

Immediate Placement and Loading of Full Arch Dental Implants in An Elderly Osteoporotic Female on Oral Bisphosphonate Therapy



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ABSTRACT: Bisphosphonates are anti-resorptive drugs commonly prescribed for management of osteoporosis. In spite of its clinical efficacy, a known adverse effect of these drugs is bisphosphonate induced osteonecrosis of the jaw (BRONJ). Dentists usually try to avoid invasive surgical procedures among patients consuming this category of drugs. This case report describes successful placement of multiple implant supported prosthesis in an elderly osteoporotic female with four years history of oral bisphosphonate therapy. Besides serum vitamin D and calcium level, the standard investigation to assess bone turn over in such patient is carboxyl-terminal crosslinking telopeptide of type I collagen (CTX). Since no local laboratory offered the CTX test; an alternative investigation N-terminal crosslinking telopeptide of type I collagen (NTX) was offered. Careful treatment planning and gentle surgical approach made it possible to immediately load the implant supported prosthesis in her both arches. This case report reiterates the fact that successful implant supported prosthesis can be placed in patients on long term oral bisphosphonates, provided comprehensive treatment planning including relevant investigations are done and the surgical trauma is kept to a minimum.

KEY WORDS: Hospital dentistry; osteoporosis; prosthodontics

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INTRODUCTION

Placement of implants into fresh extraction sockets and their immediate loading has been advocated in recent literature in an attempt to reduce the treatment time compared to the conventional protocol of delayed implant placement and loading.¹⁻³ Immediate loading is defined as 'functional loading of an implant within one week of its placement.'⁴ This loading protocol of implants in edentulous and partially dentate arches has shown equally successful outcomes as those loaded after a delay of 2-3 months.⁵⁻⁷

Bisphosphonate are one of the most common anti-resorptive drugs being prescribed for certain bone diseases, including osteoporosis. They act by decreasing the bone turnover rate; thereby increasing bone mineral density; and reducing the chance of fractures.⁸ In spite of its clinical efficacy, a known adverse effect of these drugs is the bisphosphonate related osteonecrosis of the jaw (BRONJ). BRONJ is defined as 'an area of exposed bone in the maxillofacial region that did not heal within 8 weeks after identification by a healthcare worker, in a patient who was receiving, or had been exposed to, a bisphosphonate and had not had radiation therapy to the

craniofacial region.'^{9,10} To prevent this debilitating complication, a thorough medical and drug history should be sought by the dentist. Relevant radiographic and laboratory investigations should be undertaken before making a definitive treatment plan. This case report describes successful placement of implant supported prosthesis in a patient on oral bisphosphonate therapy after appropriate investigations.

CASE PRESENTATION

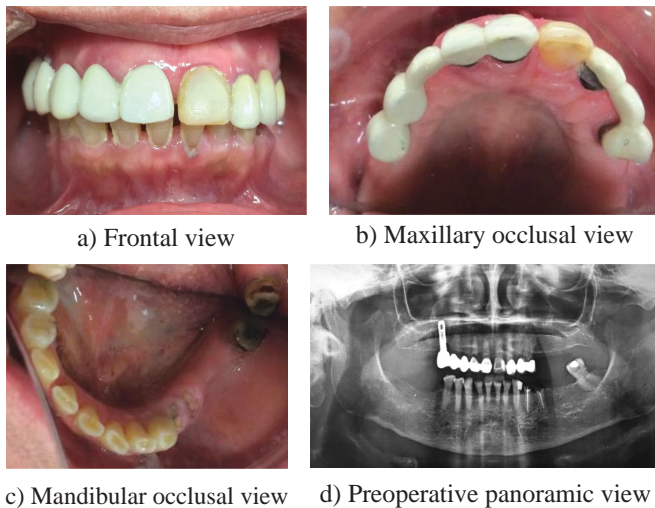
A 70 year old female presented to the Dental clinics of Aga Khan University Hospital, Karachi with complaints of difficulty in chewing food due to multiple mobile, broken down and missing teeth. The patient had similar complaints for the past few months. She had some of the missing teeth replaced by a tooth-implant supported prosthesis in her right upper arch almost one year ago. Her medical history revealed that she was affected by osteoporosis and was taking oral sodium alendronate (bisphosphonate) for over 4 years.

Clinical examination revealed a tooth implant supported fixture in her upper right quadrant which was grade III mobile (figure 1a-c). After clinical evaluation, a panoramic radiograph was taken (figure 1d) which revealed that all teeth in her upper arch appeared non salvageable. The patient was advised extraction of all teeth in the upper arch. Extraction of broken

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Figure 1: Preoperative clinical radiographic images

down roots was also advised in the lower arch; followed by replacement. As the patient expressed her interest in receiving only fixed prosthetic solution for dental rehabilitation; the option to restore her dentition was limited to provision of implant supported prosthesis.

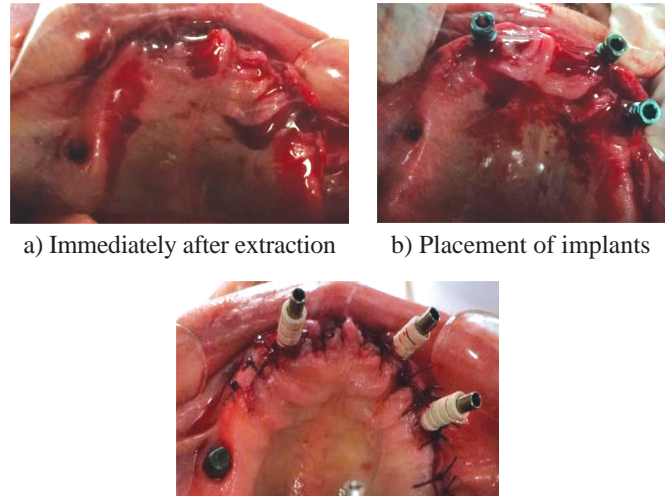
The patient was advised blood tests to check the levels of Vitamin D, Calcium and carboxyl-terminal crosslinking telopeptide of type I collagen (CTX). Since no laboratory in our vicinity offered the CTX test; the patient was recommended to get the urine N-terminal crosslinking telopeptides of type I collagen (NTX) test instead.

After confirming the suitability of the patient to receive implants by discussing reports of laboratory tests with the concerned physician; patient was given the choice of placing implant supported prosthesis in both the upper and lower jaw. The decision to give implant supported prosthesis was substantiated by the fact that the patient already had an implant fixture (ITI Straumann) in the upper right quadrant placed almost one year back which had osseointegrated and was serving her well.

After discussing the treatment plans thoroughly with the patient, her oral sodium alendronate was stopped by taking her physicians in confidence. The treatment was divided into 2 phases. Phase 1 included the extraction of mobile and broken down teeth; immediate implant placement and temporization in the upper arch. It was planned to retain the implant placed in the upper right quadrant and make it a part of the final prosthesis.

Impressions were made with alginate for study casts and to form vacuum formed clear acrylic stent for fabrication of temporary prosthesis in the upper arch. In the first visit, the upper prosthesis was sectioned and removed. The patient was advised to rinse with 0.2% Chlorhexidine gluconate solution. Under infiltration of local anesthetic solution (containing

1:100,000 epinephrine), extractions of the broken down roots and grossly carious teeth in the upper arch was done (figure 2a). A full thickness mucoperiosteal flap from the region of # 15 - # 25 was raised for better visualization of the

Figure 2: Intra operative clinical pictures

bone. After drilling the appropriate osteotomy sites, Zimmer tapered screw vent implant of 3.7 x 11.5 mm dimension were placed in the socket of tooth # 12, 22. Implant of dimensions 4.7 x 11.5 mm was placed in the position of tooth # 24 (figure 2b). After confirming primary stability of the implants, primary closure of the flap was done by using 3° vicryl interrupted sutures sparing the implant platforms. Plastic hex lock abutments were placed on the implants (figure 2c) and a screw retained temporary acrylic prosthesis extending from # 15-#25 was then fabricated using polymerizable acrylic resin in the vacuum formed stent (figure 3a). The finished provisional prosthesis was screwed into place and access opening closed with a temporary filling material (figure 3b). The patient was given post-operative instructions to minimize any risk of bleeding. The patient was advised soft diet during the healing period so as to avoid excessive loads on the osseointegrating implants. This was followed by prescription of Tab. Augmentin (Amoxicillin and Clavulanic Acid) 1g BID and Tab. Ansaid (Flurbiprofen) 100mg BID supplemented by Tab. Panadol (Paracetamol) 500 mg TID if needed for 5 days.

After 2 weeks, broken down root of #34 and #35 were extracted under local anesthesia. A full thickness mucoperiosteal flap was raised. After drilling the appropriate osteotomy sites, Zimmer tapered screw vent implant of 3.7 x 11.5 mm dimension were placed in the native bone of # 36 and # 46 region. Implant of dimensions 4.7 x 13.0 mm was placed in the socket of # 34. After confirming primary stability of the implants, primary closure of the flap was done by using 3° vicryl interrupted sutures and healing collars were placed. As lower anterior

Figure 3: Immediate post-operative clinical pictures

a) Temporary screw retained prosthesis in the upper arch- frontal view



b) Temporary screw retained prosthesis in the upper arch- occlusal view



c) Healing collars placed on implants in lower arch

teeth were intact so no temporary prosthesis was made for lower arch implants (figure 3c). The patient was given post-operative instructions to minimize any risk of bleeding. This was followed by prescription of Tab. Augmentin (Amoxicillin and Clavulanic Acid) 1g BID and Tab. Ansaïd (Flurbiprofen) 100mg BID supplemented by Tab. Panadol (Paracetamol) 500 mg TID if needed for 5 days.

At follow up of 2 weeks, the upper temporary prosthesis was removed, cleaned and screwed back after minor adjustments. After 3 months, impressions were made using poly vinyl siloxane impression material (light and heavy body) for final prosthesis fabrication. The previously placed implant was included in the final prosthesis and a cement retained prosthesis extending from # 16 -25 was cemented using Glass ionomer based cement (figure 4 a-e). Single implant crown was cemented on # 46, while a 3-unit implant retained bridge was cemented in the region of #34- #36.

Figure 4: Final prosthesis at insertion

a) Frontal view



b) Right lateral view



c) Left lateral view



d) Maxillary occlusal view



e) Mandibular occlusal view

Oral hygiene instructions were reinforced and the patient was advised for regular follow up visits at her regular dentist. Upon, her visit again to our center at 12 months interval from initial placement, we did routine prophylaxis and observed that she is doing well. The panoramic radiograph at 12 months follow-up showed favorable bone levels and absence of any pathology (figure 5).

Figure 5: Final panoramic X-ray

DISCUSSION

This case report describes successful immediate placement and loading of implant supported prosthesis in edentulous maxilla and partially dentate mandible of a patient who had been on oral bisphosphonates for more than 4 years. Immediate implant placement is defined as placement of implant into a fresh extraction socket just after tooth extraction.¹¹ This treatment protocol been advocated in recent literature because of certain advantages of this treatment procedure over the conventional delayed implant placement. It reduces the number of surgical interventions; better maintains the soft and hard tissue architecture at the site of implant placement and has been reported to have better patient satisfaction.^{12,13} In the present case a reduction in the overall treatment time was of utmost importance as the patient was not a local resident, and had come from abroad only to get her treatment done. The provision of a screw retained temporary prosthesis at the same visit as that of the implant placement has a huge social and psychological impact on the patient as she was not without teeth for even a single day.

Success of implant supported restorations is dependent on various local and systemic factors. Bisphosphonates

are said to impair the bone turnover rate, thereby decreasing chances of bone fracture.⁸ Serum C-terminal crosslinking telopeptides of type I collagen, (CTX biomarker) is said to be an effective biomarker to monitor bone turn over in patients.¹⁴ An alternate to CTX is the N-terminal crosslinking telopeptides of type I collagen, (NTX biomarker), utilized in some studies to assess the bone turnover rate.^{14,15} Since no laboratory in our area carried out the CTX test, the patient was advised the NTX test instead to assess the bone turnover. Successful osseointegration of implants in this case report shows NTX biomarker to be a reliable alternative to the CTX test.

Li *et al*¹⁶ in a retrospective study concluded that immediate loading protocol by fixed provisional prosthesis is an effective method for restoration of edentulous maxilla and mandible. The same protocol was used to restore the edentulous maxilla in this case; with the permanent prosthesis delivered after 3 months of implant placement. For immediate provisional loading of prosthesis, it is recommended that the implant placed should have a torque of at least 30Ncm.¹¹ The implants placed in our study withstood a torque of 35Ncm when assessed with a torque wrench after their placement, and thus decision of immediately loading the implants was taken. Upon 12 months follow-up the results of immediate placement and loading in this case were excellent. The patient is advised to keep her regular visits at her family dentist.

CONCLUSION

This case report reiterates the fact that successful implant supported prosthesis can be placed in patients on long term oral bisphosphonates if comprehensive treatment planning including all relevant investigations are done and the surgical trauma is kept to a minimum.

CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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