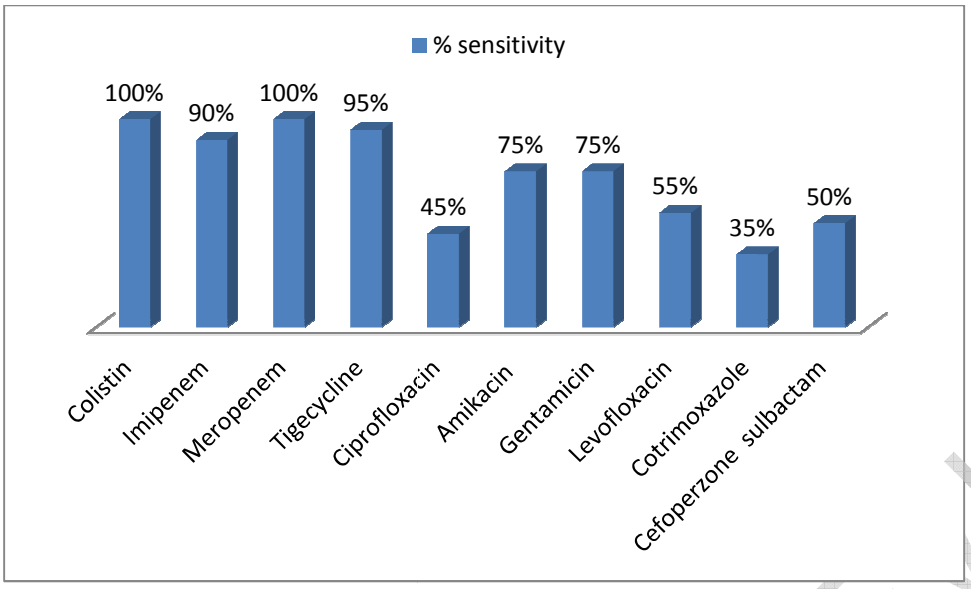


Fig 2. Antibiotic sensitivity pattern for Gram negative bacteria



Discussion.

Bacterial arthritis occurs mainly in elderly male patients and similar scenario is seen in our hospital with a mean age of 55 years. Similar results were seen in the studies performed by Eberst Ledoux et al [12] and Madruga Dias et al [13]. *S. aureus* predominates among the bacterial cause of septic arthritis and patients usually have monomicrobial aetiology. Knee was the most commonly affected joint, followed by the hip, but any joint can be affected. These features have also been documented in the literature [9, 14].

S. aureus was the most common agent (72%), which is similar to most previous series.The incidence of Gram-negative bacterial infections was around 23%, as previously described in the literature [12]. In contrast to the study performed by Madruga Dias et al [13] wherein they couldn't isolate pathogen in the majority of the cases, we were able to isolate the causative agent in 40% of patients, and similar results were seen in other incidences [15].

In our study Vancomycin and Linezolid were the most effective antibiotics for Gram positive bacterial infections followed by amikacin and gentamicin and for gram negative infections carbapenems and aminoglycosides were good therapeutic options. Similar results were seen in a study by Eric et al [16] where in they found that 88% of the bacteria isolated from hip and knee infections were sensitive to gentamicin; 96%, to vancomycin. Similar results were seen in a study done by Hadi Abdulah Abd Ali Al-Zuhairi et al [17].

Conclusion

Rapid recognition of changes in the epidemiology of arthritis can provide more appropriate empirical treatment, which targets the most probable pathogen to reduce the incidence of serious complications. To conclude, it is of immense value to conduct epidemiological studies at the institutional level to approach the characteristics of septic arthritis to establish parameters of similarity or difference between countries with transitional economy

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