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Research Article

# SHORT IMPLANTS: SUBSTITUTE TO BONE AUGMENTATION PROCEDURES- A CASE REPORT

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**ABSTRACT**

**Statement of problem:** Aggressive treatment options for reduced alveolar ridge height call for bone grafting the area followed by the placement of dental implants. An alternative approach in cases where a limited amount of bone height is available is to use short implants of less than 10 mm of length, instead of the standard range 10 to 16 mm. This strategy avoids the need for bone augmentation procedures and simplifies treatment.

**Aim:** This article presents a case report where short implants were placed instead of bone augmentation procedures in a patient with reduced alveolar ridge height.

Case description: A 28 years old male reported with a chief complaint of difficulty in chewing due to missing teeth in lower right and left back region of jaw. On radiographic examination, the available bone height was found to be inadequate and short implants were placed and crestal bone loss was evaluated at various time intervals.

**Results:** The results after placing short implants were comparable with the conventional implants in terms of crestal bone loss. Bone loss decreased from 3rd month to 6th month, and it further decreases from 6th month to 12th month.

**Conclusion:** Short dental implant placement is a successful alternative treatment modality to bone grafting procedures.



## INTRODUCTION

The sequelae of tooth loss are often associated with compromised masticatory function and unpredictable alveolar ridge resorption, which may in turn complicate prosthodontic treatment outcomes[1]. This has been an ultimate challenge to the prosthodontist in accordance with De Van'sprinciple of preservation. Patients often prefer fixed prosthesis as a treatment. Over the years, traditional methods of tooth placement are slowly and steadily being replaced by newer modalities. The placement and restoration with endosseous dental implants have become routine dental procedures that offer high success rates when suitable planning and protocols are followed[2].

A very common challenge encountered in the use of oral implants is the presence of reduced alveolar ridge height.[3] This is of particular concern when observed in the posterior areas of the mandible and the maxilla, where the mandibular nerve and the maxillary sinus, respectively, are to be avoided.[4] Aggressive treatment options for reduced alveolar ridge height call for bone grafting the area followed by the placement of dental implants.[5,6]

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While these methods have obtained a level of success, some patients reject multiple surgeries and are discouraged by additional treatment duration and financial burden. Also to date, the evidence relating to the predictability of surgically increasing vertical ridge height (other than sinus augmentation) is inadequate. At the same time, a prosthetic solution sometimes is not applicable because of inadequate interarch space.[7]An alternative approach in cases where a limited amount of bone height is available is to use short implants of less than 10 mm of length, instead of the standard range 10 to 16 mm.[8,9] This strategy avoids the need for bone augmentation procedures and simplifies treatment.

The literature regarding the survival of short implants is mixed. Recent clinical studies have demonstrated that short implants may be a viable long term solution for sites with limited bone height.[10] In the last two decades, it became clear that clinical implantology had advanced to the point that this treatment represented a predictable approach to the replacement of lost teeth. These conflicting results suggest the need for additional research efforts aimed at elucidating successful applications and recommendations for the use of short, wide-diameter implants.

In this article short implants were placed in a patient with reduced alveolar bone height and marginal bone loss was evaluated at various time intervals.

***Case Report***

A 28 years old male reported with a chief complaint of difficulty in chewing due to missing teeth in lower right and left back region of jaw. A detailed clinical examination was done and history was taken. It was found that on both the sides in mandible, first and second molars were missing. The patient was advised to have implants. The patient was given adequate information about the procedure and was provided with possible alternatives. Thereafter a written consent was taken.

***Procedure***

After case history, radiographic assessment of available bone was done based on Intra Oral Periapical Radiographs and Orthopantomogram. Radiographs revealed mesiodistal and apico-coronal dimensions of the available bone at the implant site as well as the trabecular pattern of the bone.The clinical examination was done to diagnose oral infections in the form of periodontal or periapical infection. Implant sites were evaluated for gingival architecture, adjacent tooth morphology and osseous architecture. Pretreatment planning included preparation of study and working cast models to record occlusal relationships as well as for diagnostic wax up of the proposed prosthesis. The surgical template was prepared to guide the implant location and angulation during placement.
It was found that the available bone apico coronally at implant site was inappropriate. So instead of doing bone augmentation procedures, short implants of Dentsply Xive were chosen for rehabilitation. The implant size was selected both in width and length according to the bone mapping and with the help of radiographic evaluation after taking into account the magnification error with the help of radiographic template having a ball bearing embedded in it.(Fig 1) The screw type implants (two piece implants) were used. The implants of width 4.5 mm and length 8 mm and 9.5 mm were placed according to the available bone.

***Surgical phase***

***First stage surgical technique***

Surgery was done under local anaesthesia in an aseptic field under proper antibiotic cover. The incision was placed over the crest of the alveolar bone dividing the mucosa of edentulous area of implant recipient site at the bucco-lingual midline.Full thickness flap was elevated exposing the alveolar bone. A full thickness flap was raised bucally and lingually to the level of the mucogingival junction, exposing the alveolar ridge at the implant site. (fig.2)

***Implant placement***

Strict asepsis protocols were observed to prepare the osteotomy site for implant placement. A surgical guide or stent was placed intraorally, and a small round bur or spiral drill was used to mark the implant sites. The stent was then removed, and the sites were checked for their appropriate faciolingual location. Slight modifications were done to avoid obvious ridge defects. The site was then marked to a depth of 1 to 2 mm, breaking through the cortical bone. A small spiral drill, usually 2mm in diameter and marked to indicate appropriate depth, was used next to establish the depth and align the axis of the implant recipient site. (fig.3) This drill was externally irrigated. The spiral drill was used at a speed of approximately 800 to 1000 rpm with copious irrigation to prevent overheating of bone. Subsequently sequential drills were used to widen the size of bone for accommodating the selected size of the implant. Drilling multiple implant sites, a direction indicator was used in adjacent site. Once the implant was screwed in and the cover screws were placed (fig.4), proper closure of the flap over the implant was done with 3-0 sutures.

***Post - Surgical Follow Up***

Postoperatively antibiotics, anti-inflammatory and analgesic were prescribed for 3 days and chlorhexidine 0.12% mouth rinse were prescribed twice a day for 14 days. Patients were instructed to have a liquid or semi soft diet for the first few days and then gradually return to a normal diet. At first recall visit after surgery sutures were removed and at the later visits patients were assessed for the oral hygiene and oral hygiene instructions were repeated when required.

***Second Stage Surgical Technique***

The second stage surgery was done after healing period of 3 months. The implant was exposed without damaging the surrounding bone and gingival healing cap was placed for 2 weeks. Indirect impression technique was used for taking the impression of the abutment.

***Prosthetic Phase***

Shade selection was also done during this appointment using VITA 3D shade guide.Healing abutment/gingiva former was replaced with the final abutment and provisional restoration was given till the metal ceramic crown was fabricated.The metal-ceramic crown was fabricated and checked for its passive fitting to abutment and occlusal interference checked.Crown was then cemented with glass ionomer cement.Baseline assessments were carried out & the patient was dispatched with a reminder of oral hygiene instructions& the recall programme.

***Radiographic Investigation***

A radiographic follow up was conducted during the following periods. Fig 5, fig 6 and fig 7

- Immediately post operative.
- 3 months
- 6 months
- 12 months

To evaluate crestal bone loss radiographic examination was conducted on a Planmeca Prostyle intraoral X-ray machine using a parallel cone technique with a Dentsply® film positioning device. A size 2 adult film Kodak® Ekta speed film was used, exposure parameters were kept standardized at 70 kVp, 10 mA and 0.2 seconds. To allow for magnification and image distortion errors a lead grid with 1 sq mm grid pattern was affixed on to the film for the exposure (Fig.8). The IOPA's with grid were analyzed on the Adobe photoshop® Ver 8 software. Prior to the analysis the image characteristics were enhanced (contrast, density, brightness) to optimal levels by the software itself. Images were resized wherever magnification error was found. A filter tool was used to create an embossed effect on the image to highlight the bone details of the image and minimize errors. Metric analysis was performed on a micrometer scale using the measuring tool available in the Screen Caliper Software.

***Points Were Selected as Follows***

***Mesial***: Distance from the first thread (coronal) on the implant fixture to the most coronal point on mesial alveolar bone crest.

***Distal***: Distance from the first thread (coronal) on the implant fixture to the most coronal point on distal alveolar bone crest.
The determined values of each fixture was compared over the follow up period separately for the mesial and the distal aspects to arrive at the following results. The radiograhic findings were also co-related with the clinical findings.

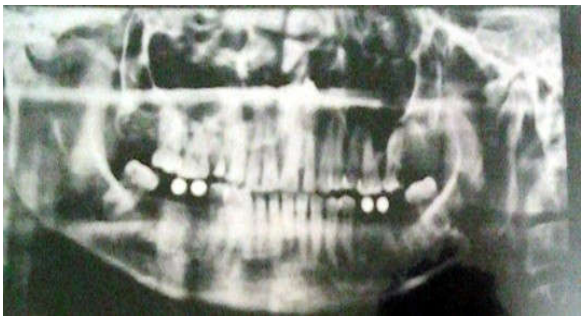

**Fig 1** Pre Operative Orthopantomogram

**Fig 2** Elevation of Flap

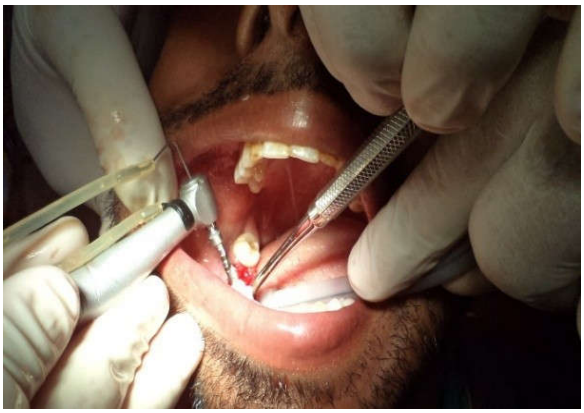

**Fig 3** Pilot Drill Is Used For Preparation of Osteotomy Site

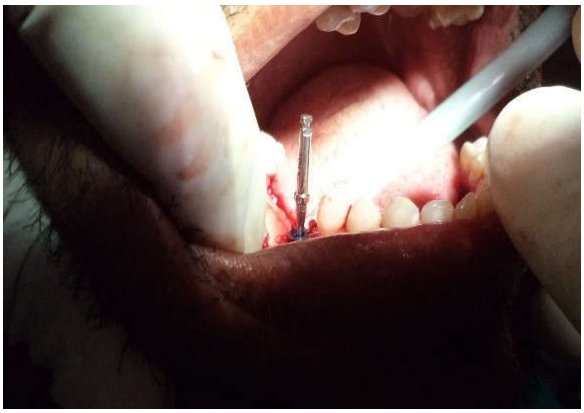

**Fig 4** Implant and Cover Screw Placed (Wrt 46)

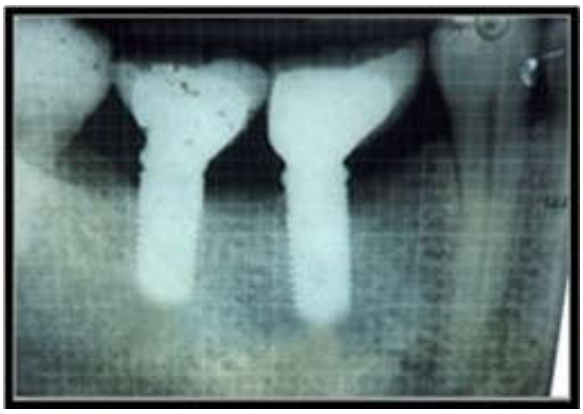

**Fig 5** Iopa Radiograph At 1 Year (Wrt 46 & 47)

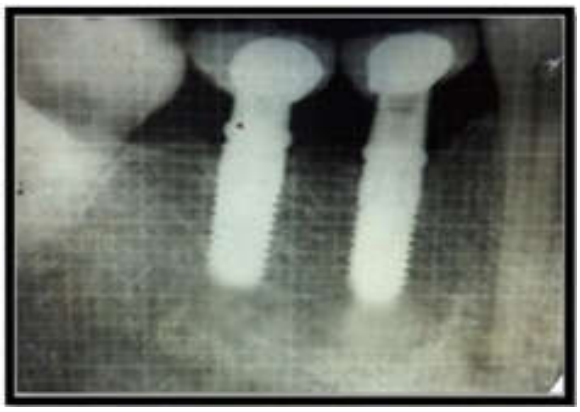

**Fig 6** Iopa Radiograph At 1 Year (Wrt 36 & 37)

**Fig 7** Post Operative Orthopantomogram

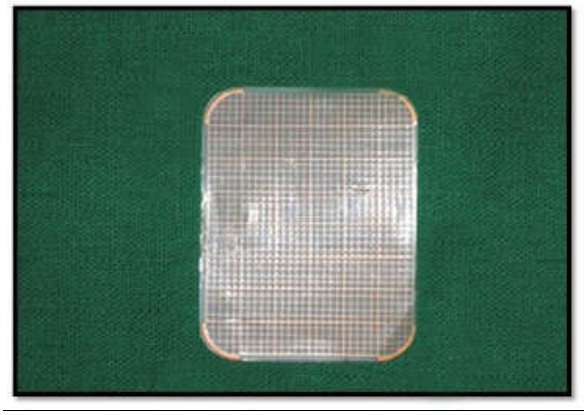

**Fig 8** Grid Used With IOPA Radiograph

## RESULTS

The results obtained shows the mean marginal bone loss that has taken place mesially and distally from baseline to 12th month was 0.84 mm mesially and 0.80 mm distally.Bone loss decreases from 3rd month to 6th month, and it further decreases from 6th month to 12th month.

## CONCLUSION

Osseointegrated dental implants are an effective alternative in the rehabilitation of partial or total edentulous patients. Both the need and increase of using treatments associated with dental implants resulted from the combined effect of several factors, such as: population aging, tooth loss related to age, anatomical consequences of edentulism, unsatisfactory performance of removable dentures, psychological aspects of tooth loss, and advantages of implant-supported dentures. However, implants placement can be limited due to situations of either reduced bone height or presence of anatomical structures, such as the extensive maxillary sinus pneumatization and mandibular canal proximity to tooth sockets. Aiming to surpass these physiological and anatomical limitations, several bone grafting techniques have been proposed. Although these techniques have been well successful, they require multiple surgical procedures, showing higher postoperative sensitivity, cost, and treatment length. Short dental implant placement is a successful alternative treatment modality to bone grafting procedures.Short implants are a much less complex and less invasive treatment than placement of longer implants. They also result in the removal of less bone than with longer implants and are less invasive compared to these and therefore probably less traumatic.

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