

CASE REPORT

Prosthetic rehabilitation of a patient with osteoporosis and bisphosphonates treatment

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Abstract

The oral rehabilitation of a patient with osteoporosis and bisphosphonates treatment represents a challenge involving the therapeutic decisions of the dental practitioner, due to the high risk of osteonecrosis, which occurs in surgical procedures like dental implants and bone graft substitutes. The main direction in these cases includes minimal invasive dental solutions like fixed and removable dental prostheses, which achieve aesthetic and masticatory function.

Keywords: osteoporosis, bisphosphonates, oral rehabilitation.

Introduction

Teeth are fundamental to the quality of life throughout the human existence [1]. An association between tooth loss and osteoporosis has been reported in the literature. Women with osteoporosis are three times more likely to experience tooth loss than those who do not have the disease [2,3].

Osteoporosis as described by World Health Organization (WHO) is a progressive systemic skeletal disease characterised by low bone mass and micro architectural deterioration of the bone tissue, with a consequent increase in bone fragility and susceptibility to fracture. The main treatment of osteoporosis involves the use of Bisphosphonates (BPs) to improve bone density and new bone growth. BPs act on macrophages in the blood reducing their life span and causing morphological alterations and changes in differentiation of monocytes into macrophages. This reduces the body's ability to defend against pathogens [4].

The action mechanism of BP is based on the inhibition of the farnesyl diphosphate synthase enzyme (FPPS), which in turn stimulates isoprenylation of small guanosine-5'-triphosphatases (GTPases), which signals proteins that activate and regulate changes in osteoclast morphology [5].

There have been studies with a low level of specificity and many of them with a small number of clinical cases or a poorly defined control group that cannot suggest a direct link between BPs and implant failure. Therefore,

the BPs effect on implant osteointegration is not well established [6].

Subclinical hypothyroidism (SCH) is defined by the presence of serum free thyroxine levels (FT4) and triiodothyronine (FT3), within reference limits, in the presence of thyroid stimulating hormone (TSH) levels [7]. There is evidence to suggest that subclinical hypothyroidism is also linked to dyslipidemia and osteoporosis [8]. It is diagnosed based on symptoms and clinical signs associated with low thyroid stimulating hormone (TSH) levels [9]. There are studies that confirm the association of low levels of TSH with bone demineralization and alteration of trabecular bone structure. [10,11].

Patients with SCH can present with anxiety, irritability, poor concentration, slow information processing, and poor learning in comparison to healthy subjects [12].

Psychiatric illnesses such as anxiety, bipolar disorder or depression, as well as the medication associated with these diseases can reduce salivary secretion to the appearance of xerostomia [13].

In these clinical situations, associated with poor economic and social conditions, conventional prosthetic treatment is often preferred and can include crowns, bridges, inlays, onlays, veneers or conventional dentures or overdentures.

Case Report

A 62-year-old female patient, with poor social condition, came to the Integrated Centre

of Dental Medicine, University of Medicine and Pharmacy of Tîrgu Mureş with worn out upper jaw fixed bridges on a metal framework with acrylic veneers and a class II/1 Kennedy edentation treated partially with a fixed bridge in the lower jaw. Her general medical history showed bipolar schizophrenic disorders diagnosed 23 years ago, diagnosed osteoporosis, hyperlipidemia and nodular goiter in the left lobe, associated with a suspected diagnosis of hypothyroidism. The patient was treated with BPs for osteoporosis and completed the treatment one month before checking in for dental treatment. In addition, the patient is prescribed antipsychotic medication (valproic acid 900mg/day, risperidone 4mg/day, venlafaxine 225mg/day and alprazolam 0.5mg/day) and antihyperlipidemic drugs (atorvastatin 20mg/day and fenofibrate 145mg/day). Blood tests confirm hyperlipidemia (cholesterol 280 mg/dl, LDL cholesterol 195 mg/dl, triglyceride 242 mg/dl in serum) and a subclinical hypothyroidism diagnosis is suggested (anti-TSO 1.1 IU/ml, cortisol 11.1µg/dl, FT40, 86 ng/dl). The ultrasonographic examination of the thyroid revealed the presence of a well-defined 10.3/11.1 mm node in the left lobe. Thyroid biopsy showed a smear with atypia of

undetermined significance. CT scanning in the conical fascicle (CBCT) showed moderate bone demineralization and a tender bone in the mandible was acceptable from a dimensional point of view.

After the clinical (figure 1A and 1B) and radiological examination (figure 2), the remaining teeth had multiple carious lesions. In the upper jaw, the teeth were previously treated with multiple single crown restorations and a fixed bridge. In the lower jaw the patient had a fixed bridge extended from 4.3 to 4.7. All prosthetic elements had a metal base framework with acrylic veneers.

The initial orthopantomography shows the presence of multiple carious lesions involving several teeth on the arch, periodontal disease, incorrect endodontic obturations and bone resorption. Initial impressions were taken with irreversible hydrocolloids. The oral rehabilitation was started with the buildup of the frontal area with nanohybrid composite fillings. Root canal retreatment of 1.6, 2.5, 1.4, 2.4 was performed with a rotatory system using ProTaper® Gold and the root canals were then obturated with AdSeal® sealer and gutta-percha points condensed laterally.

The old fillings have been removed and they were replaced with nanohybrid composite fillings (figure 3 A, B).



Figure 1. A- Initial clinical appearance; B-details



Figure 2. Initial orthopantomography

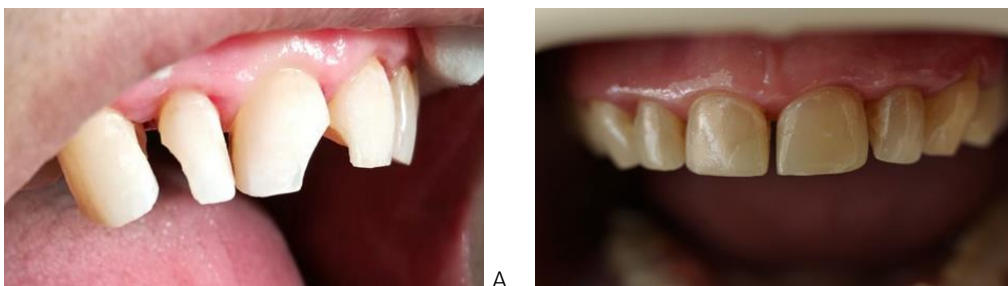


Figure 3. A-appearance of the teeth after cavity preparation; B- aesthetic composite restorations in the front

The following treatment option was suggested and discussed with the patient during the following visits:

- Removal of all fixed dental prosthetics in the upper jaw, treatment of the carious lesions and replacement with the following (figure 4):

- fixed dental bridge from 1.4 to 1.7 with a metallic framework with ceramic veneers,
- single crown restorations from 2.4 to 2.7 with the same materials as previously mentioned,
- aesthetic composite restorations in the frontal teeth.



Figure 4. Final status on the maxilla

- Removal of the fixed dental bridge in the lower jaw and replacement with a removable partial denture (RPDs) specially fixed on OT-CAP® systems united by a rigid Dolder bar (figures 5-8). For better stability a clasp on 3.3 was advised. We advised OT-CAP® systems on the teeth 4.3 and 4.7 and a clasp on 3.3 resulting from the skeletal prosthesis.

For the lower jaw a removable partial denture was made for better stability and a metal clasp was added on the 3.3 for extra reinforcement. The fixed prosthetic elements were adhesively attached to the prepared tooth surfaces with glass ionomer cement.

All the decisions have been made to enhance aesthetics and functionality in the maxillary and mandibular jaw.



Figure 5. intraoral view of the OT-CAP® system



Figure 6. Jaw relation recording



Figure 7. Intraoral View of the finished prosthetic rehabilitation in the lower jaw



Figure 8. Final result of the oral rehabilitation

Discussion

The use of dental implants is becoming more common in modern dentistry, but fear of surgery is at elevated levels [14]. Therefore, the possibility of inserting dental implants into the mandible was evaluated in terms of the patient's psychiatric and dismetabolic diseases. The diagnosis of osteoporosis and BPs treatment has also been taken into account. For these reasons and in agreement with the patient, conventional prosthetic treatment was considered, although the satisfaction of RPDs wearers is low due to alteration of oral functions, pains and injuries in the tissues [15].

A 10-year longitudinal study which was carried out on 27 patients treated with RPDs showed that no significant deterioration of the periodontal status of the remaining teeth. In addition, there was a low increase in the frequency of decayed and filled tooth surfaces [16].

Another study showing the success rate of clasp retained removable partial dentures determined that this type of rehabilitation has a 36,6% success rate, 23,8% partial success rate

and 39,6% were casted as failures on a 10-year retrospective. This study was carried out on 72 patients [17].

The terapeutical decision of removable partial dentures was motivated by a number of case report studies showing bisphosphonate related osteonecrosis of the jaw when performing dental implants. It was reported that the incidence rate of Bisphosphonate Related Osteonecrosis of the Jaw (BRONJ) in patients taking bisphosphonates who had intraoral surgery was seven times higher than that of those who did not have surgery [18-20].

The treatment objectives for patients with an established diagnosis of BRONJ are to alleviate pain, eliminate inflammation in soft and hard tissues, and minimize the progression of bone necrosis, that also leads to removal of the dental implants [21,22].

A number of studies have recently reported that the incidence of BRONJ decreased after discontinuation of oral BPs therapy [23-25].

Following the growth of the aging population patients diagnosed with osteoporosis, further studies need to be carried

out to elucidate the subject on the most successful treatment option regarding these patients [26].

Conclusion

The treatment of anxious patients with RPDs enhances mastication, functionality and it represents a good therapeutical decision in patients diagnosed with osteoporosis because of the surgical limitations associated with its treatment. The use of ball attachment systems in drug-induced xerostomia and subclinical hypothyroidism increases the maintenance and stability of prostheses. An RPD also provides important support for the facial structures such as the lips, maintaining a more youthful appearance. When a patient is faced with both general and dental conditions, it is important to provide not only long-term oral healthcare, but to also help the patient by causing the least amount of psychological trauma.

Conflict of interest: None to declare.

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