

Management of mandibular chronic osteomyelitis using Belfast technique.

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Summary

Chronic osteomyelitis is still common in developing countries like Nigeria due to the fact that conditions associated with the lowering of resistance to infections like malnutrition, malaria, anaemia, and acute eruptive fever are still prevalent in our society. Various operative techniques have been described for the treatment of chronic osteomyelitis with various outcomes. A case of chronic osteomyelitis of the mandible managed using the Belfast technique is presented. The Patient was followed up for 2 years with no evidence of recurrence of infection and a repeat radiograph at the end of follow-up revealed new bone formation. The Belfast technique is effective in the treatment of chronic osteomyelitis of the mandible and is recommended in the management of this condition.

Keywords; *Chronic osteomyelitis, mandible, antibiotic beads, Belfast operation.*

Résumé

L'ostéomyélite sévère est encore existant dans les pays sous-développés comme le Nigeria du aux conditions de résistance aux infections, de malnutrition, du paludisme, d'anémie et les fièvres aiguës. Plusieurs techniques ont été décrites pour le traitement de l'ostéomyélite sévère avec différents résultats. Un cas d'ostéomyélite sévère de la mandibule soignée utilisant la technique de Belfast est exposée. Ce Patient était suivi pour deux ans avec aucune évidence de récurrence de l'infection et une radiographie répétée à la fin de la suivie révélait une formation de nouvel os. La technique de Belfast technique est effective pour le traitement de l'ostéomyélite sévère de la mandibule et est recommandé pour les soins de cette condition

Introduction

Chronic osteomyelitis of the mandible is a relatively uncommon disease in developed countries and when it does occur, there are usually underlying co-

morbidities such as diabetes mellitus, alcoholism, immunosuppression or local radiotherapy to the bone [1,2]. However, this disease is still common in developing countries like Nigeria due to the fact that conditions associated with the lowering of resistance to infections such as malnutrition, malaria, anaemia, and acute eruptive fever are still prevalent in our society [3,4]. Sources of mandibular osteomyelitis include dento-alveolar septic foci, trauma (usually open fractures) and in some instances, haematogenous spread to the bone. In mandibular osteomyelitis, the infection usually starts from the medullary cavity while the cortical bone and periosteum are involved in the latter stages of the disease.

In chronic osteomyelitis, the offending microorganisms are usually a mixed flora including anaerobic bacteria such as *Bacteriodes* species as well as aerobic bacteria such as streptococci and staphylococcus aureus. However, in most instances *Staphylococcus aureus* is still the most common organism isolated in this infection. Other organisms implicated include *Klebsiella* species, proteus species and *Pseudomonas aeruginosa*. In some cases, single organism such as *Actinomyces israelii* and *Mycobacterium tuberculosis* may be involved in the formation of chronic osteomyelitis [5-10]

In chronic osteomyelitis, plain radiograph of the infected mandible usually reveal areas of bone necrosis and separation of the necrotic bone segment from the remaining viable bone to form a bony sequestrum with new bone (involucrum) formation around the dead bone. It is often believed albeit erroneously that a combination of antibiotics can be used in the treatment of chronic osteomyelitis. These antibiotics include benzyl penicillin and metronidazole (floxacin in case of Beta lactamase producing staphylococcus aureus) and clindamycin in patients that exhibit hypersensitivity to penicillin. In managing this disease with antibiotics, it is important to take samples of exudates from the sinuses for microscopy, culture and antibiotic sensitivity to determine the appropriate drug therapy [5].

However, the conventional treatment of chronic osteomyelitis of the jaw is surgical and this includes the removal of the focus of infection (such as tooth extraction), drainage of pus and sequestrectomy.

In the last two decades, hyperbaric oxygen therapy has emerged as a complement to surgical resection of the infected segment and as an adjunct to enhance host immune response. The most important mode of action of hyperbaric oxygen is the enhancement of neo-angiogenesis in the aerobic portion of the proliferative phase of healing [11].

Extraoral examination revealed a diffuse, tender swelling over the body of the mandible bilaterally extending along the region of the right first premolar to the right third molar and the left canine tooth to the left third molar. There were no sinuses on the skin, and no paraesthesia or anesthesia over the lesion or the lower lip. Submandibular lymph nodes were tender, palpable and mobile bilaterally.



Fig. 1: Preoperative right and left oblique lateral views of the mandible

The Belfast technique is a two stage procedure designed for the treatment of chronic osteomyelitis of long bones. It involves the radical excision of all infected bone and soft tissue and immediate implantation of antibiotic beads in the resultant cavity with primary soft tissue cover [12].

In this report, the Belfast technique was used in the treatment of bilateral chronic osteomyelitis of the mandible in one patient with excellent outcome. Many cases of refractory infection were noted with conventional methods of treatment. This is the first case of management of chronic osteomyelitis of the jaw using the Belfast technique. The procedure is cost effective and it allows for shorter hospital stay.

Case report

A 68 year old female petty trader presented at the dental clinic with a four-year history of swelling and pain in the mandible as a result of neglected carious teeth. There was associated history of purulent intra-oral discharge. In the four years, she had had various courses of antibiotics and analgesics which gave temporary relief of pain, but the pain became severe and unbearable a month prior to presentation.

Intraoral examination revealed limitation of mouth opening, generalized attrition of the teeth, halitosis and poor oral hygiene with moderate accumulation of plaque and calculi. There were notable swellings involving the right first premolars to the right third molar and from the left canine to the left third molar regions of the mandible bilaterally. In addition, there was marked buccal swelling and purulent discharge from the buccal periodontal space.

Left and right oblique radiographs of the mandible revealed mottled appearance of the mandible bilaterally, with areas of radio-opacity surrounded by radiolucency suggestive of bone sequestrum on both sides (fig 1). However, the lower border of the mandible was intact.

Microscopy, culture and sensitivity of the oral discharge revealed the presence of Gram positive cocci with moderate growth of staphylococcus aureus which was sensitive to Augumentin, Amoxycillin and Ceftriaxone (but resistant to Erythromycin, Tetracycline and Cloxacillin). The patient was commenced on Augmentin, Ciprofloxacin and metronidazole prior to being scheduled for the Belfast operation.

Procedure

Under general anaesthesia, 3 sided mucoperiosteal flaps were raised around the affected regions bilaterally, sequestrectomy was performed and four stringed Ceftriaxone – polymethylmethacrylate (PMMA) antibiotic beads each were laid in resultant bony cavities and the flaps replaced and sutured over the defect (fig. 2).

The patient made an uneventful post-operative recovery. One week post operative review revealed

radiograph, 2 years after the second stage of the Belfast technique revealed new bone formation evidenced by cortical thickening at the site of the previous lesion (fig. 3).

Discussion

Chronic Osteomyelitis is a debilitating disease of bone characterized by pus discharge which may be intermittent with infiltration of the infected cavity with granulation tissue and is nearly always associated with

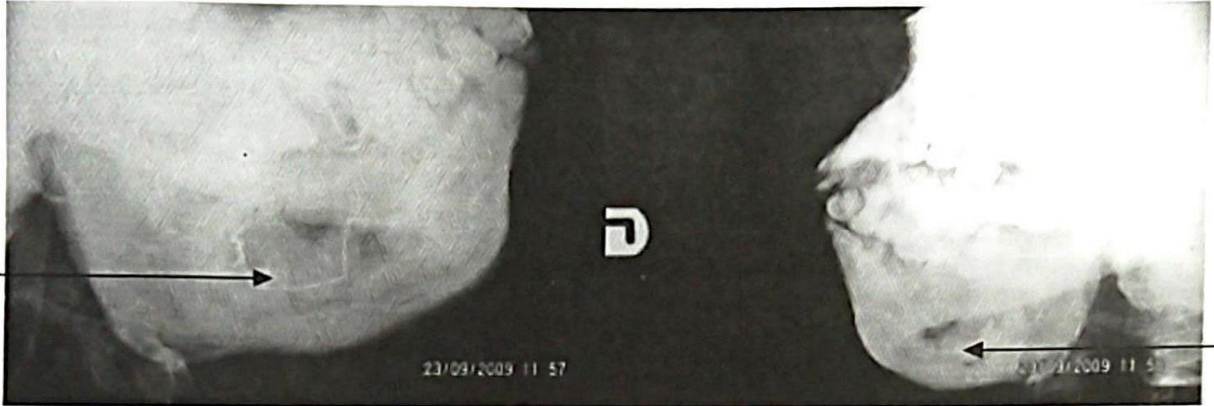


Fig. 2: Immediate postoperative right and left oblique lateral views of the mandible with antibiotic impregnated acrylic beads in situ.

gross reduction of the buccal swelling with no evidence of active infection. However, there was minimal exposure of a bead in the right mandible. This was covered with mucosal flap at the exposed site under local anaesthesia. Six weeks after the first stage, and under local anaesthesia, the implanted beads were removed (and this constituted the second

sequestration of a part of the dead bone within the infected granulated tissue [12].

The sequestrum is ultimately trapped within a fibrous envelope which acts as a barrier to blood vessels. The implication of this is that oral or parenteral antibiotics that require blood vessels for their delivery to infected site will be ineffective in the treatment of chronic osteomyelitis [11].

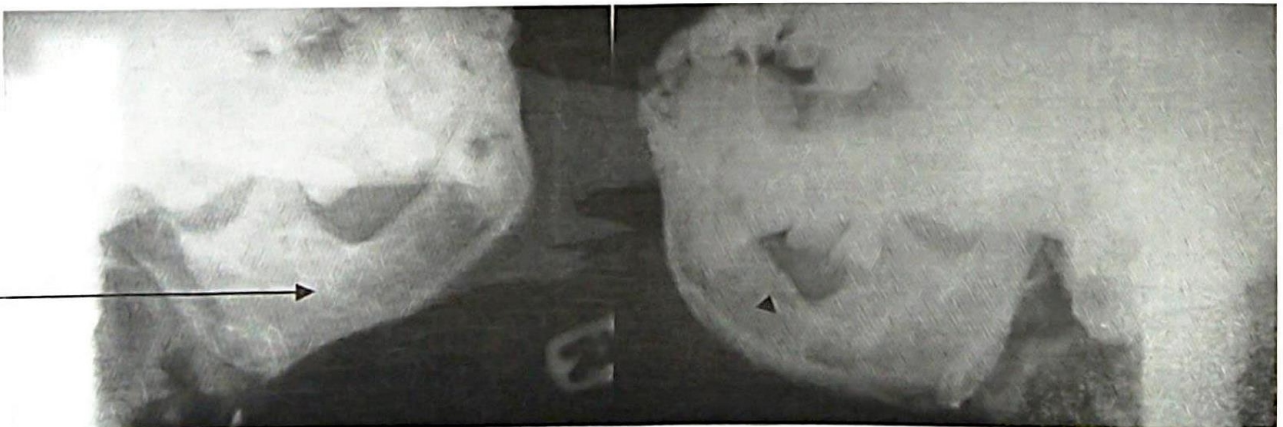


Fig. 3: Two years postoperative right and left oblique lateral views of the mandible.

stage of the Belfast technique) and soft tissue closure was achieved.

Patient has been followed up till date with no evidence of recurrence of infection. Repeat

Various operative techniques for the treatment of chronic Osteomyelitis of the mandible have been described, but with varied reports of successful outcome. These procedures include

saucerization and curettage, debridement and reconstruction, sequestrectomy and bone resection and more recently the Belfast technique [11,13].

The Belfast technique is a two stage procedure which involves the radical excision of all infected bone and soft tissue and immediate implantation of antibiotic beads in the resultant cavity with primary soft tissue cover [14].

This method was used by Hartley and Sanderson for the treatment of chronic osteomyelitis of the mandible (which was refractory to systemic antibiotic treatment) in a Bennett's Wallaby (*Macropus rufogriseus rufogriseus*) with satisfactory treatment outcome [15]. Gentamicin impregnated PMMA beads was the commonest antibiotic beads used but over time various antibiotics have been impregnated into PMMA to make beads.

Ceftriaxone, a third generation Cephalosporin, has a high sensitivity profile for staphylococcus aureus, which is the most common organism isolated from cultures of chronic osteomyelitis in our environment. Ceftriaxone impregnated PMMA bead which was formulated in our institution [16] has been shown to "elute" the antibiotic [11] and has been used in the treatment of chronic osteomyelitis of long bones [17].

This case report has demonstrated the efficacy of Ceftriaxone impregnated PMMA beads in the eradication of chronic osteomyelitis of the mandible in an elderly Nigerian woman.

Conclusion

The Belfast technique ensures primary closure of wound, and eliminates prolonged wound dressing. In addition, it is cost effective and allows for shorter hospital stay. This case report on the use of Belfast technique in the treatment of osteomyelitis of the mandible with an excellent outcome is the first in English Literature in our region.

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