

Outcome of Management of Chronic Osteomyelitis at National Orthopaedic Hospital, Enugu

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Abstract

Introduction: Chronic osteomyelitis remains challenging to treat despite advances in antibiotics and new operative techniques. The associated morbidity and difficulty in eradicating the infection has posed a problem for the surgeon. The objective of the study is to evaluate the management of chronic osteomyelitis using the National Orthopaedic Hospital Enugu experience and recommend some modification of the treatment protocol in antibiotic usage.

Method: A retrospective study was carried out. Records of fifty patients presenting with chronic osteomyelitis over a ten year period from 1997 to 2006 were analyzed. Patients with incomplete records were excluded.

Results: The young active age group was more involved. Majority of the patients presented quite late, more than 6 months from onset of symptoms.

Saucerization, curettage and sequestrectomy were the commonest surgical intervention done; as types III and IV [Cierny Mader] chronic osteomyelitis prevailed over the others. The duration of parenteral (intravenous) antibiotics usage was within 72 hours in most of the patients; with oral antibiotic continued for about 4-8 weeks in most of the patients.

Most of the patients had stopped discharging at 12 weeks of follow-up and showed clinical evidence of arrest of the infection.

Conclusion: Following adequate surgical debridement in chronic osteomyelitis, short term sensitivity based intravenous antibiotics for 48-72 hours and subsequent oral antibiotics for a variable period of 4-8 weeks is adequate treatment for chronic osteomyelitis in a non-immuno compromised patient.

Key Words: chronic osteomyelitis, antibiotic therapy, management outcome, Enugu

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Introduction

Chronic osteomyelitis remains one of the most

challenging problems in orthopaedic surgery. It is a progressive infective destruction and new apposition of bone.¹ It commonly occurs after trauma with open fractures; as a complication of Acute Haematogenous Osteomyelitis, or following surgery [internal fixation]. At all ages, *staphylococcus aureus* is the most common bacteria causing osteomyelitis. Among Sicklers, the predominant organism in some series is *Salmonella* species while in Drug Addicts and Patients on haemodialysis, *Pseudomonas aeruginosa* and *staphylococcus epidermidis* are common isolates respectively.² Two currently popular classification systems are those of Waldvogel,³ and Cierny and Mader.⁴ Cierny and Mader's classification was used in this study because it is of value in guiding treatment and also serves as a prognostic indicator.

The goals of the treatment are to remove the purulent materials by drainage, irrigation and debridement of necrotic tissues within the bone and joints; and removal of avascular necrotic bone.³

Adequate drainage, thorough debridement, obliteration of dead space, wound protection and specific antimicrobial coverage are the mainstays of therapy.⁵ Culture and histologic examination should be obtained in each case as malignant tumours may infrequently be mistaken for infection.

The duration of antibiotic management remains controversial. The traditional duration of treatment in most stages of osteomyelitis is four to six weeks. The rationale for this duration is based on the results of animal studies,⁶ and the observation that revascularization of bone after debridement takes about 4-8 weeks. Longer courses of intravenous or oral antibiotics (six months or more) have been attempted by some authors^{6,7}, but the outcome of those trials suggests nothing superior to the six weeks period of therapy. Failures occur in all clinical trials whatever the duration of treatment, mostly as a result of emergence of resistant strains or inadequate surgical debridement.⁹

Patients and Method

The clinical records of fifty patients with chronic osteomyelitis who presented in NOHE from January 1997 to December 2006 were reviewed. The data analyzed were patients age, sex, occupation, involved bone, mode of infection, duration of illness before presentation, the type based on Cierny and Mader classification, the number and type of surgery, duration of parenteral and oral antibiotic therapy, duration of post operative wound discharge, clinical state of the patient at 12 weeks, immune status of the patient and duration of hospital stay.

Results

The age of the patients ranged from 9 months to 45 years. Thirty-two (64%) of the patients were in the young adult age group of 16-45 years, while the rest 18(36%), fell below 16 years. There were no patients above 45 years. Thirty-two (64%) were secondary to acute haematogenous bone infections while 18(36%) followed post operative and post trauma infections. Males were more affected, [33 (66%)] than females [17 (34%)] giving a male to female ratio of 1.9:1.

Thirty (60%) of the patients were students; while the others were made up of traders, civil servants, apprentices, and farmers. The predominant bone involved was the tibia [23 (46%)] with the right tibia being more involved. Other bones included the femur [16 (32%)], radius, ulna, humerus, metatarsal, clavicle, maxilla, and iliac crest [Table. I].

Using the Cierny and Mader classification, type IIIA [32 (64%)] was the most common type followed by type IVA [8 (16%)], type IIA [6 (12%)] and type 1A and IIIB [2 (4%)], [Fig.1].

Most of the patients presented after six months of being symptomatic [39 (78%)], while the rest presented in less than six months [Table II].

Majority (94%) of the patients had saucerization, sequestrectomy and curettage while incision and drainage was done in the remaining 6%.

The duration of parenteral antibiotics (fig.2) was for 24 hours in 13 (26%), 48 hours in 18 (36%), 72 hours in 6 (12%), 5 days in 6(12%), while 5(10%) of the patients had none except that given with induction of anaesthesia. The route was intravenous in all those who had parenteral antibiotics.

Oral antibiotics was continued for 4 weeks in 24 (48%), and between 4-8 weeks in another 24 (48%), while only 2

(4%) received antibiotics for more than 8 weeks. None had antibiotics for more than 12 weeks. The antibiotic used was initially based on culture- sensitivity of sinus discharge and later changed, where indicated, to that of the swab or specimen from the infected medullary cavity. Primary wound closure was done for all the cases except where incision and drainage was done.

Two weeks post-operatively, 14(28%) patient were still discharging from areas of superficial wound breakdown and sinuses. Seven (14%) persisted by the 6th week. Thirty six (72%) patients had no post operative discharge.

At 12 weeks, 45 (90%) patients had no wound/sinus discharge while 5(10%), were still discharging (Table.III).

S. Aureus was the commonest infecting organism isolated, followed by Coliforms (table IV). *Pseudomonas* was cultured in two cases that were secondary to compound fractures.

No evidence of primary immuno-compromise was identified in the study population except for five patients; four (4) had sickle cell disease while one had Pott's disease and chronic osteomyelitis caused by pyogenic bacteria.

The average length of hospital stay was two weeks.

Table I: Distribution of Infections in Bones

Bones	no. of patients.	Percentage.
Tibia	23	46
Femur	16	32
Radius	3	6
Ulna	3	6
Humerus	2	4
Maxilla	1	2
Iliac crest	1	2
Clavicle	1	2
TOTAL	50	100

Table II: Duration of Illness before Treatment

Duration	Number Of Patients	Percentage
> 6 months	39	78
3 - 6 months	3	6
6 weeks - 12weeks	4	8
< 6weeks	3	6
Unknown	1	2
TOTAL	50	100

Table III: Post Operative Infection Control within Twelve Weeks

Post-Op Duration	Number of patients still discharging	Number of patients without discharge	Total
2 weeks	14 (28%)	36 (72%)	50
6 weeks	7 (14%)	43 (86%)	50
12 weeks	5 (10%)	45 (90%)	50

Table IV: Cultured Organisms

Organisms	Staph. Aureus	Coliforms	Strep. Spp	Pseudomonas	H. Influenza	No Growth
No. of cases	31	11	3	2	1	2

Figure 1: Classification based on Cierny and Maders'

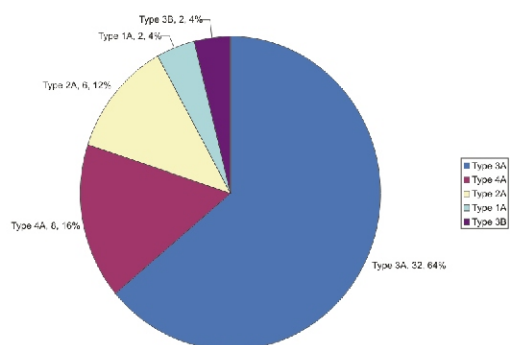
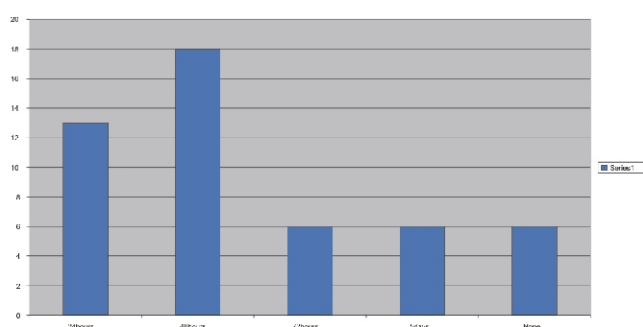


Figure 2: Duration of parenteral antibiotics



Discussion

Osteomyelitis is a disaster and a great challenge and nightmare to the Orthopaedic Surgeon. Chronic osteomyelitis is difficult to eradicate completely.¹⁰ It is a dreaded sequelae of acute haematogenous osteomyelitis; though nowadays, in the developed countries it more frequently follows an open fracture or operation.¹¹ In the West African sub - region, the commonest aetiologic factor still remains acute haematogenous osteomyelitis. In a study by Onuminya and Onabowale, acute haematogenous osteomyelitis was the major predisposing factor in more than 83% of chronic osteomyelitis patients who have haemoglobinopathy.¹² In our study, majority of the cases (64%) were secondary to acute haematogenous osteomyelitis; while 36% followed trauma and post-operative infections.

Early diagnosis and effective surgical and antibiotic management can control the infection, suppression of which may last a life time¹³.

Since complete re-vascularization of bone after debridement takes an average of six weeks⁶, we have chosen twice this period (12 weeks) as the follow-up period in the believe that any discharge(infection) that persists beyond this period signifies failure of the initial therapy.

From our study, young adults were mostly involved. This is similar to the findings in the study by Alonge, Ogunlade and Omololu¹⁴. This is probably because of the remarkable contribution (36%) of post traumatic / post operative cases in our study population. They are the active age group usually involved in trauma. Trauma has remained the leading cause of death and morbidity world over, in the first four decades of life¹⁵.

Seventy- eight percent (14) of the trauma associated cases were found in males. This may explain the preponderance of males over females in our study. The males have higher levels of activities, more adventurous, take greater risks and are therefore, more trauma prone.

The bones of the lower limbs especially the tibiae were more involved. This is probably due to the preponderance of trauma associated cases in our series, especially with the increasing use of motor bikes for transportation in our environment, gunshot injuries

and assaults. The tibia is subcutaneous and easily exposed to infection following trauma. This also explains why the Cierny and Mader type III lesion is more common in our series.

The right side of the body was more involved than the left. This is probably because most people are right-handed and tend to defend self and break falls with them; thus predisposing this part to injury.

Most of the patients presented late, more than 6 months after being symptomatic. This is possibly because of ignorance, illiteracy and poverty which make them to seek treatment at the perceived cheaper unorthodox and alternative practices (traditional bone setters and chemist shops).

Surgery consists of sequestrectomy, saucerization or guttering of the bone with the cavity curetted, removing the pyogenic membrane¹⁶. This is what was done for the patients who had types III and IV lesions. Other established operative measures include obliteration of bone defects, use of antibiotic impregnated acrylic beads, bone stabilization and soft tissue coverage.⁹ Antibiotic beads are not readily available in our practice at Enugu and were not used in any of the patients. Hashmi described the Lautenbach procedure as involving debridement, intramedullary reaming and the insertion of double lumen tubes to establish both a local antibiotic delivery system and cavity analysis for volume and culture. The end point of treatment is when the irrigate produces three consecutive clear cultures with improvement in the blood indices and obliteration of the cavity volume¹⁷.

In most studies in the literature, parenteral antibiotics were given for a long duration. In a work by Salvana et al, intravenous antibiotics were administered for a median of 16 days and oral for a median of 59 days with infection control¹⁸. Wagner et al studied the efficacy of prolonged (3 months or more) out-patient intravenous antibiotic therapy via a Hickman catheter with reports of recurrences.⁸

In the works by Rodriguez et al and Feigin et al, stage I, osteomyelitis in children received 1-2 weeks of parenteral antibiotic therapy prior to oral regimen^{19,20}. Lazzarini et al treated stage I osteomyelitis in adults with appropriate parenteral antimicrobial therapy for 4 weeks after last operative debridement. If the patient is clinically compromised by a recurrent infection, bone and/or soft tissue debridement is necessary in conjunction with

another 4 weeks course of antibiotic. Then stages 3 and 4 with antimicrobial therapy for 4-6 weeks after debridement.⁹

In a study done in Korea, 6 weeks of oral antibiotics was given to the patients after 2 weeks of intravenous antibiotic, post surgery.²² Successful outcome was defined in this study as resolution of symptoms after surgery within 8 weeks of antibiotic therapy.

In our series, 74% of the patients had intravenous antibiotic for 72 hours or less post operatively; followed by oral antibiotics for 4-8 weeks. We had good results as 90% of the patients had complete resolution of symptoms with clinical and radiological evidence of infection control at 12 weeks. This is close to the work done by Swiontkowski in which the current standard recommendation of intravenous treatment for 6 weeks was compared to short term intravenous therapy (5-7 days) followed by oral dosage. He concluded that there was no difference in outcome and that short term intravenous therapy followed by oral therapy for 6 weeks after adequate surgery was safe.²¹

Our wounds were closed primarily with good results. Only 9(18%) patients had wound break down. This is in keeping with what Lazzarini reported that healing by so-called secondary intention should be discouraged since scar tissue that fills the defect may later become avascular. Complete wound closure should be obtained whenever possible.⁹ Primary wound closure in the treatment of chronic osteomyelitis has the advantage of reducing length of hospital stay and producing more cosmetically acceptable scar.

Conclusion

The management of chronic osteomyelitis remains a great challenge to the surgeon and expensive to the patient. Intravenous (parenteral) antibiotic therapy is very necessary in the management of chronic osteomyelitis in the immediate post operative period.

However, parenteral antibiotic usage beyond 72 hours in an otherwise healthy individual is usually unnecessary. Longer parenteral antibiotic administration is indicated in the immuno compromised patients.

Adequate and painstaking surgical debridement of the bone infection site is the key to the therapy.

Primary wound closure is advocated .We recommend short term intravenous antibiotic therapy of 72 hours, with oral antibiotics for 4 - 6 weeks duration, after adequate surgical debridement and wound closure .

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