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Case Report

A Case of Bisphosphonate-Related Jaw Osteonecrosis: Radiological Features and Early Diagnosis

A. El Ouali[1*], R. Boutachali[1], A. Merzem[1], A. Orgi[1], H. belgadir[1], N. Moussali[1], N. El Benna[1]

[1]Radiology Department, 20th August Hospital, Ibn Rochd University Hospital of Casablanca

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Abstract: Bisphosphonate-related osteonecrosis of the jaw (BRONJ) is a morbid adverse effect characterized by the exposure of the alveolar bone. It presents with distinctive radiological features that not only guide diagnosis but also help detect complications, as illustrated in our patient. The purpose of this presentation is to demonstrate the radiological semiology through our case to familiarize radiologists with this pathology and briefly remind them of the pathophysiological mechanisms behind this side effect.

Keywords: Bisphosphonate-related osteonecrosis of the jaw (BRONJ), Radiological features, Osseous sequestrum, Patchy bone demineralization, Double contour periosteal.

INTRODUCTION

Bisphosphonates are a group of drugs that act as potent inhibitors of osteoclastic activity [1]. Initially prescribed for Paget's disease and osteoporosis, they are now widely used for the management of secondary osteolytic lesions. Bisphosphonate-related osteonecrosis of the jaw is a relatively rare side effect due to the accumulation of bisphosphonates in the bone [2]. Radiological signs are quite specific to suggest the diagnosis; however, differential diagnosis with osteoradionecrosis remains challenging.

CASE REPORT

A 57-year-old patient with a history of breast cancer and bone metastases presented to the emergency department with severe pain in the right hemi-mandible following a dental extraction. A panoramic radiograph was performed, revealing a patchy bone demineralization in a « wet sugar » pattern associated with an osseous sequestrum (Fig. 1). A CT scan was conducted, showing a lytic lesion in the right mandibular symphysis with a large osseous sequestrum (Fig. 2, 3), along with cortical thickening and periosteal reaction, producing the « double contour periosteal » appearance (Fig. 3).

DISCUSSION

Bisphosphonate-related jaw osteonecrosis is frequently observed in maxillofacial surgery, first described by Max in 2003 [3]. Bisphosphonates act as powerful inhibitors of osteoclastic activity [1], and due to their non-metabolized nature, they accumulate in bones over long periods [4], leading to chronic ischemia [2]. They are indicated in the treatment of osteoporosis, Paget's disease, multiple myeloma, and bone metastases [1]. The incidence of BRONJ depends on the type of bisphosphonate used, the route of administration (especially intravenous), the high oral dose, and potentially the duration of treatment [1].

The mechanism is not yet fully elucidated, but several factors can increase the risk, including dental extractions, bone exostosis, or inflammatory diseases [4]. The mandibular tropism is favored by hypotheses such as the very fine structure of the alveolodental ligament and the fragility of the periodontium [2]. Maxillary necrosis, however, is frequent despite the rich vascularization, distinguishing the mechanism from osteoradionecrosis, which exclusively affects the mandibular bone [2].

***Corresponding Author:** A. El Ouali
Radiology Department, 20th August Hospital, Ibn Rochd University Hospital of Casablanca

The diagnosis is defined by the American Association of Oral and Maxillofacial Surgeons (AAOMS, 2024) using specific criteria, including the absence of jaw radiotherapy or metastatic disease at this level, exposure of the bone for 8 weeks, and failure to heal after 3 weeks [5].

Imaging is widely used for early diagnosis and detection of complications. A panoramic radiograph is recommended as the first-line modality [6], often followed by a CT scan to better characterize the osseous involvement, either as isolated osteosclerosis or combined with osteolysis [2]. The most commonly encountered radiological findings include lytic and sclerotic lesions, presence of osseous sequestra [4], a "wet sugar" appearance, and a "blown double contour" of the cortical bone [2].

Complications such as fractures, osseous sequestra, oroantral fistulas, and ipsilateral sinusitis may also be detected [2]. MRI is indicated for exploring bone marrow lesions, but it may exaggerate the findings due to contrast uptake in hyperemic or edematous regions [7]. While imaging can confirm the diagnosis, it does not differentiate bisphosphonate-induced jaw osteonecrosis from other causes such as osteoradionecrosis or osteonecrosis due to steroid-induced osteomyelitis [6]. However, alveolar denudation is not seen in infectious osteitis or osteoradionecrosis [2].

Early diagnosis of bisphosphonate-related osteonecrosis is crucial, as it takes time for bisphosphonates to be eliminated from bone after treatment cessation [1]. The evolution of osteonecrosis under treatment has been little studied, and persistent necrotic areas are frequently observed [2].

CONCLUSION

Bisphosphonate-related osteonecrosis of the jaw is a rare disease whose prognosis depends on early diagnosis, highlighting the importance of radiologists becoming familiar with this pathology. Panoramic radiography and CT imaging are essential for diagnosing and detecting potential complications.

Figure 1: **Panoramic radiograph showing a heterogeneous bone structure with a "wet sugar" appearance and osseous sequestrum**

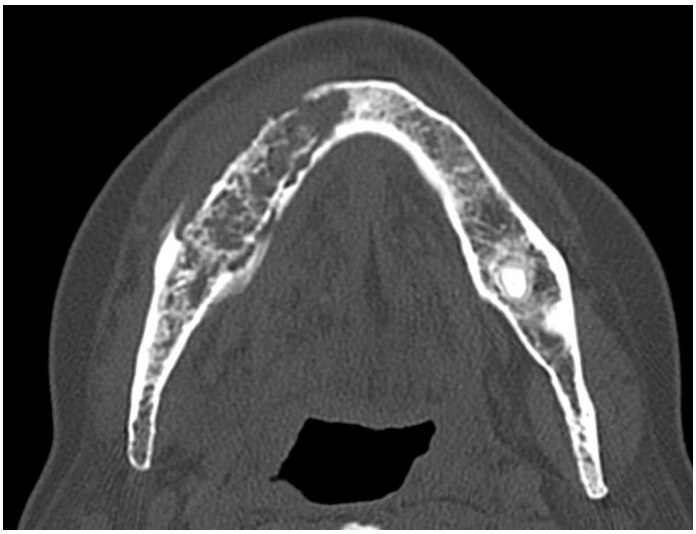

Figure 2: **Osteolytic lesion with a large osseous sequestrum**

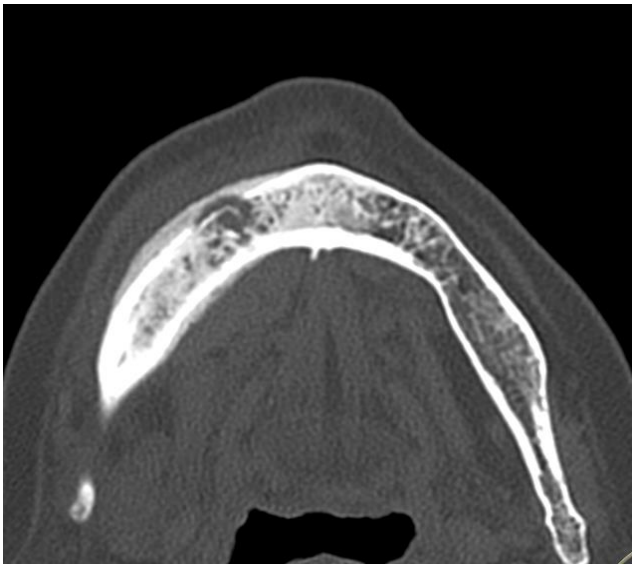

Figure 3: **Cortical thickening with periosteal reaction, "double contour periosteal appearance**

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