

Prosthodontic Management of Patients Receiving Bisphosphonates Drugs

Dr. Maya Dalaya

Professor
Dept. of Prosthodontics
Bharati Vidyapeeth Deemed University
Dental College and Hospital
(Navi Mumbai)

Dr. Geet Vijay

PG Student
Dept. of Prosthodontics
Bharati Vidyapeeth Deemed University
Dental College and Hospital
(Navi Mumbai)

Dr. Sumeet Agarwal

PG Student
Dept. of Prosthodontics
Bharati Vidyapeeth Deemed University
Dental College and Hospital
(Navi Mumbai)

Dr. Mahesh Ghadage

PG Student
Dept. of Prosthodontics
Bharati Vidyapeeth Deemed University
Dental College and Hospital
(Navi Mumbai)

Abstract

Bisphosphonate has been the drug of choice for the patients who have bone related pathologies like osteoporosis, Paget's disease, metastasis of bone cancers etc. Though these classes of drugs have been successful in treating and curing such pathologies but still it has got its side effects. Studies have shown that patients taking bisphosphonates are prone to develop osteonecrosis of jaws. This side effect of bisphosphonate make it must for a prosthodontist to take a different protocol for treating a patient receiving bisphosphonate drugs. This article aims at reviewing the literature on how to manage patients taking bisphosphonates for both removable and fixed prosthesis.

Key words Osteoporosis; Tissue Tolerance; Paget's disease; Osteonecrosis; Bisphosphonate related osteonecrosis of jaw (BONJ); C-telopeptide test (CTX)

Introduction

Bisphosphonates are well established drugs which are used generally for the treatment of pathologies where resorption of bone increases like that in cases of osteoporosis or in cases of rheumatoid arthritis or tumour induced bone resorption. However bisphosphonates can cause the incidence of BONJ & thus patients taking bisphosphonates, in some way or the other, require special attention & modification in routine treatment plan.

Bisphosphonate-related osteonecrosis of jaw is defined as an area of exposed bone of more than 8 weeks duration in a patient taking a bisphosphonate for bone disease. BONJ may range from a painless prolonged healing to a seriously painful and debilitating condition that lasts for many years without resolution^[1].

What are bisphosphonates & their action.

Bisphosphonates are the class of drugs that are used to preserve and increase bone mass & are used to treat pathologies in which there is increased bone resorption. Bisphosphonates target the osteoclast directly either by increasing apoptosis or by affecting metabolic activity.^[2] Bisphosphonates are not readily metabolized; they may persist in bone with potential long-term suppression of osteoclasts.^[3]

The most common dental complication which has been reported for the patients taking bisphosphonates is BONJ. Also bisphosphonates hinders the blood supply of tissues and thus reduces the tissue tolerance.^[4]

Bisphosphonates on chronic use also shows anti-inflammatory response.^[5]

Bisphosphonates are of two types: Non nitrogen containing & Nitrogen containing. Among these nitrogen containing bisphospho-

honates are the only one's which shows Bisphosphonate osteonecrosis.^[6]

The majority of reported cases of BONJ have been diagnosed after dental procedures such as tooth extraction. Less commonly, Bisphosphonate osteonecrosis appears to occur spontaneously in patients taking these drugs.

Incidence of BON increases many folds when

- Bisphosphonates taken I.V
- Bisphosphonates taken with drugs like corticosteroids
- In immune compromised patients like that of diabetes mellitus & like in patients undergoing radiation therapy.

Discontinuing the drug before dental treatment has not been demonstrated to reduce the risk of osteonecrosis, as the drug has been shown to persist in human bone for up to twelve years.^[7]

Early diagnosis and prevention has been the key to the management of BP-induced osteonecrosis of jaw. To date, the only quantitative method for monitoring the status or progression of BP-induced osteonecrosis of jaw, proposed by Marx et al, measures the relative risk for developing osteonecrosis of jaw through the use of the C-telopeptide test (CTX). Based on this, a period of drug cessation, known as a "drug holiday", has been proposed; whereby the patient stops taking the bisphosphonate until CTX numbers have normalized. Once normalized, the patient is considered to be at relatively low risk for developing osteonecrosis of jaw following surgical or invasive procedures.^[8]

Discussion

Prosthodontic consideration of patient taking Bisphosphonate drug

A) Removable prosthesis

Removable prosthesis like that of complete denture or removable partial denture all rest on mucosa and underlying bony tissue. It is now clear that patients who have been exposed to nitrogen containing BP therapeutic agents are at risk for Osteonecrosis of jaw when dental treatment or trauma violates the integrity of the oral epithelium.^[9-11]

Landesburg et al published a landmark study showing the effect of nitrogen containing BPs on oral mucosa cells and the inhibition of oral keratinocyte migration. Following an intraoral traumatic event to mucosa, Bisphosphonate inhibit normal epithelial wound healing and keratinocyte migration, resulting in a prolonged exposure of underlying bone to oral micro flora, thereby allowing secondary bone infection to ensue.

Many experimental & clinical studies show that BP's conserve bone architecture and strength.

However there have been concerns about whether use of prolonged high doses of BP's may impair bone turnover to such an extent that bone strength is impaired. It has been suggested that BP's might prevent naturally occurring microscopic cracks in bone from healing, which in turn leads to accumulation of micro damage.^[12]

Chances of developing BON increase many folds if patient is having other factors like in immune compromised patients.^[13]

Since in residual alveolar ridge is not meant to bear direct occlusal loads and also the mucosa covering the ridge is also compromised in patients taking bisphosphonates, following prosthodontic



considerations which should be considered.

- I. The main function of denture should be for esthetics and speech and should provide either no or very limited functionality for mastication depending on the type of bisphosphonate drug patient is taking, route of administration, time span of administration and any previous history of BON.
- II. Removable prosthesis made should be stable and should be relined or rebased time to time, as unstable dentures are tend to injure the epithelium as well as demand for more residual ridge resorption.
- III. Removable prosthesis should not engage into any undercut or tori if present.
- IV. If patient requires any kind of pre-prosthetic surgery than CTX test should be carried out and accordingly "drug holiday" should be taken into consideration.

B) Fixed prosthesis

For a patient getting fixed prosthesis maintenance of oral hygiene status becomes an important step towards good prognosis. Margins during crown preparation should always be kept supra-gingival for following reasons:

- I. To place margins sub gingival, sulcus epithelium can get traumatized in the process which can latter lead to delayed healing and thus chances of developing BON are there.
- II. Also since the loss of alveolar bone in periodontitis is a regular immune response of body towards the microorganisms, inhibiting or modulating host response by bisphosphonate drugs can actually lead to BON. A study conducted by Aghaloo TL et al, demonstrate that bisphosphonates can attenuate alveolar bone loss caused by an on-going periodontal disease.

These indicate that margins for crown preparation should be supragingival in patients taking bisphosphonates.

Implants are an absolute contraindication for the patients having high risk of developing BONJ. Also since bisphosphonates significantly reduce bone turnover, it is not surprising that a patient taking bisphosphonates may have a problem with integration of implants or, if the implants are already successfully integrated, then there can be a marked delay in bone healing and thus the potential for loss of integration to occur. According to a study there is a risk of failure of implants related to oral bisphosphonates. This may occur either when there is a failure to integrate when implants are placed in patients taking oral bisphosphonates or when there are

existing integrated implants and the patient subsequently prescribed begins taking oral bisphosphonate for osteoporosis. The risk is relatively low, less than 1%, but is devastating to the patient.¹⁴

Conclusion

In context to this article it can be concluded that very less information is available on the line of treatment for the patient receiving bisphosphonates. All points that can be concluded from the literature reviewed are as follows

1. Proper medical and dental history should be taken for the patients who are receiving bisphosphonates drugs or who have received it in past.
2. Non-invasive dental treatment should be given priority over invasive treatment.
3. Removable prosthesis made should be made to solve the purpose of esthetics and speech.
4. Regular recalls and follow ups are must.
5. Crown preparations should be supra-gingival.
6. Oral hygiene maintenance is important.
7. Implants should not be placed in patients having high risk of developing BONJ.

Summary

Bisphosphonates are the drugs which are taken to cure bone related pathologies. These drugs basically affect the bone remodelling process. The incidence of developing BONJ is very less but still it should be taken into consideration when one is treating a patient who has been receiving the bisphosphonate drugs or who has received it in past. The chances of developing the pathology becomes more pronounced when patient receives nitrogen containing bisphosphonates intravenously. Also the rate of disintegration of the drug inside the body is too slow and thus drug molecules reside inside the bone for a long period of time. Removable prosthesis though are safe to be given to the patient receiving bisphosphonate drugs but still these prosthesis should be made with great care and should be only solve the purpose of esthetics and speech mainly. In terms of fixed prosthesis oral hygiene maintenance should be given the main priority. Implants form an absolute contraindication in such cases.

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