

Immediate Loading of Long Implant Placement with Bicortical Engagement in the Anterior Esthetic Zone: A Case Report.

Dr. ShubhKarmanjit Singh Bawa, Post Graduate¹, Dr. Vikas Jindal, Professor², Dr. Divye Malhotra, Professor³, Dr. Parul Sharma, PostGraduate⁴

^{1, 2, 4} Department of Periodontics, Himachal Dental College, Sundernagar

³ Department of Oral Surgery, Himachal Dental College, Sundernagar

Corresponding Author: Dr. ShubhKarmanjit Singh Bawa, Post Graduate, Department of Periodontics, Himachal Dental College, Sundernagar

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Abstract

Extraction sites in the anterior maxilla can present restorative challenges with regard to esthetics. Immediate loading of an implant especially in the esthetic area is an obvious appealing alternative to the patient despite of wearing a removable partial denture during healing period. Implant placement into fresh extraction sockets with immediate loading has recently become more popular due to some advantages including less treatment time, avoidance of second stage surgery, and the preservation of existing soft tissue contours. This case report describes the replacement of a maxillary left central incisor with the placement of a long implant with bicortical engagement and final loading done within 48 hours to preserve anterior esthetics.

Introduction

Dental Implant has ameliorated dramatically in last 20 years providing clinicians with new opportunities for dental rehabilitation that were previously considered impossible. Branemark implant system has been used widely since 1965.¹ the recent advancement in implant dentistry is placement of long implants with bicortical engagement and immediate prosthetic loading. Bicortical

implants provide immediate advancing stability as they derive support from the bony cortices so they can be used in compromised ridge conditions. They can be immediately loaded using same conventional procedures. These implants have a sharp tip for bicortical anchorage which also provides high primary engagement and easy insertion in the cortical bone. The overall advantages of immediate loading with bicortical implants are avoidance of a second stage surgical procedure which results in reduction in overall treatment time. The prosthetic procedure is also simplified and soft and hard tissue loss is reduced ultimately providing psychological satisfaction to the patient. Conventional two-stage implantation (with or without immediate implant placement) would require bone augmentation following teeth extraction but in bicortical implants bone augmentation procedures are bypassed which further makes them more economical. Bicortical implants are used to overcome all the limitations that occur because of conventional implants such as inlay or onlay alveolar grafts, nerve repositioning, sinus lift and even nasal lift, cost and time factor and tissue integration.

This article focuses on the placement of a self-tapping long implant to restore with a metal ceramic crown in the anterior region of the patient's mouth.

Clinical Case Report

A 21 year-old male patient reported to the Dept. of Periodontics, Himachal Dental College, Sundernagar. Distt. Mandi with the chief complaint of a missing upper front tooth. The patient gave a history of loss of the tooth due to accident one month back. Clinical evaluation revealed that the maxillary left central incisor was missing. Preoperative radiographs showed sound bone and adequate space for placement of a long implant with bicortical engagement in the maxillary right central incisor region. The width of bone was determined by utilizing a bone sounding technique for implant placement.

Treatment Plan

Thorough oral prophylaxis was done before any intervening procedures were carried out. After thorough evaluation of the history, clinical condition, radiological evaluation, other necessary investigations, cost factor and considering the patient's need for an immediate fixed restoration, it was decided to place a 3.75 mm diameter and 18 mm insertion-length long implant in the edentulous space.

Surgical Procedure

On the day of surgery the patient was asked to rinse with 0.2% chlorhexidine digluconate solution for 1 minute before the procedure. Administration of local anesthesia (2% lignocaine HCL containing 1:80000) is done. Strict infection control measures were followed before and during the implant placement surgery to avoid any contamination of the placement site or the implant.²

The external compact bone was entered using a slow-speed bur, 3.5 mm diameter bur with constant cooling. This is done to avoid overheating of the osteotomy site³. Then the bur was stopped at tactile contact with the

opposite cortical bone. The cancellous bone was coarse, hence no further drilling was required to place a 3.75 mm diameter implant. Osteotomy with the 3.5 mm drill is usually sufficient to screw a self tapping 3.75 mm implant. Stability of the implant was checked by the perception of the surgeon, insertion torque measurement and by the reverse torque test⁴. The implant was checked for sufficient occlusal clearance and position. Final adjustment for optimal position was done by milling the abutment with the help of metal cutting bur. The flap was then covered and sutured. A temporary crown was placed over the implant and splinted over the abutment on the same day. Cement was avoided as any overhanging could cause irritation while the gingival was healing. Postoperative OPG and RVG were taken for confirming the accuracy of implant placement. Postsurgical instructions were given and medication was advised and the patient was recalled after one week for suture removal and evaluation.

Impressions were made for maxillary and mandibular arches followed by transfer of the implant analog into the master cast with the help of a transfer post. A metal ceramic crown was prepared in the laboratory and cemented over the implant after three days of the surgery. The crown was kept slightly out of occlusion to avoid disturbance to the integrating implant.



Figure 1: Pre-operative photograph



Figure 2: Pre-operative RVG



Figure 5: Post -operative OPG



Figure 3: Pre-operative OPG



Figure 6: Abutment placed



Figure 4: Implant placed



Figure 7: Temporary Crown



Figure 8: Immediate temporization



Figure 9: Final Restoration



Figure 10: Occlusal view with Final Crown

Discussion

If chosen, in presented clinical case, conventional two-stage implantation placement would require bone augmentation. The above mentioned implant can be loaded after a minimum of 3 to 6 months. The main drawback of this treatment option is lack of predicting the bone modeling process after implant placement. Thinking

of the long-term outcome, we particularly need to consider the possible direction of physiological atrophy of the maxillary alveolar bone and complications in a case of implant surface exposure and its subsequent bacterial contamination. Tall implants supporting bicortical engagement is a recent advancement and few reported cases have proven to be highly successful. Basal bone is the stress bearing part of our skeleton and it never gets resorbed.⁵ This bone is highly dense, corticalised and offers exceptional support to dental implants. According to C-J Ivanoff et al in 1996,⁶ study done in rabbit tibia, it was seen that the removal torque was two times higher for the bicortical implants after 6 weeks and three times higher after 12 weeks than the monocortical ones. It also showed a statistically higher amount of bone contact and bone area than the short implant. Even according to Harsha K et al in 2017, they stated that use of long implants with tilt concept having bicortical engagement gave more anchorage and better stability.⁷ Bicortical engagement reduces the stress in superior cortical bone by 20% and transfers the forces to cortical bone which is highly mineralised. Major advantages of this procedure are reduced number of surgical appointments, reduced edentulous phase and preservation of soft tissue architecture. NAG in 2018 stated that delivering the prosthesis within a day after the implant procedure fulfills both functional and esthetic requirements which are considered as the primary treatment modalities.⁸ VENKAT NAG in 2019 did immediate loading in bicortically stabilized implants and reported a very high success rate.⁹ Cortical implantology includes the application of the rules of orthopedic surgery, the science behind it is already been proved in orthopedics (total hip/knee replacements). Bruno Salles Sotto-Maior *et al.*¹⁰ conducted study to evaluate the biomechanical influence of apical bone anchorage using FEA models and found

bicortical engagement reduces implant displacement. No doubt it's a patient oriented therapy, which meets the demand of the patient ideally.

Conclusion

Based on the outcomes of the present case report, it shows that final results and long-term success of immediately loaded long implants with immediate loading may be a viable treatment option for this case. The unquestionable benefits of bicortical implant use are the reduction of the number of visits and the possibility of immediate loading of the implanted screws due to optimal primary stabilization, which is obtained by placing the implants in the cortical bone. However, this approach is considered highly technique sensitive and requires proper execution. Regenerative procedures (including simultaneous implantation) are not required for this type of implants, but they can be implemented due to aesthetic or functional. Despite the advantages of the use of bicortical implants allowing to achieve the immediate aesthetic rehabilitation, the risk of gingival recession and bone atrophy still exists. Careful selection of cases, proper treatment plan and follow-up of surgical and prosthetic protocols are the keys to success in this case.

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