ORIGINAL ARTICLE

Outcome of Management of Non-Gonococcal Septic Arthritis at National Orthopaedic Hospital, Enugu, Nigeria

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Abstract:

Background: *Septic arthritis is an acute bacterial infection of a synovial joint. It is an orthopaedic emergency that can lead to morbidity or mortality if not properly treated. The fundamental issues in the management of septic arthritis include the duration of antibiotic therapy, the mode of joint drainage and the role of physiotherapy. There is paucity of local data on septic arthritis in Nigeria.*

The study was carried out at the National Orthopaedic Hospital, Enugu; a regional trauma and orthopaedic center with wide catchments area covering at least three geopolitical zones of Nigeria.The objective of the study is to describe the pattern and distribution of non-gonococcal septic arthritis, the causative organisms, and the outcome of management of this condition at Enugu, Nigeria and make recommendations on the antibiotic therapy.

Method: *A retrospective study of all the patients that presented at the National Orthopaedic Hospital Enugu with Non-gonococcal septic arthritis between January 1997 and December, 2006 was done.*

The patient's case notes were retrieved from the Medical Record Department. Information extracted and analyzed included demographic data, joints affected, cultured organisms, antibiotic sensitivity pattern, duration of parenteral and oral antibiotics therapy, complications and follow-up period.

Patients with incomplete records, immune-compromised patients and those with subjacent osteomyelitis were excluded from the study.

Result: *Forty-three patients were seen within the period and 40 had analyzable data. The age range was 1 month to 39 years, with a mean age of 10.2 years.*

Twenty-one patients (52.5%) were males and 19 (47.5%) were females.

The hip joint was the most commonly affected (47.5%).

Staphylococcus aureus was the most common organism (50%), followed by Coliforms (42.5%). Most patients (75%) had parenteral antibiotics for 3-5 days, while 77.5% of patients received oral antibiotics for 2-4 weeks. All the patients had arthrotomy and joint irrigation within 48 hours of admission. Complications were recorded in 11 patients (27.5%). Fixed flexion deformity was the commonest complication (17.5%). No mortality was recorded.

Conclusion: *Septic arthritis is an orthopaedic emergency. Early diagnosis and prompt treatment with appropriate antibiotics and surgical drainage are the keys to a successful outcome. In our environment (Enugu), the coliforms are competing favourably with staphylococcus aureus as causative agents of septic arthritis. Short term parenteral antibiotics of 3 – 5 days seems to be as effective as the 1 – 2 weeks therapy in the non-immune compromised patients and in cases not complicated by juxtarticular osteomyelitis or presence of prosthetic implants.*

Keywords: *Septic arthritis, antibiotic therapy, outcome of treatment.*

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Introduction

Septic arthritis results from bacterial invasion of a joint space which can occur through haematogenous spread, direct inoculation from trauma, instrumentation or surgery. Contiguous spread from an adjacent site of osteomyelitis or cellulitis may occur. Septic arthritis is otherwise referred to as suppurative arthritis, bacterial arthritis or purulent arthritis.

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Despite in-depth research into the pathophysiology and treatment of septic arthritis, the morbidity and mortality are still significant especially in patients at the extremes of age[1].

Septic arthritis can occur at any age, but young children and elderly individuals are most susceptible especially if they have an already abnormal joint from previous trauma or from conditions such as hemophilia, osteoarthritis or rheumatoid arthritis[2,3].

Septic Arthritis in Rheumatoid arthritis is associated with an increased mortality of 25-30% due to delay in diagnosis and treatment, as it may mimic acute flare up of the disease.[4]

It is not a very common condition, the overall estimated incidence in Europe is reported as 2 - 6 cases per 100,000 population per year[3,5]. The estimated incidence in the West African sub region and Nigeria is not known.

Large joints are more commonly affected than small joints and in up to 61-79% of cases, the lower limb weight-bearing joints are predominantly affected[5,6,7].

The most common aetiological agent of septic arthritis is Staphylococcus aureus[2,3,5,8,9]. 0ther common pathogens include Streptococcus species, Pseudomonas aeruginosa, Escherichia coli, Klebsiella species, and Neiserria gonorrhea.

The most common gram negative organisms are Escherichia coli and pseudomonas, the later being relatively common in Intravenous drug addicts.

Anaerobes rarely cause septic arthritis, but may be isolated in diabetic patients and in patients with history of penetrating trauma.[2]

Approximately 10% of patients with non-gonococcal septic arthritis have poly-microbial infections.

Haemophilus influenzae is no longer a common cause of septic arthritis in children under 2 yrs because of the H. influenzae type b (Hib) vaccine now given to children [10,11].

The risk factors for development of septic arthritis are osteoarthritis, rheumatoid arthritis, previous joint surgery, prosthetic joint, extremes of age, sickle cell disease, previous intra-articular steroid injections, alcoholism, diabetes, cancer, low socio-economic class and intra-venous drug abuse.

Treatment involves joint drainage and irrigation, antibiotics administration and splinting of affected joints in functional position. The changing patterns of the spectrum of the causative bacterial species and the development of antibiotic resistance by these organisms add to the difficulty of eradicating these infections and achieving good functional outcome. The fundamental issues in the management of septic arthritis include the duration of antibiotic therapy (oral & parenteral), the mode of joint drainage and the role of physiotherapy. Thus the optimal treatment is far from being clear.

Ideally, antibiotic treatment is begun only after all specimens are collected for culture. Generally, parenteral antibiotics are used for 7 days before changing over to oral antibiotics.[12] Parenteral antibiotics is initially required to achieve high concentration quickly in the infected tissues.

The disadvantages of the parenteral route are that it is more expensive and more inconveniencing to the patient. Oral antibiotic therapy is instituted after an initial good clinical response from the parenteral administration as shown by the subsidence of the fever and the patient demonstrating an increase in appetite and level of energy; and possibly an improvement in the range of motion of the joint. Oral antibiotics are more convenient and less expensive; and have been shown to be effective in the treatment of septic arthritis after parenteral therapy. As a guiding principle, doses for oral antibiotics are two to three times higher than the usual doses for less serious infections and are equivalent to the parenteral dosage.[13]

The total duration for antibiotic therapy in septic arthritis is controversial. More virulent causative organisms require longer duration of therapy. A total of 2 weeks therapy is required in less virulent organisms, while 2-3 weeks of antibiotics treatment is added if very virulent organisms like S. aureus or Gram negative bacillus is the causative organism.[12]

The management of prosthetic infected joints is varied; depending largely on whether or not the prosthesis is removed. If the prosthesis is removed, treatment for six weeks with antibiotics is required.

However, for stable prosthetic joints, several regimens have shown high success rates, including initial intravenous antibiotics followed by oral therapy for six months and three months respectively for the knees and hips.[13] One of the most recent advances in the management of septic arthritis is the issue of home intravenous and oral antibiotics therapy. Clinical and laboratory monitoring of the serum bactericidal activity of the drugs is necessary since serum level of oral drugs is dependent on intestinal absorption.

C - reactive protein (CPR) level increases in response to bacterial infection, rising earlier than the ESR in a patient with septic arthritis. CRP also normalizes rapidly and its normalization appears to indicate the end of the invasive bacterial process; and is therefore useful as a monitor of duration of antibiotic therapy.[14] Poor prognosis is associated with delayed or inadequate treatment as well as older age, pre-existing joints disease and presence of synthetic material within the joint. Other factors include infection by Gram Negative rods, positive blood culture results, poly-articular infections, and the presence of other serious systemic illnesses.
Currently, there is paucity of local studies on septic arthritis in Nigeria. This study was therefore undertaken to determine the pattern and distribution, causative organisms and outcome of management of patients with non-gonococcal septic arthritis and to make recommendations on the antibiotics therapy.

Patients and Methods
A retrospective study of patients with septic arthritis who presented at National Orthopaedic Hospital Enugu from January, 1997 to December, 2006 was carried out.
National Orthopaedic Hospital Enugu is a regional Orthopaedic and trauma centre for the entire south- East geopolitical zone and parts of the South-South and North-Central zones of Nigeria.
Source of information was the patients' case notes. Details gathered included demographic data, joints affected, cultured organisms, antibiotic sensitivity pattern, duration of parenteral and oral antibiotics therapy, surgical treatment offered, complications and duration of follow-up.
Data was analyzed using SPSS 9.0 for WINDOWS.

Results
Within the period under review, 43 patients presented with non-gonococcal septic arthritis in 43 joints; however 3 patients had incomplete records and were excluded from the study. Forty patients had analyzable data and were recruited for the study. Their age range was from 1 month to 39 yrs. with a mean age of 10.2 yrs. (Fig. 1).
Twenty-one patients (52.5%) were males while 19 (47.5%) were females, ratio 1.1:1

There is no significant difference in the number of hips 19(47.5%) and knees 18(45%) affected in our series.
The peak age incidence is in the 1-5 years age group and the knee joint was the most commonly affected joint in this group (Table II). Septic arthritis of the hip was distributed almost evenly among the different age groups.
The shoulder was affected in 2 patients (5%) and the ankle in one patient (2.5%), (Table I).
S. aureus was the most isolated causative organism in 20 patients (50%). Coliforms were isolated in 17 patients (42.5%) while Pseudomonas aeruginosa was found in 3 patients (7.5%). No polymicrobial infection was identified. 82.4% of those with coliform infection were children.
All the affected joints in our series are large joints, and the lower limb weight bearing joints constituted 95%.

Parenteral antibiotics were given for 2-3 days in 12 patients (30%), 4-5days in 18 patients (45%). Nine patients (22.5%) had IV antibiotics for 6-7 days while only one patient received IV antibiotics for more than seven days.
Seven patients (17.5%) had oral antibiotics for two weeks, 11 patients (22.5%) for 3 weeks, 13 patients (32.5%) for 4 weeks and 9(22.5%) for ≥5 weeks.
All the patients had arthrotomy and joint irrigation with normal saline within 24 - 48 hours of presentation. Eleven patients (27.5%) had complications.

Fixed flexion deformity was the commonest complication recorded in 7 patients (17.5%). Two patients (5%) had joint stiffness which was treated by physiotherapy. One patient (2.5%) developed chronic osteomyelitis while another had limb shortening. (Table III). No evidence of immune-compromise was noted in any of the patients and no mortality was recorded.

Twenty-nine patients (72.5%) were followed up for between 2 months to 5 years, 10 patients (25%) were lost to follow-up and 1 patient still attends the out-patient clinic for chronic osteomyelitis.

Table I: Joints Affected

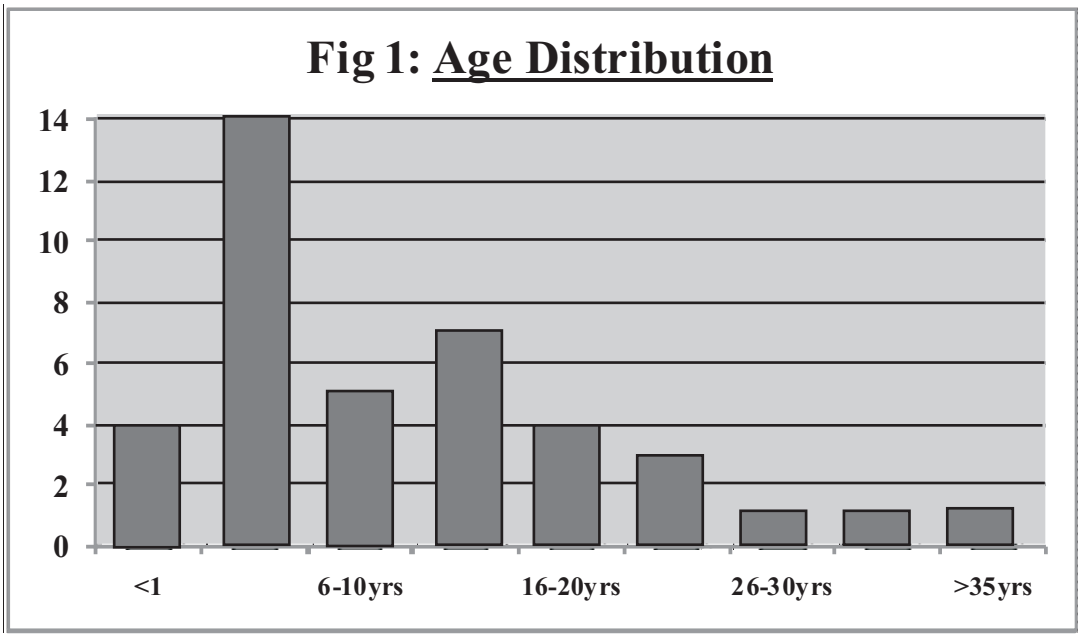
Joint	No	%
Hip	19	47.5
Knee	18	45
Ankle	1	2.5
Shoulder	2	5
Total	**40**	**100%**

Table II: Age Distribution and Joints Affected

Age (yrs)	Hip	Knee	Ankle	Shoulder	Total	%
<1	2	2	-	-	4	10%
1-5	2	10	1	1	14	35%
6-10	3	2	-	-	5	12.5%
11-15	3	3	-	1	7	17.5%
16-20	4	-	-	-	4	10%
21-25	3	-	-	-	3	7.5%
26-30	1	-	-	-	1	2.5%
31-35	-	1	-	-	1	2.5%
>35	-	1	-	-	1	2.5%
Total	19(47.5%)	18(45%)	1(2.5%)	2 (5%)	40	100%

Table III: Complications

	No.	%
Fixed flexion deformity	7	17.5
Chronic osteomyelitis	1	2.5
Joint stiffness	2	5.0
Limb length Discrepancy	1	2.5
Total	**11**	**27.5%**



Discussion

Despite the availability of potent anti-microbial agents, bacterial infection of joints remains one of the most rapidly destructive and potentially lethal forms of arthritis. Usually the infection involves a single large joint such as hip or knee, but many joints may be involved.

The initial infectious process can begin elsewhere in the body and spread through the blood stream (haematogenous) to the joint.[15] Other sources include open injuries, surgery and unsterile injection into the joint.

Within the period of this study (10 years), forty-three patients presented with non-gonococcal septic arthritis, three of whom were excluded because of incomplete data.

We observed a near equal male to female ratio of 1.1:1, which is corroborated by earlier studies by Eder L. et al16. Eder et al also reported a bimodal age distribution of 5-14 years and more than 65 years; however our study showed a peak age incidence at 1-5 years with a mean age of 10.2 years. The reason for the lower peak age incidence in our environment may be as a result of the poorer environmental hygiene and socio-economic class of the Nigerian populace compared to that of the Western world which predisposes the Nigerian child to infections earlier in life.

The oldest patient in our series was aged 39 years. The explanation for the apparent low incidence of non-gonococcal septic arthritis in the middle aged and elderly in our environment is lacking. Probably, a large series, multi-centre study is required to elucidate this and collaborate this finding. The absence of infection in the elderly population may be due to the low number of prosthetic joints and low incidence of rheumatic arthritis in our environment.

There was no significant difference in the infection rate of the hip 19(47.5%) and the knee 18(45%). Many authors[5,6,7] agree that large joints are more commonly affected than small joints and that in up to 60% of cases, the joints affected are the hip or knee joints. The hip and knee were affected in 92.5% of our series. The reason for this high percentage of hip and knee infections is not clear. However, the pattern of joint involvement in childhood septic arthritis is somewhat different in that hip infections are more common[17,18]. Since most of the patients in our study (≥ 75%) were children; it is not surprising that the percentage of hips infections were high.

No patient in our series had poly-articular involvement. This agrees with the common pattern of non-gonococcal bacterial arthritis[17,18] in literate. In our study, staphylococcus aureus was the most isolated causative organisms in 50% of patients, followed by coliforms in 42.5%. This observation is in consonance with reports from other authors that identified staphylococcus aureus as the leading cause of septic arthritis[2,3,5,8,9].

The acute form of septic arthritis is usually caused by bacteria such as staphylococcus, streptococcus pneumoniae, Group B streptococcus and sometimes organisms that cause gonorrhoea and lyme disease.

The reason for the high percentage of septic arthritis caused by coliforms in our series is not known. However, 5(29.4%) of the patients in whom coliforms were isolated (17) had a history of recent diarrhoeal disease within 2-3 weeks before the onset of the arthritis. Another 7(41.2%) had associated urinary tract infection by the same organisms. Most of the patients with coliform infection are children.

We are therefore tempted to postulate that diarrhoeal disease may as well be a predisposing factor to acute septic arthritis. Bacterial pathogens are important causes of diarrhoea in children, particularly in developing countries and other settings where the standards of personal and community hygiene are low[19]. Escherichia coli is an important bacterial cause of diarrhoea in Nigeria and other developing countries[20]; and has been implicated in the pathogenesis of protracted diarrhoea in children[21]; a situation that has the potential of aggravating the precarious nutritional status of the children. A survey of blood, urine and lung aspirate in the University of Benin Teaching Hospital (UBTH) revealed that S. aureus, E. coli, Klebsiella spp, H. influenza, N. meningitides and Citrobacter are the most commonly isolated pathogens. Thus diverse group of pathogens and infections are encountered in both general (community) and hospital clinical practice [22].

The route and duration of antibiotics are key unanswered questions about septic arthritis[23]. There is therefore need for randomized controlled trials to address these questions.

Analysis of the complication profile and duration of antibiotic administration showed that majority of our patients (75%) received parenteral antibiotics for 3-5 days and showed no significant change in complication profile and general morbidity from those who got it for longer periods.

There was also no significant difference between those who received oral antibiotics for 4 weeks and those who got it for 6 weeks and beyond.

All the patients in our series had no immune compromise and demonstrated clinical signs of efficacy of the antibiotics before they were changed to oral antibiotics based on the culture and sensitivity results in the vast majority of cases.

The average duration of parenteral antibiotic treatment (5 days) in our series is significantly lower than the 7 days commonly advocated in current literatures[12]. Thus the disadvantages of parenteral antibiotics therapy of increased cost and inconveniences to the patients were reduced.

Most of the organisms that were isolated in our study were very virulent (S. aureus, Coliforms etc); and this necessitated the use of oral drugs for four to six weeks, as advocated by Daniel et al [12]. However, it was clear from this study that the extension of the duration of the antibiotics therapy beyond four (4) weeks does not have much added benefit to the treatment outcome; except possibly in situations where the infection is persisting. We believe that intensive parenteral antibiotic administration and prompt surgical drainage and post-op antibiotics are very important determinants of sequelae. Delayed or inadequate treatment of septic arthritis can lead to irreversible joint destruction and subsequent disability.

All our patients had arthrotomy and joint irrigation within 48 hours of admission. This was a factor in the low complication profile (27.5%) in our study. Osteoarthritis, a later complication of joint infection was not seen in our series since an overwhelming majority of the patients were children. We advocate arthrotomy and joint irrigation and not joint aspiration as surgical treatment for septic arthritis.

We noted zero mortality in our study as opposed to mortality rates as high as 11% reported by some authors[2]. It is therefore important that diagnosis be made rapidly and that treatment be started promptly to reduce mortality and prevent adverse sequelae. If diagnosis is suspected, advice from a musculoskeletal specialist should be sought at the earliest opportunity.

Conclusion

The diagnosis of septic arthritis must be done early and intensive treatment with parenteral antibiotics commenced as soon as possible. This must be followed by surgical drainage of the joint to ensure a satisfactory outcome. Short-term parenteral antibiotics of 3-5days seems to be as effective as the 1-2 weeks therapy in the non-immune compromised patients and in cases not complicated by juxta-articular osteomyelitis or presence of prosthetic implants.

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