Cureus
Part of SPRINGER NATURE

Open Access Case Report

Successful Management of Medication-Related Osteonecrosis of the Jaw (MRONJ) Surgically Treated by the Fragmentation Technique: A Case Report

Jean Martinien Engoue [1], Baraa Shamsi-Basha [1], Théo Bichet [1], Paul Juillard-Marchay [1], Alp Alantar [1]

1. Oral Surgery Unit, Hôpital Max Fourestier, Nanterre, FRA

Corresponding author: Alp Alantar, alpalantar@wanadoo.fr

Review began 06/04/2026
Review ended 06/13/2026
Published 06/15/2026

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DOI: 10.7759/cureus.110908

Abstract

An 82-year-old woman was referred with a post-extraction bone sequestration to the Unit of Oral Surgery. She was treated for osteoporosis with bisphosphonate (BP; alendronic acid, 70 mg/week) for 15 years. According to the clinical signs, a stage 2 medication-related osteonecrosis of the jaw (MRONJ) was diagnosed. Preoperative treatment consisted of antibiotherapy combined with 0.12% chlorhexidine mouthwash. A specific surgical approach was used, sequestrectomy by fragmentation of the bone sequestrum. Antibiotherapy was continued until the bone was completely covered by the gum. The clinical and radiological controls at 24 months and 30 months, respectively, were satisfactory. Excision of bone sequestra measuring more than 10 mm by the fragmentation technique could minimize operative trauma and thereby recurrence. This hypothesis will have to be confirmed by clinical studies.

Categories: Therapeutics, Oral Medicine
Keywords: antibiotherapy, bone healing, bone sequestrum, dental extraction, fragmentation, medication-related osteonecrosis of the jaw (mronj)

Introduction

The development and administration of bisphosphonates (BP) and denosumab have led oral surgeons to increasingly manage medication-related osteonecrosis of the jaw (MRONJ). Asymptomatic and non-extensive MRONJ is the most common type (95%) [1]. The hallmark feature of MRONJ is the area of exposed, necrotic, non-healing, asymptomatic bone for more than eight weeks. The mean age of onset of MRONJ is 66.5 ± 4.7 years, and it has a male-to-female ratio of 1:2. The mean duration of BP administration is 38.2 ± 15.7 months [2]. The triggering factor of MRONJ is tooth extraction, and its incidence varies between 0.3% and 9.0 % [3], with a 4.34% mean incidence [4]. Individuals may develop post-extraction MRONJ with 0.6% incidence when treated with oral bisphosphonates [5]. Although the excision of oral bone sequestra induced by bisphosphonate-related osteonecrosis of the jaw (MRONJ) is well documented, the fragmentation technique has been very rarely proposed. However, this original approach could minimize operative trauma and thereby recurrence. This hypothesis is illustrated by the present case report.

Case Presentation

An 82-year-old woman was referred with a bone sequestration (Figure *1*) that had occurred after a recent extraction of the mandibular incisors. She was treated for osteoporosis with oral BP (alendronic acid, 70 mg/week) for 15 years. She had chronic respiratory failure with a history of thrombophlebitis and pulmonary embolism. She was treated by aerosols (budesonide/formoterol, tiotropium bromide, 2-agonist terbutaline, ipratropium, and antibodies (omalizumab)), furosemide 10 mg, and potassium chloride. Her surgical history revealed extractions of the incisors performed without antibiotic prophylaxis.

How to cite this article
Engoue J, Shamsi-Basha B, Bichet T, et al. (June 15, 2026) Successful Management of Medication-Related Osteonecrosis of the Jaw (MRONJ) Surgically Treated by the Fragmentation Technique: A Case Report. Cureus 18(6): e110908. DOI 10.7759/cureus.110908

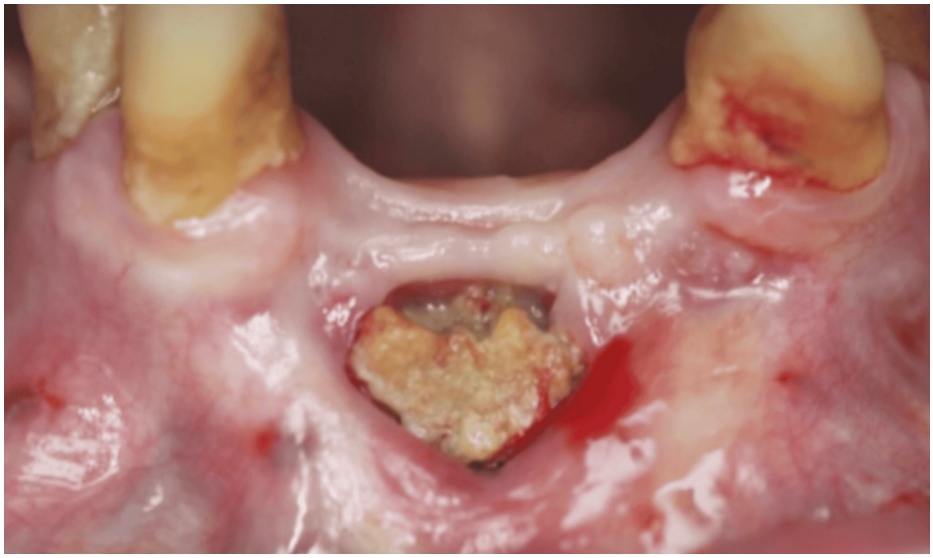


FIGURE 1: Extraction-related jaw osteonecrosis in the mandibular anterior sextant

Extraction-related jaw osteonecrosis in a female treated with alendronic acid 70 mg/week for 15 years. Notice a 10 × 5 mm area of exposed, necrotic, asymptomatic bone.

Image by Dr. A. Alantar

Exo-oral examination revealed submental lymph nodes; the endo-oral examination revealed a bone sequestrum of size 10 × 5 mm in the mandibular anterior sextant. The lesion was painless but annoying to the patient during chewing. The panoramic view (Figure *2*) is not specific, as a bony sequestrum is a dense bone lesion.



FIGURE 2: Panoramic view on the day of examination

Notice the slight bony hypodensity (arrow). Distally to tooth #45, notice the asymptomatic cicatricial intraosseous radiolucency.

The diagnosis of stage 2 MRONJ has been made. Preoperative informed consent was given to the patient. Initial treatment consisted of antibiotherapy (amoxicillin/clavulanic acid, 2 g/day, 15 days), combined with 0.12% chlorhexidine mouthwashes (3 rinses/day, 30 days). Based on our experience, a specific surgical approach was used to prevent any recurrence: (1) sequestrectomy by fragmentation of the bone sequestrum using a 23 mm Zekrya carbide bur with irrigation (Figure *3* and Figure *4*), (2) sharp edge smoothing, (3) bone cavity filling with a collagen hemostatic sponge (Figure *5*), and (4) soft tissue suturing with 4-0 resorbable Monocryl and simple interrupted pattern (Figure *6*).

Discussion

The standard treatment for stage 2 MRONJ is a minimally invasive surgery by sequestrectomy, preserving the soft tissues, combined with local and general anti-infective treatments [6]. According to Blus et al., healing of treated sites with ultrasonic piezoelectric bone surgery may result from the synergic effect of bone ablation, biofilm alteration, and antibiotic administration [7]. This alteration of the biofilm may permit better access of antibiotics to the involved germs.

Regarding the surgical treatment of MRONJ, available evidence is insufficient to either claim or refute a benefit of association to low-level laser therapy (LLLT), plasma rich in growth factor (PRGF), cell therapy [8], hyperbaric oxygen therapy, tetracycline fluorescence-guided sequestrectomy [6,7], or pentoxifylline-tocopherol with clodronate therapy [9]. In extensive forms of stage 3 MRONJ, after a previous cone beam computed tomography (CBCT) exploration, flap coverage is required [10]. Early detection and follow-up of MRONJ with 99mTc scintigraphy has been proposed by Tanabe et al. [11]. As BPs were given for osteoporosis, no histopathological examination was needed in order to rule out any metastatic disease. To our knowledge, the fragmentation sequestration technique has not been explicitly described.

The management of MRONJ depends on the extent of necrosis, the underlying disease, the symptomatology, the administration route, and the cumulative dose of the implicated bone antiresorptive treatment [12]. The average healing time after sequestrectomy is three months for stage 2 and two months for stage 1 [13]. The success rate is 96.6% for low cumulative dose treatments and 51.5% for other doses. Giudice et al. recorded that surgical treatment of patients in the early stages of MRONJ guarantees benefits in outcomes such as mucosal integrity and lesion downstaging, and improvement in quality of life [13].

Conclusions

Although the prognosis of stage 2 MRONJ is generally favorable, the excision of bony sequestrum measuring more than 10 mm could be optimized by fragmenting, thereby minimizing operative trauma and eventual recurrence. Patients must be warned that a bony cavity will form after healing. The effectiveness of bony sequestrum removal using the fragmentation technique should be confirmed by clinical trials.

Additional Information

Author Contributions

All authors have reviewed the final version to be published and agreed to be accountable for all aspects of the work.

Concept and design: Alp Alantar, Jean Martinien Engoue, Baraa Shamsi-Basha, Paul Juillard-Marchay, Théo Bichet

Acquisition, analysis, or interpretation of data: Alp Alantar, Jean Martinien Engoue, Baraa Shamsi-Basha, Paul Juillard-Marchay, Théo Bichet

Drafting of the manuscript: Alp Alantar, Jean Martinien Engoue, Baraa Shamsi-Basha, Paul Juillard-Marchay, Théo Bichet

Critical review of the manuscript for important intellectual content: Alp Alantar, Jean Martinien

Engoue, Baraa Shamsi-Basha, Paul Juillard-Marchay, Théo Bichet

Supervision: Alp Alantar

Disclosures

Human subjects: Informed consent for treatment and open access publication was obtained or waived by all participants in this study. **Conflicts of interest:** In compliance with the ICMJE uniform disclosure form, all authors declare the following: **Payment/services info:** All authors have declared that no financial support was received from any organization for the submitted work. **Financial relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work. **Other relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

Acknowledgements

The authors extend their gratitude to the late Dr. J.C. Béatrix and to Dr. O. Alhassan for their valuable clinical and research contributions on MRONJ in oral surgery.

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