

Management of Osteomyelitis of the Jaws: Reports of experience at a Teaching Hospital in Northern Nigeria.

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ABSTRACT

Background: Osteomyelitis of the jaw is an infection of the jaw bones and its marrow, usually caused by pyogenic bacteria or mycobacterium, which could be acute or chronic. It is an infection that spreads away from its primary source.

Objectives: To report the aetiology, clinical features, management and complications of osteomyelitis of the jaws managed in our centre.

Methodology: This study was done at Barau Dikko Teaching Hospital, Kaduna, Nigeria. It was a retrospective analysis of patients who were treated for osteomyelitis of the jaws. Those who declined our treatment modalities were exempted from the study. The study spanned from January 2013 to December 2023. Patients' record files were used to extract the information needed. Records in the radiology unit of the hospital were also used. The data collected includes: - the age of the patient at presentation, sex, location of the lesion, clinical features, radiological report, treatment modalities and complications of the disease.

Results: forty eight patients were included in this study, males were 29, while females were 19 and the ratio of males affected by this lesion to females was 1.60: 1.00. This lesion affected all age groups. The youngest in this study was 9 years while the oldest was 83 years. The mandible was more affected than the maxilla. The chronic suppurative type was the most common while proliferative periostitis was the least. The most common cause is odontogenic that is tooth decay and advanced periodontitis. The treatment given includes antibiotics therapy, rehydration, extraction of offending teeth, incision and drainage, curettage, sequestrectomy and decortication. Common complications were persistent facial asymmetry in children and recurrence in adults.

Conclusion: Osteomyelitis of the jaws could be managed effectively through the use of antibiotics, and surgical curettage. Also, it could be prevented through adequate dissemination of oral health knowledge to the citizens and the availability of affordable dental services.

Keywords: Osteomyelitis, jaws, odontogenic, suppuration, sequestrectomy.

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INTRODUCTION

Osteomyelitis of the jaw is an inflammatory process in the medullary spaces or cortical surfaces of the bone that extends away from the initial site of involvement.¹ It occurs due to direct infection of the bone by microbial or the spread of infection from distant structures through a haematogenous route to the bone.¹ However, in the etiology of osteomyelitis of the jaws, various microbes have been implicated including bacteroides and porphyromonas.² Salmonella typhi had been isolated in sickle cell disease.³ Staphylococcus aureus had been isolated from adults that suffer osteomyelitis of the jaw. Osteomyelitis of the jaw has been classified into suppurative and non-suppurative.^{3,4} The suppurative type could be classified into acute and chronic suppurative osteomyelitis and infantile osteomyelitis. Also, the non-suppurative type could be classified as chronic sclerosing osteomyelitis which is subdivided into focal and diffuse types, Garre's sclerosing, radiation osteomyelitis and actinomycotic osteomyelitis.³ The chronic suppurative osteomyelitis is commoner in the mandible and is characterized by continuous pus discharge through single or multiple intraoral and extraoral sinuses. There may be associated febrile illness in children but not common in adults. The change from the acute phase of osteomyelitis to chronic phase is usually transient and may not be noticed. Osteomyelitis of the jaw is commoner in developing countries when compared to advanced economies.⁴ This is because developing ones are affected by poverty and poor healthcare systems. The lesion is commoner in children but can occur in all age groups.⁴ The aetiology of this jaw lesion includes the presence of decayed teeth, advanced periodontal disease, pericoronitis, and infected jaw fracture.⁵ It affects the mandible majorly and less in the maxillae.⁵ This is due to the greater vascular supply in the cancellous bone of the maxillae, which resist bacterial colonization.⁴ Common clinical presentations of osteomyelitis of the jaws are pains, febrile illness, presence of draining sinuses through intraoral or extraoral routes.^{4,5} There may be restricted mouth opening, fetor oris, anaemia, weight loss, malnutrition and retarded mandibular growth in children. Pathological fracture of the jaw could be a complication of long-standing osteomyelitis.⁶

However, osteomyelitis treatment encompasses antibiotic therapy, surgical curettage, sequestrectomy, decortication and bone

reconstruction when the need arises.⁶ Additionally, extraction of offending teeth, haematinics, blood transfusion, hospital admission, surgery; which consists of incision and drainage, and bone grafting may be necessary. There were documented morbidities associated with this lesion which include: ankylosis of the temporomandibular joints, and persistent facial asymmetry due to mandibular retrognathism.⁷ This study was done to present our experience in the management of this lesion through an audit of patients treated for osteomyelitis of the jaws in our Centre.

METHODOLOGY

Consent: Consent was obtained from the parent of the boy with a typical bird face appearance for the use of his photograph in this publication

This was a retrospective study of all patients who were diagnosed with osteomyelitis of the jaws and were treated at Barau Dikko Teaching Hospital, Kaduna, Nigeria. Those who declined our treatment modalities were exempted from the study. We reviewed the case files of patients who were treated for osteomyelitis of the jaw in our centre from January 2013 to December 2023. Required information was extracted from case folders of the patients and records in the radiology unit of the hospital were also used. Data collected includes: - the age of the patient at presentation, sex, location of the lesion, clinical presentation, radiological report, treatment and complications that resulted from the lesion. Data obtained were analyzed using the SPSS for window (version 11.0); SPSS Inc (Chicago) using simple percentages.

RESULTS

This lesion affected all age groups. The lowest age in this study was 9 years while the highest age was 83 years. Forty-eight patients were included in this study, males were 29, while females were 19 and the ratio of males affected by this lesion to females was 1.60: 1.00 (Table 1). The mandible was most affected, while the maxilla was least affected (Figure 1). The chronic suppurative type was most common while proliferative periostitis was least common. The most common cause is odontogenic that is tooth decay and advanced periodontitis. 12 patients had associated comorbidities, which include Sickle Cell Disease (n=2, 4.17%), poorly controlled diabetes mellitus (n=6, 12.5%), immunodeficiency disease (HIV/AIDS) (n=2, 4.17%), and old age (> 80years) (n=2, 4.17%) (Table 2). Other clinical conditions that affected our treatment were malnutrition and

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anaemia. These conditions resulted in long hospital stays for good recovery.

Clinical features:

The presentation of osteomyelitis in children was more severe compared to adults.

The acute phase of osteomyelitis in children presented with febrile illness and swellings in the buccal space, submasseteric space, and submandibular region. Poor oral hygiene, grossly carious teeth, malnourishment and deterioration of overall health were common signs observed. There were associated pains and tenderness of the region of the swelling and limitation of mouth opening. Continuous suppuration from single or multiple discharging sinuses was a hallmark in the chronic type. Late presentation in the chronic phase included retrognathism from restricted mandibular growth, giving the child a typical bird-like appearance (Fig. 4). Adults presented with a slowly progressive lesion, though suppurative in most cases but less, compared to children and adolescents (Fig.1). Chronic sclerosing types were found in adults. Facial deformities were not common in adult lesions. Immuno-compromised individuals presented with recalcitrant lesions.

Radiological features were pronounced during the chronic stage and consisted of a central radiopaque lesion surrounded by a defined radiolucent region (Fig. 3).

A computerized tomography scan showed osteolytic areas that covered the body and ramus of the mandible.

Histology:

This showed fibrous connective tissue with a mixed type inflammatory infiltrate, predominance of macrophages, lymphocytes, plasma cells, giant cells, osteoclasts and necrotic trabecular bone

Microscopic Culture and Sensitivity: Bacteria were cultivated from twenty patient samples; and general result showed *Fusobacterium*, *Porphyromonas*, and *Staphylococcus aureus* to be the most frequent. The results affirmed that cases of chronic osteomyelitis of the jaws are usually mixed anaerobic infections.

Treatment: Due to the diagnosis, our first line of treatment was intravenous ceftriaxone 1gm 12hrly for 3days, followed by oral clindamycin 300mg for adults and 150mg for and adolescents taken 12hourly for 2-months after which curettage, sequestrectomy and decortication were done. 35 (72.92%) patients had sequestrectomy without decortication, while 13

(27.08) patients had sequestrectomy with decortication. The overall treatment that was given includes antibiotics therapy, rehydration, extraction of offending teeth, incision and drainage, curettage, sequestrectomy and decortication. After our treatment, there was marked improvement in the general health of our patients, with good surface healing of the lesion. Common complications were persistent facial asymmetry in children and recurrence in adults.

Table 1: Demography of the Patients Treated

AGE /YRS	SEX		TOTAL	PERCENT (%)
	M	F		
0 - 10	4	2	6	12.5
11-20	6	3	9	18.8
21-30	5	2	7	14.6
41-50	4	2	6	12.5
51-60	5	2	7	14.6
61-70	2	3	5	10.4
>70	3	5	8	16.6
TOTAL	29	19	48	100.0

Table 2. Comorbidities Reported in this Study.

Comorbid Conditions	No of Patients	Percent/ %
Sickle Cell Disease	2	4.17
Poorly Controlled Diabetes Mellitus	6	12.5
HIV/AIDS	2	4.17
Old Age	2	4.17
Total	12	25.01



Figure 1: A Photograph of a 12 year old boy with osteomyelitis of the right mandible which shows multiples sinuses.



Figure 2: Sequestrum extracted from the mandible in osteomyelitis.

RIGHT SIDE

LEFT SIDE

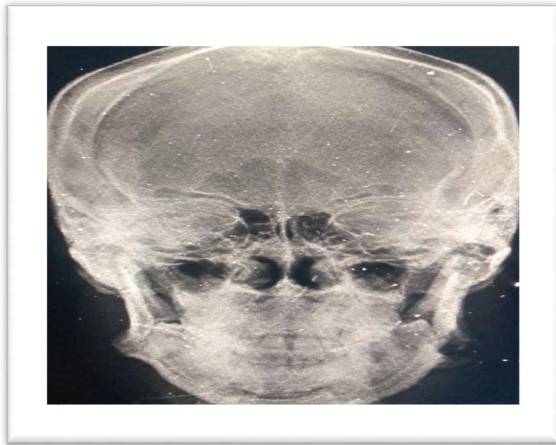


Figure 3: Plain radiography of the jaws showing left multiple radiolucency in the mandible caused by osteomyelitis.

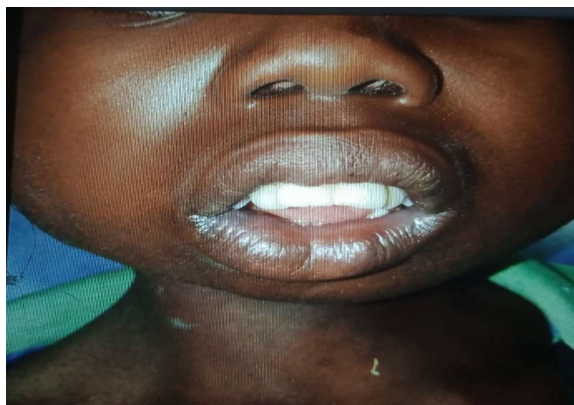


Figure 4: A boy with bilateral osteomyelitis of the mandible presented with typical bird face appearance.

DISCUSSION

Osteomyelitis of the jaw is characterized by an inflammatory process that includes swelling, pain, suppuration, bone necrosis and reactionary facial hyperplasia.⁵ It is a polymicrobial infection, predominantly dominating anaerobes such as bacteroides and porphyromonas; staphylococci aureus may be a cause when an open fracture is involved.⁶ It may result from decayed teeth, poorly treated bone fracture, and gunshot injury to the jaws.⁸ Also, it could occur due to direct infection of the bone or a spread of infection through the blood vessels to the bone.⁸ Haematogenous spread from bacteremia or a remote infectious site may occur especially in acute osteomyelitis in infants and children.⁴ This study showed that the majority of our cases were caused by dental infections, which include: grossly carious teeth, retained roots of teeth and advanced periodontal diseases. However, few cases developed from a fractured jaw, radiation injury and osteoporosis of bone. Most patients treated during the period of study presented with draining sinuses and febrile illness especially in children. It affects the mandible majorly, and less in the maxillae, this is due to the greater vascular supply in the cancellous bone of the maxillae, which hinders bacterial colonization, except the frontal part where the contribution is suboptimal which favors the formation of bone sequestration.⁵ This study showed that 85% occurred in the mandible while 15% affected the maxillae. The maxillary lesions were seen in children mostly and they mimic cancrum oris. However, the main clinical features related to chronic osteomyelitis of the jaw are: pains, facial swelling, suppuration, discharging sinus, and healed sinuses among others.⁹⁻¹⁵ Our patients presented with swollen face, discharging sinuses, pain, and trismus. The patients' oral hygiene were poor, and there were associated fetor oris.

Furthermore, most of the infectious processes in the oral and maxillofacial region are caused by various anaerobic bacteria, but the isolation of these microbes may be difficult as special culture media are needed.¹² Microscopic culture and sensitivity test in this study yielded bacteroides, porphyromonas, and a few staphylococcus aureus. Also, few cases showed no growth, this may be due to previous antibiotics used by the patients.

Complementary tests, such as plain radiography showed regions of bone destruction, and areas of new bone formation. In children, it takes seven days

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and in adults about two weeks from the beginning of infection to be visible; at which time, about 50% of the mineral content has been lost.¹⁰ Computed tomography helps us to identify the involvement of adjacent structures to the jaw affected.¹¹ Plain radiographs were used for diagnosis for most of our patients and it showed a region of radiopacity being surrounded by a radiolucent area.

However, for the treatment of osteomyelitis Renapurkar et al¹³ and Fantoni et al¹⁶ recommended intravenous use of antibiotics (3-10 days) at the beginning of the infection and after a good response has been obtained to switch to oral treatment (4-6 weeks) until completing 6 months. Some of our patients were treated with intravenous ceftriaxone 1gm 12hrly for 3 days before continuing with oral clindamycin and metronidazole. Moreover, the treatment for each patient varied depending on their clinical state at presentation. Surgical curettage, sequestrectomy and decortication, excision of the sinus tract and closure of the wound were done for our patients. The overall response of our patients to treatments was remarkable.

Moreover, the treatment for osteomyelitis of the jaws takes a long period. When it occurs in children and adolescents, it responds well to treatment, unlike in adults, it is usually refractory to therapy.^{9,13,14} Patients with comorbidities such as uncontrolled diabetes, those patient on immunosuppressive therapy and those who have received radiation therapy have a higher risk of developing osteomyelitis.¹² In this study patients with uncontrolled diabetes mellitus, old age, immunodeficiency disorders (HIV-infection) and sickle cell diseases were recalcitrant to treatments. Therefore, their treatments were done in conjunction with Physicians, who were able to manage the medical conditions and other associated complications. However, we recorded three mortalities, which consisted of one adolescent who is a known sickle cell disease patient, and two adults with poorly controlled diabetes mellitus. This constituted 6.25% of patients that were treated.

CONCLUSION

For the proper diagnosis of osteomyelitis of the jaws, a good clinical evaluation, radiographic assessment, microscopic culture and sensitivity test, and histology test are required. It is essential to assess the general state of health of the affected patient, identify any comorbidities, the causative agent, and the appropriate treatment protocol implemented. However, antibiotic therapy and surgical treatments

are needed for the complete care of patients with osteomyelitis. A long time follow-up is needed to prevent the recurrence of the disease.

RECOMMENDATION

To reduce the incidence of this disease, oral health care should be integrated into the school curriculum and public awareness of the dangers of neglecting oral health should be done.

Source of support

Nil

Conflict of interest

None declared

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