

# Failure of dental implants in cemento-osseous dysplasia: a critical analysis of a case

*Insucesso na instalação de implantes dentários em áreas de displasia cemento-óssea: análise crítica de um caso clínico*

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## Resumo

**Introdução:** Implantes dentários têm sido rotineiramente utilizados como excelente alternativa para a reabilitação oral. Pacientes com doenças ósseas displásicas representam um desafio especial para a reabilitação oral com implantes dentários. No entanto, a instalação de implantes em pacientes com displasia cemento-óssea (DCO) tem sido relatada com aparente sucesso. **Objetivo:** Neste artigo, apresentamos um caso de um paciente com DCO florida em que um implante dentário fora instalado em paciente com lesões da variante florida da displasia cemento-óssea, seguido de insucesso seis meses após a cirurgia. Diante dos achados clinicopatológicos, foi realizada uma análise da pertinência da indicação da instalação do implante dentário em área acometida pela lesão, considerando a natureza displásica da doença, sua patogenia e comportamento biológico. **Conclusão:** O presente caso é ilustrativo em caracterizar a impertinência da indicação dos procedimentos de implantes dentários em pacientes portadores da DCO, considerando imperativo fornecer informações ao paciente a propósito dos riscos em manipular tecido ósseo portador destas lesões.

**Descritores:** Implantes dentários; osseointegração; doenças do desenvolvimento ósseo.

## Abstract

**Introduction:** Osseointegrated dental implants have been routinely used in oral rehabilitation. Patients with dysplastic bone diseases represent a particular challenge for oral rehabilitation with dental implants. Nevertheless, the installation of implants in patients with cemento-osseous dysplasia (COD) has been reported with apparent success. **Objective:** In this paper, we present a case of a patient with COD in which a dental implant had been installed and lost six months later. In this regard, we analyzed pertinent aspects of the indications for dental implants in patients with COD considering the pathogenesis, dysplastic nature, and behavior of the disease. **Conclusion:** The present case report illustrates that COD can be considered a limiting factor in the recommendation for a dental implant. Because of this, it is imperative to inform the patient about the risks of surgically manipulating the diseased bone.

**Descriptors:** Dental implants, osseointegration, bone diseases, developmental.

## INTRODUCTION

Osseointegrated dental implants have been routinely used in oral rehabilitation. Factors such as quantity and quality of bone are associated with osseointegration and thus the success of the treatment. Systemic and local risk factors that affect metabolism and bone remodeling should be considered when assessing the indications for these surgical procedures. Endocrine disorders, osteoporosis and primary bone lesions such as cystic, dysplastic and tumoral lesions are among the main diseases to consider in this assessment<sup>1-3</sup>.

Patients with dysplastic bone diseases represent a particular challenge for oral rehabilitation with dental implants. The nature and biological behavior of bone dysplasia are often associated with structural changes in the bone that compromise its normal

blood supply and plasticity, resulting in potential problems for osseointegration. Although osseointegration is not fully achieved at the histological level, satisfactory clinical bone healing has been described for titanium implantation in fibrous dysplasia (FD), for example<sup>1-3</sup>.

In particular, cemento-osseous dysplasia (COD) constitutes a special problem when dysplastic bone lesions progress to become strongly mineralized, poorly vascularized and highly susceptible to solitary bone cavity formation. Nevertheless, the installation of implants in patients with COD has been reported with apparent success<sup>4</sup>. These findings suggest that some concepts related to implant rehabilitation in dysplastic bone should be revisited.

In this paper, we present and discuss a case of a patient with COD in which a dental implant had been installed but lost six months after surgery.

## CASE REPORT

A 40-year-old female patient was referred with a chief complaint of a failed dental implant, which had spontaneously fallen out of the mouth six months after installation. She reported no symptoms and had no signs of inflammation. She brought a panoramic radiograph taken after surgery that showed the presence of a dental implant in the region of tooth #25, surrounded by an inconspicuous radiolucency (Figure 1).

A periapical radiograph and cone beam computed tomography image taken after implant removal revealed a roughly ovoid well-corticated radiolucent lesion showing moderate degrees of mineralization at the center (Figures 2a and b).

The patient was asked if she was aware of the existence of some type of alteration in that area, which she denied, indicating that she was absolutely unaware of the disease. Unfortunately, any examination, including periapical radiographs before the time of implant installation, were not available for evaluation. New panoramic and periapical radiographs confirmed the same osseous alteration as described above.

An incisional biopsy was performed, and histopathological examination revealed different areas of a dense, slightly vascularized connective tissue that was rich in fibroblasts and showed a moderate amount of collagen fibers that were permeated with a varying amount of osteoid trabeculae and cement-like nodules of different shapes and sizes. The osteoid trabeculae showed varying degrees of peripheral matrix layered by fusiform to polygonal cells. Furthermore, a variable amount of cells was found in these trabeculae. A small number of basophilic globular structures of different sizes could also be observed through the field (Figures 3a and b).

These findings, together with the qualities found in the imaging analysis, were considered diagnostic for the florid variant of COD (FCOD).



**Figure 1.** Panoramic radiograph of the patient showing a dental implant in the area of tooth #25. It should be noted that it is practically impossible to visualize any type of bone alteration in that region. However, mixed lesions are clearly associated with the canine and first premolar in both the right and left mandibular quadrants.

The patient was informed about the diagnosis and risks of an eventual new surgical intervention in the area of the dysplastic bone tissue and chose to undergo rehabilitation with an adhesive fixed prosthesis. One year after biopsy, the area from which the implant was removed had healed uneventfully (Figure 4).

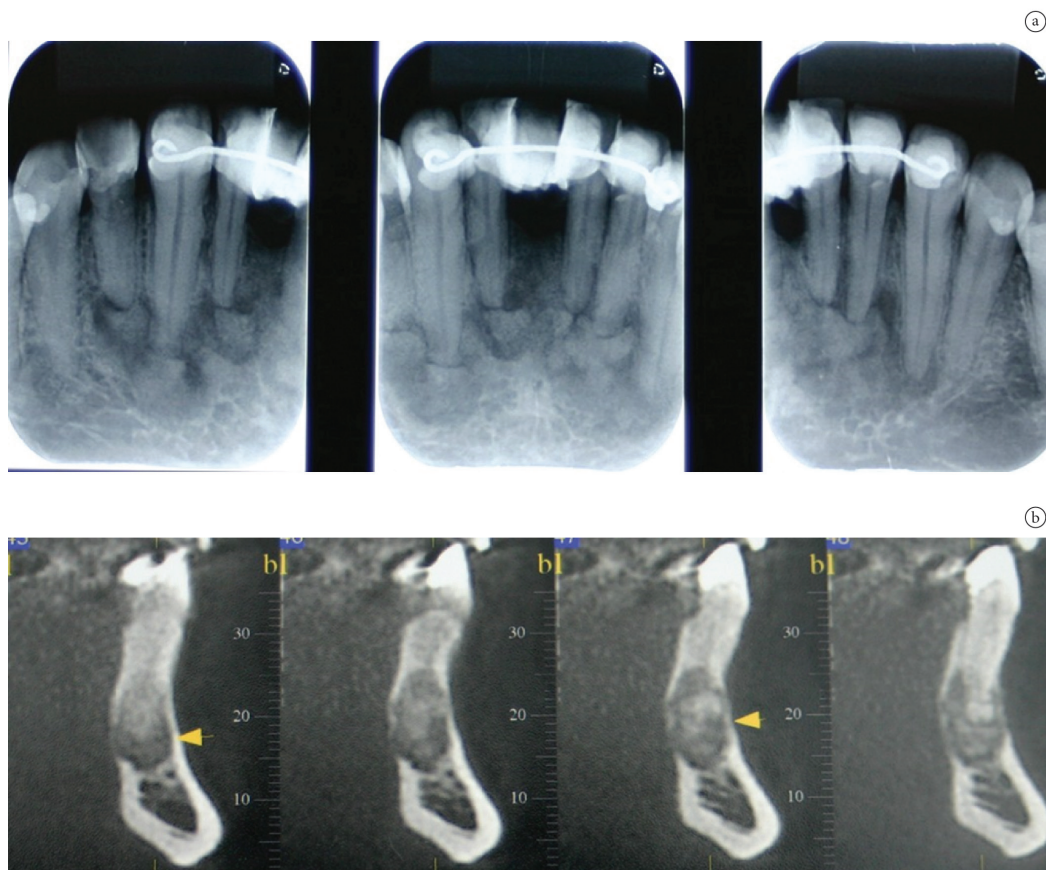
However, FCOD lesions could still be detected extending to the second premolar area in both the right and left mandibular quadrants.

## DISCUSSION

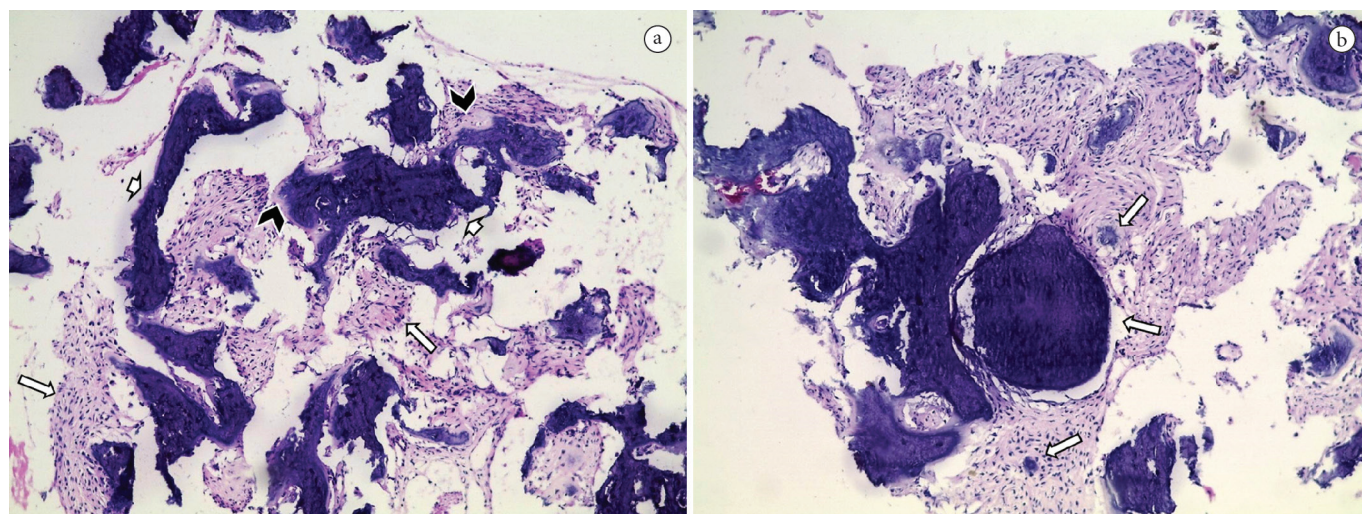
Oral rehabilitation using dental implants has become one of the most successful treatment modalities in dental practice, providing good esthetic and functional results. However, the success of this procedure is directly dependent on the quantity and quality of the bone tissue to achieve primary implant stabilization. This condition allows for osseointegration and leads to treatment predictability. Systemic and local factors that affect bone tissue, such as the presence of endocrine disorders (diabetes mellitus, hyperparathyroidism, hypothyroidism and osteoporosis), cysts, tumors, radiation therapy, and bone dysplasia are relevant in planning oral rehabilitation with implants<sup>1</sup>. However, the successful use of implants in patients who have undergone radiotherapy, have received bone grafts and osseous free flaps, or have suffered from mucosal disease and even bone pathologies have been well documented, introducing a new field of discussion: the use of dental implants in diseased tissue<sup>1,3</sup>.

It is interesting to note the recent descriptions of dental implants in patients with FD and COD in its florid variant (FCOD). In the first case, the dental implant was inserted in the diseased bone and, although histological evidence argues against true osseointegration, clinical success was supported by the lack of symptoms, mobility, inflammation and periimplant bone loss<sup>1,2</sup>. In parallel, Bencharit et al.<sup>4</sup> (2003) reported the installation of five implants in the anterior region in a patient with FCOD. In this report, the implants were installed in an area of supposedly "normal bone," because no consideration about the local bone conditions had been made. Panoramic radiograph yielded poor information about the local bone quality because it had low resolution in the anterior region that limited proper assessment of the area of interest. Nevertheless, the authors considered the rehabilitation to be successful after an observation period of 3 years.

Our experience in the present case report, however, has shown that we are far from being fully informed about dysplastic bone behavior with respect to dental implants. We believe that COD should be seen as a restrictive risk factor, which should be carefully considered in these cases. Although we were unable to prove how much the technical variables of the surgical procedure interfered with implant failure, we strongly believe that the main reason for the failure is related to the manipulation of dysplastic bone, a hazardous procedure due to the nature of the disease. Bone lesions in FCOD, especially in the mixed and mature phases, show a small amount of vascularized connective tissue and a great volume of dense avascular or hypovascular



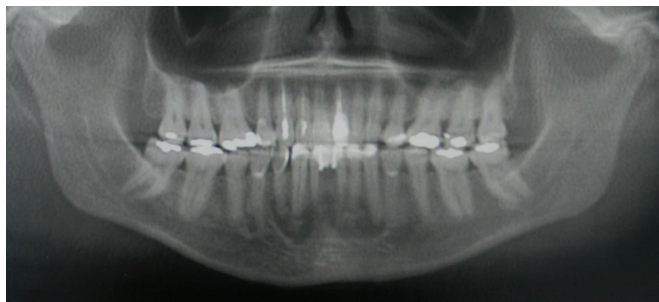
**Figure 2 (a-b).** Periapical radiographs of the area of the mandibular incisors. (a) Note the marked mixed aspects of the periapical lesions that are typical of cemento-osseous dysplasia involving all mandibular anterior teeth. (b) Imaging aspects of the lesions obtained by cone beam computed tomography. The same typical mixed radiolucent-radiopaque aspects can be observed, which are compatible with the maturation of the progressive lesion.



**Figure 3 (a-b).** Histopathological pictures of the diseased bone removed from the area of implantation. (a) Tissue fragments composed of relatively hypovascular and hypercellular connective tissue (major arrows) permeated by some bone trabeculae (minor arrows). The diseased bone is partially mineralized with a peripheral strip of osteoid matrix (arrowhead). (b) In some areas, small and major nodules of mineralized tissue in a cementoid pattern can be observed (arrows).

osteocementoid material. This dysplastic tissue lacks plasticity and could compromise post-surgical repair, directly affecting osseointegration. These lesions can easily become infected and prone to necrosis<sup>5</sup>. Waldron et al.<sup>6</sup> found poor socket healing and even sequestrum formation following surgical procedures such as tooth extraction in areas with large cemental masses.

Accordingly, based on the findings from our case report and those reported by Bencharit et al.<sup>4</sup>, some questions about FCOD behavior merit consideration when discussing the feasibility of the installation of implants in affected patients. COD can present different standards of clinicopathologic expression, considering the number of lesions and the stage of the disease. In some cases,



**Figure 4.** Panoramic radiograph of the patient showing FCOD lesions of the anterior mandibular area extending to the second premolar area.

COD presents as multiple lesions (FCOD) in which lesions could appear to overlap each other in multiple quadrants, without or with a minimum of lesion-free bone among them. In others, the disease is less expressive and dysplastic lesions are unevenly distributed through the bone. In this case, it is clearly possible to identify areas of normal bone among the lesions<sup>5,7</sup>. In both situations, dysplastic bone can range from predominantly osteolytic (fibroblastic) to osteogenic (partially or completely mineralized). Progression from fibroblastic to mineralized lesions makes dysplastic bone hypovascularized and hard, compromising the tissue response to injuries.

Thus, considering the possibility of surgical procedures in patients with COD, a fundamental question arises: Is COD a self-limiting disease that is expressed solely in the areas where lesions are present, or are these lesions only local and temporary stages of a progressive syndromic picture expressed on an apparently healthy but primarily dysplastic bone susceptible to

new lesions? To answer the first part of the question, two points should be discussed as follows: if we consider only the lesions, it is imperative to take into account the dynamics of disease development. At the first stage, the lesions are predominantly composed of a fibroblastic component when osseointegration cannot be achieved. As the disease progresses from the middle to the last stage, lesions became osteo-cementoid in nature with a hypovascular stroma. This dense hypermineralized dysplastic tissue has been associated with limited plasticity and high susceptibility to infection<sup>5-7</sup>. Osteomyelitis has been reported as a consequence of surgical manipulation<sup>7</sup>. On the other hand, looking at the second part of the question, the concept of apparently normal bone that is likely to develop dysplastic lesions leads to a highly unstable tissue environment that makes the dynamics of bone healing an unpredictable phenomenon. It should be noted that although the lesions in COD usually have considerable stability, cases have been described in which the disease shows a progressive developmental behavior reflected by an expansion of lesions or by a rise in the number of new lesions and simple bone cysts that advance to areas that were not originally affected<sup>5,7-10</sup>.

It is true that we were not able to find reliable information about the temporal pattern of alterations for the COD lesions, especially regarding the moment at which the lesions could be considered stabilized. While this issue does not have a definitive answer, it is crucial to consider apparently normal bone tissue as dysplastic bone and therefore vulnerable to the development of new lesions. Thus, we suggest that COD should be seen as a limiting factor in the recommendation of dental implants and it is imperative to inform the patient about the risks associated with this disease.

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## CONFLICT OF INTEREST

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The authors declare no conflicts of interest.

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