Original Article

Childhood Osteomyelitis: A five-year analysis of patients with sickle cell anaemia in Port Harcourt, Nigeria

IO George[1], AI Frank-Briggs[2], CO Ihezie[3]

ABSTRACT

Objective: Osteomyelitis is an important cause of morbidity and mortality among sickle cell patients. The aim of this study was to determine the prevalence and pattern of osteomyelitis among children with sickle cell disease at the University of Port Harcourt Teaching Hospital, Port Harcourt, Nigeria.

Methodology: This was a retrospective review of all the medical records of sickle cell patients below the age of sixteen years who were admitted into the Paediatric ward of the University of Port Harcourt Teaching Hospital, Port Harcourt from January 2003 to December 2007. Those with incomplete records were excluded.

Results: A total of 187 sickle cell patients were reviewed. Mean age of the study population was 6.95±4.23. There were more males (105) than females (82) giving a male female ratio of 1.3:1. Out of the 187 subjects with sickle cell anaemia 15 had osteomyelitis which accounted for a prevalence of 0.08%. Acute osteomyelitis accounted for 100% of cases. *Klebsiela pneumonia* was commonest organism isolated from blood culture 5(33.3%). Fever, leg swelling and bone pains were the commonest mode of presentation. The Tibia bone was commonly involved 8(53.3%).The aetiological organisms were sensitive to ceftazidine and gentamycin in 55% of the positive blood cultures.

*Conclusion***:** The preponderance of *Klebsiella pneumonia* indicates a change in the previously accepted pattern of infection in which Salmonella specie were considered to be the main causative organism.

KEY WORDs: Childhood, Osteomyelitis, Sickle cell anaemia**,** *Klebsiella pneumonia***.**

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INTRODUCTION

Sickle cell disease is very common in the tropics.[1] One of its most serious complications is osteomyelitis requiring hospitalization.[1] This increased susceptibility to infections is related to abnormalities in the defense mechanisms of these patients, including functional hyposplenism,[2] an abnormality in the alternative pathway of complement activities,[3] and defective neutrophil function.[4] *Salmonella, Staphylococci, Pneumococci* and *E. coli* has been postulated as the incriminating factor towards increased frequency of infections.[1]

The primary site of infection is the metaphysis, where the blood flow becomes sluggish in the capillary loops. Microinfarcts in the bones act as a nidus for infection.[5] Rarely, the epiphysis can be

primarily infected. The cardinal signs of early osteomyelitis are soft tissue swelling and marked bone tenderness with voluntary guarding of the affected limb.[5]

Sickle cell osteomyelitis causes enormous burden in our society. This is manifested in the long stay in hospital with loss of man hours spent in caring for the sick child and financial crunch on the family with payment of huge hospital bills. There are also attendant bony deformities and cosmetic problems.

There is paucity of data in our environment on childhood osteomyelitis among sickle cell patients, the aim of this study, therefore, was to retrospectively evaluate the pattern of osteomyelitis among children with sickle cell disease at the University of Port Harcourt Teaching Hospital, Nigeria .This will serve as background data in future prospective studies in our environment.

METHODOLOGY

Sickle cell patients below the age of 16 years with osteomyelitis at the University of Port Harcourt Teaching Hospital from January 2003 to December 2007 were reviewed. The information was obtained from our admission and discharge register and patients' case records. Data obtained from the records included age, gender, haemoglobin genotype, clinical and laboratory features, diagnosis, isolated bacterial pathogen, and source of specimen for microbiologic studies. Diagnosis of osteomyelitis was based on clinical (characteristic signs and symptoms of bone infection) and X-ray findings (soft tissue swelling and periosteal reaction). Modern techniques for the diagnosis of osteomyelitis such as computed tomography, magnetic resonance imaging and bone scan were not done. Osteomyelitis was considered acute if the duration was shorter than two weeks and chronic if the duration was above two weeks. Sickle cell anaemia was diagnosed based on clinical features such as recurrent bone pains, persistent or recurrent anaemia/jaundice, hand and foot swelling and habitus. This was confirmed by haemoglobin electrophoresis. The statistical package for social sciences (SPSS) Version 14 was used to enter data and analysis was by descriptive statistics.

Table-I: Clinical features at presentation of the 15 subjects with osteomyelitic.

Symptoms/Signs	*No.*	*%*
Fever	15	100
Leg swelling	15	100
Bone pains	15	100
Inability to walk	12	80
Purulent discharge from wound	3	20

RESULTS

A total of 187 sickle cell patients were reviewed and 15 of them had osteomyelitis. This gave a prevalence rate of 0.08%. There were more males 105 (56.1%) than females 82(43.9%) giving a male/female ratio of 1.3:1. The mean age of the study population was 6.95±4.23years (range 8 months to 16years).The median age for subjects with osteomyelitis was 9 years. The lower limbs were involved in 93.3% of cases with the tibia bone (53%) being the most frequently affected. Other bones affected were femur (40%), and sacrum (7%).

All the subjects with osteomyelitis presented with fever, leg swelling and bone pain (Table-I). There were 10(66.7%) positive blood cultures while 5 (33.3%) cultures were negative. *Klebsiella pneumonia* was the commonest organism cultured from blood specimen (Table-II). The highest number of patients presenting with osteomyelitis occurred in the first decade (median of 9 years). All the cases were of acute onset. Radiological study of the affected bone showed soft tissue swelling in 13(86.7%) cases while film report of two subjects was not available. From (blood culture) sensitivity tests, ceftazidine (30%) and gentamycin (25%); were found to be the most effective antibacterial drugs. Other antimicrobial agents were cloxacillin (18%), chloramphenicol (18%) and erythromycin (11%). These agents were used in various combination based on blood culture sensitivity pattern: cloxacillin/gentamycin (n=6), ceftazidine/gentamycin (n=6), cloxacillin/chloamphenicol (n=2), chloramphenicol/gentamycin (n=1) based on blood culture sensitivity pattern. Surgical debridement was done in 6(40%) cases. Complications included septicemia 10 (66.7%), shortening of the limb 2 (13.3%) and pathological fracture 1 (6.7%).

Table-II: Bacteria organisms isolated from blood of the 15 cases of osteomyelitis.

Organisms	*Positive blood culture*	
	No.	*%*
Klebsiella pneumonia	5	33.3
Staphylococcus aureus	3	20.0
Salmonella species	2	13.3
Proteus species	1	6.7

DISCUSSION

The prevalence of osteomyelitis among children with sickle cell disease was 0.08%.This is similar to report by Keeley et al[6] in which 41 out of 192 children with sickle cell anaemia had osteomyelitis. Acute osteomyelitis was the only mode of presentation in our series. This may be as a result of regular follow up early detection early and prompt treatment. The most common presenting symptoms were fever, bone swelling and pains. This agrees with findings of other authors.[6,7] The lower extremities, were the most common region affected with the tibia bone being the most common site of infection which is similar to findings in other series.[8,9] In some series humerus and femur were the commonest site.[10,11]

The most common bacterial pathogen in osteomyelitis in patients with SCD is controversial.[12] In the literature, *Salmonella specie* is usually considered the most prevalent organism associated with osteomyelitis.[11-14] Other reports have shown that *Salmonella* osteomyelitis may no longer be common.[11,15] This is supported by report of Aken'Ova et al[15] in which 48% of the isolated organisms in osteomyelitis were Gram negative bacilli. We found *Klebsiella pneumonia* the most frequently isolated organism (accounting for 33.3% of organisms isolated from blood specimen). *Staphylococcus aureus* 3(20%) was the next commonest aetiological agent. Thanni[13] in a meta- analysis of hospital data published in African online and Pubmed showed that Staphylococcal aureus was the most common aetiological agent associated with osteomyelitis in Nigerian children with sickle cell disease. Low prevalence 2 (13.3%) of Salmonella osteomyelitis was found in our study. It is possible that availability of antibiotics as over the counter drug in many Nigerian cities may have resulted in controlled endemicity of salmonella infections in this region thus reducing its association with osteomyelitis.

Diagnosis of osteomyelitis depends on high index of suspicion and supported by laboratory and radiological investigations. In our hospital we do not have facilities for radionuclide bone Scan or MRI facility, we relied on conventional radiography which shows area of bone destruction 7-10 days after onset of infection. However, in centers where facilities for radionuclide bone scan and MRI are available it is possible to identify infection in bone early.

In acute osteomyelitis, it is important to prevent progression to chronic form and also to prevent acute exacerbation of infection. Therapy with high dose parenteral antimicrobials directed at organisms isolated in the culture of the infected bone is usually recommended.[16] In our study, ceftazidine and gentamycin were found to be effective against 55% of the organism isolated in our study. This is at variance with that of Ebong and colleagues in Ibadan, [8] Nigeria which found cloxacillin and chloramphenicol most effective against 72% of the organism isolated. Surgery also plays a significant role in the management of osteomyelitis in the acute stage. [16] It is aimed at draining the pus and the removal of necrotic soft and bone tissues as well as bacterial slime and to restore blood supply. Debridement is a modality of treatment and should not be delayed if the clinical and examination suggest infection.

In conclusion *Klebsiella pneumonia* is an unusually common cause of osteomyelitis in patients with sickle cell anaemia in Port Harcourt, Nigeria. Combination of ceftazidine and gentamycin may prove beneficial.

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