

Original Article

Outcome of Treatment in Patients with Chronic Osteomyelitis in Aminu Kano Teaching Hospital: A 10 Years Retrospective Analysis

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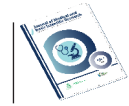
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ABSTRACT

Background: Chronic osteomyelitis (COM) is a challenging condition to treat due to the myriad of predisposing factors. The aim of the study is to review the outcome of patients treated for COM at our hospital and the factors associated with the outcome.

Methodology: The study was carried out in Aminu Kano Teaching Hospital (AKTH) which is a tertiary hospital in Kano Nigeria. The study was carried out in the orthopaedic unit of the hospital. It is a Retrospective study where records of patients managed for COM at the orthopedics unit of the institution, between January 2009 to December 2018 were reviewed. The information obtained from the records were analyzed using Statistical Package for Social Science version 16.

Results: About 88 patients with COM were seen, of these, 50 (56.8%) were males and 38 (43.2%) were females. The mean age was 15.47 years. Standard deviation of ± 13.84 . Symptoms were, discharging sinus, pain, deformity and fever. 42 (47.7%) were age 1-10 years. Bones involved are, Tibia 43 (48.9%), Radius/Ulna, 3 (3.4%) and Iliac bones, 1 (1.1%). Four (4.6%) patients had multifocal sites. The commonest route of infection was hematogenous (78.4%). Staphylococcus aureus was isolated in 63 (71.6%) patients. 65 (73.9%) had Sequestrectomy. 22 (25%) patients were lost to follow-up. 3 (3.4%) patients died. 32 (36.4%) had complications.

Conclusion: Patients treated at AKTH had good outcome following multi disciplinary approach, surgical debridement, use of antimicrobial therapy and Polymethylmethacrylate Antibiotic (PMMA) beads.

Keywords: Chronic osteomyelitis, Treatment outcome

INTRODUCTION

Chronic osteomyelitis (COM), a commonest chronic bone infection, it is defined as a long-standing infection of the bone and bone marrow characterised by persistence of microorganism, presence of sequestrum, low-grade inflammation and discharging sinus.^[1] COM continues to be a challenge for orthopaedic surgeons,

and it is common after Gustilo Anderson III open fractures with gross bacterial contamination and soft tissues compromised. Presence of implant following internal fixation of fractures and prosthetic joint replacement surgery can lead to perpetuation of infections once it occurs. COM can also be sequel to acute

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haematogenous osteomyelitis though less common now. It has impact on function and mobility, particularly in the younger productive population because of prolonged treatment and hospital stay involved. In addition staged surgeries and antibiotic therapy involved also lead to high cost of management and loss of productivity due to multiple hospitalization and increase mobility.

COM is a disease of both children and adult. It is acquired by haematogenous means in children and exogenously in adult. The clinical characteristics of COM are varied, and may be affected by geography, time, and pathogenetic differences. Geographically, developing countries have a higher incidence of the disease than developed ones, likely due by

differences in economic status, life style and health care level. ^[2, 3]

Over time, a shift has occurred from predominately haematogenous osteomyelitis several decades ago, to a predominance of COM that results from trauma, implant infection, and diabetes. ^[4,5]

Cierny and Mader proposed a classification of the disease into twelve clinical stages according to the host physiological status and the anatomical nature of the disease. ^[6] This classification system is helpful in determining if treatment should be simple or complex, curative or palliative, and limb sparing or ablative.

No single modality of treatment has been shown to be effective in the treatment of COM. Successful treatment requires a multidisciplinary team approach with surgical debridement and appropriate antimicrobial therapy as the cornerstone of treatment. Staging of the disease and identification of the causative microorganism is essential before initiation of treatment. The route of administration and the duration of antimicrobial therapy continue to be debated^[1]. The role of Polymethylmethacrylate Antibiotics (PMMA) beads is now clearly established. ^[1] Several sub-Saharan African studies have looked at the clinical pattern of COM and the outcome of patients with the disease. ^[7, 8] However, continued re-assessment of the outcome after treatment and the factors associated will go a long way in improving management of the disease and aiding further research.

The aim of this study is to review the outcome of the patients treated for COM at Aminu Kano Teaching Hospital and the factors associated with the outcome.

METHODOLOGY

This is a retrospective descriptive study of patients who were managed for COM at the department of surgery, orthopaedics unit, Aminu Kano Teaching Hospital, Kano, Nigeria, over a 10-year period between January 2009 and December 2018. All the patients included had clinical, evaluation, Laboratory investigations which include Full Blood Count, Erythrocyte sedimentation rate, Electrolyte, Urea, Haemoglobin Genotype, Blood sugar, Wound Microscopy, culture and sensitivity. Radiological evaluation in the form of X-Ray of the involved anatomical part and histopathological confirmation of the disease. Specimens from patients were sent to the medical microbiologist for culture and sensitivity. Some of the patients were also referred to the hospital nutritionist so as to build up their nutritional reserve. Also, some of the patients were managed by the physical therapist so that they could be train on ambulation and building functional muscles and joints. Excluded from the study were patients with acute osteomyelitis, those who had no surgical intervention, and those whose case records were either not found or did not have complete information.

Information obtained from the case files included demographic characteristics such as age and sex. Clinical information included main presenting symptoms, duration of the symptoms, bone affected, number of sites, surgical interventions, presence or absence of complications and present status of the patients.

The data were entered into the spreadsheet and analyzed using the Statistical Package for Social Science version 16.0 (SPSS Inc., Chicago, Illinois, USA). Quantitative data were summarized as frequencies and percentages and presented as tables.

RESULTS

Within the 10-year period of review, a total of 88 patients with COM were seen. Among the patients, 50 (56.8%) were males and 38 (43.2%) were females with sex ratio (M: F) of 1.3:1. The age ranged from 1 year to 68 years with a mean age of 15.47 years (standard deviation [SD] =13.84) [Table 1]. The age group 1-10 years constituted the largest number of patients seen, 42 (47.7%), followed by 11-20 years (34.1%). Only 3 (3.4%) patients were above 51 years [Table 1].

Table 1: General characteristics of the patients (n=88)

Age groups (Years)	Male	Female	Both sexes (%)
1 – 10	17	25	42 (47.7)
11 - 20	20	10	30 (34.1)
21 - 30	5	1	6 (6.8)
31 - 40	3	0	3 (3.4)
41 - 50	2	2	4 (4.6)
51 +	2	1	3 (3.4)
Total (%)	49 (55.7)	39 (44.3)	88 (100)

Table 2: Clinical characteristics of the patients (n=88)

Variable/Presenting complaints	Number of patients	Percentage
Discharging sinus	76	86.4
Pain	66	75
Fever	32	36.4
Deformity	15	17.1
Others	27	30.7

Table 3: Bone involvement on the patients (n=88)

Variable	Number of patients	Percentage
Tibia	43	48.9
Humerus	18	20.5
Femur	14	15.9
Fibular	3	3.4
Radius	2	2.3
Ulna	1	1.1
Others	7	7.9
Multiple bones involvement	4	4.6

Table 4: Surgical Intervention on the patients (n=88)

Procedure/Variable	Number of patients	Percentage
Sequestrectomy	65	73.9
Saucerization	16	18.2
Amputation/disarticulation	6	6.8
Arthrodesis	1	1.1
External fixation	14	15.9
POP application	12	13.6
K-wire application	5	5.7
Multiple procedures	21	23.9
Polymethylmethacrylate Antibiotic beads application	Majority of the patients	

The main presenting symptoms were discharging sinus in 76 (86.4%), pain in 66 (75%), fever in 32 (36.4%) and deformity in 15 (17.1%). While the remaining symptoms constituted 27 (30.7%) [Table 2]. Patients who had the onset of the symptoms between 1 and 10 years of age constituted the majority.

Table 3 shows that the most common affected bone was Tibia 43 (48.9%), followed by Humerus 18 (20.5%) and Femur 14 (15.9%). Radius and ulna 3(3.4%) were among the less common affected bones. Four (4.6%) of the patients had multifocal sites, and all were sickle cell disease patients. Haematogenous route of spread was 69 (78.4%) patients. Post Open Reduction and internal fixation was 10 (11.36%). Staphylococcus aureus was isolated in 63 (71.6%) of the patients.

Majority of the patients had Sequestrectomy, 65 (73.9%) as surgical intervention, while External fixator (15.9%) was the main implant used for prevention and treatment of pathological fracture that may develop following surgery. Other surgical interventions were saucerization in 16(18.2%), amputation in 6 (6.8%) and arthrodesis in 1 (1.1%) patient. Twenty-one of the patients constituting 23.9% had multiple surgical procedures done at the same sitting. [Table 4]. One patient with calcaneal bone affectation had three surgical interventions at different sittings over 18 months period. He had remission achieved by the use of Polymethylmethacrylate Antibiotic beads at the last operating time. Another patient with fibular affectation had Fibulectomy following initial sequestrectomy with recurrence.do you do sequestrectomy in fibula COM? Primary fibulectomy would have saved the stress of double surgery the minimum duration for antibiotic therapy for our patients was six weeks.

Twenty-two (25%) of the patients were lost to follow-up, with 3 (3.4%) recorded death and 32 (36.4%) recorded complications mainly persistent discharging sinus and recurrence of symptoms.

DISCUSSION

Chronic osteomyelitis (COM), which is the commonest chronic bone infection, is still a challenging condition to treat especially in developing countries where the incidence is high with impact on function and mobility, particularly in the young productive patient population because of prolonged treatment and hospital stay involved. The outcome of its management is still a concern to the physicians because of

the significant morbidity and recurrence.

The study revealed a marginal male predominance of 56.8%, with a sex ratio of 1.3:1, similar to other studies in Nigeria^[7-10] and many other studies worldwide.^[11-13] The mean age of the patients was 15.47 years (SD = 13.84) with age range 1- 68 years, slightly different from findings by other authors.^[7,10] In agreement with other similar studies,^[8, 13, 15] those between the ages of 1- 20 years constituted the majority in our study. In contrast, Ma *et al.* in China^[11], and Akinyoola *et al.* in Nigeria^[10] reported 21- 60 years and 1 - 40 years old as being most affected.

The study also revealed less infection in those above 51 years of age, similar to findings by other authors,^[8-11] that it is a disease of young age groups.

The main presenting symptoms were discharging sinus, pain, deformity and fever, similar to findings by some authors.^[7, 14, 15] Discharging sinus is the commonest symptoms in our study. Of the 15 patients with deformity, 3 had secondary knee ankylosis which was corrected by manipulation and application of plaster of Paris.

Our study also revealed Tibia to be the most common affected bone, this is because of its subcutaneous location thus is commonly involve in trauma. Its unique pattern of blood supply is also a factor.. This finding is similar to what was obtained by some authors,^[7,12,16,18] but in contrast to studies by other authors^[11,13] which showed Tibia to be second to Femur. Ibingira *et al.*^[15] in Uganda reported phalanges as the common affected bone following pricks. The study also revealed multiple bones affectation mostly in sickle cell disease patients similar to findings by other authors.^[8,16]

We also found haematogenous route as the commonest mechanism of infection especially in children, similar to findings by many other authors,^[7, 8, 10, 17] but in contrast to some authors that found trauma as the commonest mechanism of infection especially in older age group.^[12,16] Post-operative Osteomyelitis which account for 11.6% of causes of COM was treated by removal of the Implant or prosthesis.^[3,4]

Staphylococcus aureus was found to be the commonest isolated microorganism similar to many other studies done worldwide.^[7, 8, 10-12, 16-20] This is in addition to other microorganisms that were isolated, with some patients having mixed infection.

Sequestrectomy was the most common surgical intervention in our study, similar to studies done by other authors.^[13, 15, 18, 21] Comparable

to other studies,^[1, 13, 15, 18] that reported multiple surgical procedures, our stud revealed similar findings. One of our patients with Calcaneal infection had multiple surgical interventions indicating resistant to treatment in such infection. Another patient had Fibulectomy, similar to findings by some authors.^[13, 18, 24] 14 patients in the study had External fixator applied to prevent or treat pathological fracture, similar to findings by other authors.^[1, 13, 18] Linear Rail System (LRS) was used in two patients to achieve and maintain stable reduction viz a viz bone union. Polymethylmethacrylate Antibiotic beads were used routinely in our study group where the patient can afford, similar to other studies.^[1, 11, 18] Although the optimal duration of antibiotic therapy remains undefined, in our study, the minimum duration for antibiotic therapy was six weeks, similar to finding by some authors.^[22,23]

Like Nwadiaro *et al.* in Nigeria^[8] and Ibingira in Uganda^[15] who reported persistent discharging sinus and recurrence of symptoms as the main complications, this study revealed similar findings.

The patients lost to follow-up in this study probably highlight the frustration of the parents/guardians or patients because of prolonged treatment, hospital stay and high cost of treatment. Though some patients in this study were lost to follow-up, there were only three recorded mortality in all the cases managed. The author's discussion is largely centered on compare and contrast with local and international studies.

CONCLUSION

There appears to be a good outcome in our patients managed for COM with multidisciplinary approach and a combination of different surgical techniques like Sequestrectomy, saucerization, surgical debridement. The use of appropriate antimicrobial therapy and Polymethylmethacrylate Antibiotic (PMMA) beads also helps in curtailing infection and preventing relapse.

Conflicts of interest

There are no conflicts of interest.

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