

Esthetic Zone Rehabilitation Through Immediate Implant Placement and Guided Bone Regeneration- A Case Report

Dr. Aishwarya Joshi,¹ Dr. Bhageshwar Dhami,¹ Dr. Deepa Aryal,¹ Dr. Sagun Regmi,¹ Dr. Min Bahadur Gurung¹

¹Department of Periodontology and Oral Implantology, Kantipur Dental College and Hospital, Basundhara, Kathmandu, Nepal

ABSTRACT

Alveolar ridge deficiency presents a major challenge during dental implant placement in the maxillary anterior region, where esthetics and function are critical. Adequate peri-implant bone is essential for implant stability, long-term success, and healthy gingival contours. Guided bone regeneration (GBR) is a predictable technique used to augment deficient ridges and improve implant outcomes. This case report describes a 56-year-old female patient with Grade III mobility of the upper right maxillary lateral incisor and severe buccal bone deficiency. Immediate implant placement with horizontal ridge augmentation using GBR achieved satisfactory esthetic and functional outcomes.

Keywords: Anterior maxilla; augmentation; dental implant; esthetic outcome; guided bone regeneration.

INTRODUCTION

The evolution of dental implants has significantly enhanced the ability to restore esthetics, form and function, provided adequate residual bone is present.^{1,2} Dental implant in anterior maxilla remains challenging because of anatomical defects, tissue deficiencies, infections, trauma, and esthetic expectations which complicate treatment outcomes.³ Adequate buccal bone volume is required to prevent the occurrence of soft tissue recession.⁴ To overcome these deficiencies, bone augmentation procedures such as guided bone regeneration (GBR) are commonly used through simultaneous or staged approaches to create adequate bone volume for implant placement.³

CLINICAL CASE

A 56-year-old female reported with a chief complaint of loosening of upper front region of tooth since one year. Clinical examination revealed fair oral hygiene based on the simplified oral hygiene index (OHI-S)

(Figure 1a). The intra-oral examination in relation to 12 (according to two-digit teeth numbering system) revealed thick gingival phenotype with periodontal probe visibility (PPV) assessment, Grade III mobility, probing pocket depth (PPD) of 10 millimeter (mm) buccally (Figure 1b).

Cone Beam Computed Tomography (CBCT) analysis showed vertical bone height of 18.62 mm from nasal floor and buccolingual width of 6.41 mm and bone of D3 quality (Figure 2a). After discussing the available prosthetic alternatives, implant-supported rehabilitation was selected. Based on these findings, a 3.5 mm x 11.5 mm implant (NobelReplace® CC) was planned. Since, the buccal bone thickness was 0.6mm horizontal ridge augmentation using a guided bone regeneration (GBR) technique was planned (Figure 2b). Patient was regarded as advanced case according to Straightforward, Advanced, Complex (SAC) classification of Swiss Society of Oral Implantology (1999).

After obtaining informed consent, patient was given 500 mg of Amoxicillin, one hour before the surgery, for surgical prophylaxis. Following standard aseptic preparation, local anesthesia was administered using 2% lignocaine with 1:2,00,000 epinephrine. An atraumatic extraction was carried out and all the cortical plate was checked (Figure 3a). Using a Bard Parker blade number 15, an intrasulcular incision was

Correspondence

Dr. Aishwarya Joshi

Email: draishwaryajoshi325@gmail.com



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Figure 1a: Pre-operative frontal view.



Figure 1b: Pre-operative occlusal view.

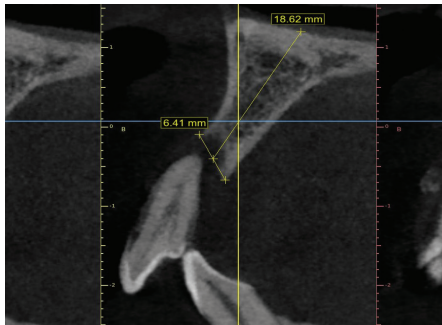


Figure 2a : Evaluation of alveolar bone support in relation to 12.

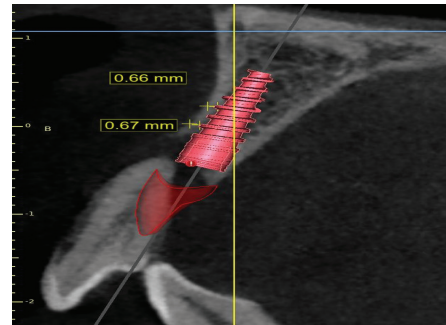


Figure 2b : Immediate implant planning showing buccal wall thickness of 0.67mm.



Figure 3a: Atraumatic extraction in relation to 12.



Figure 3b: Marginal bone dehiscence after extraction.

made from the mesial of 12 to distal of 13 followed by full-thickness mucoperiosteal flap elevation. The extraction socket revealed marginal buccal bone dehiscence (Figure 3b). Osteotomy site was prepared sequentially according to the manufacturers recommended protocol. An implant of size 3.5mm x 11.5 mm (NobelReplace® CC) was inserted (Figure 4a). The primary stability was confirmed by achieving a torque of 35 Ncm. To compensate for deficient contour and exposed implant thread of 3mm, GBR was performed simultaneously. Cortical bone perforation was carried out with round carbide bur to induce bleeding points and resorbable collagen membrane (fix-gide 25 × 25 mm) was extended 2-3mm beyond the defect. Deproteinized bovine bone mineral graft material (Geistlich Bio-Oss® 0.5g) was packed over the buccal aspect of the implant followed by healing

abutment of size 3.6 x 5mm (Figure 4b). Stabilization of the membrane was achieved using horizontal mattress sutures using 4-0 silk sutures extending from the facial periosteum to the palatal flap in passive manner (Figure 4c). Natural tooth pontic was splinted with Ribbond fiber (Figure 6a). The patient was prescribed Tablet Amoxicillin with Clavulanic acid 625 milligram (mg) three times a day (TDS) for seven days, Serratiopeptidase 10 mg six hourly for five days and Ibuprofen 400 mg for three days. The patient was examined after 10 days, healing was satisfactory, and the sutures were removed.

At four-month follow-up, the healing abutment was changed to 5 × 5 mm for soft tissue shaping. (Figure 7). CBCT after eight months revealed increase in buccal bone thickness to 2.1mm (Figure 8a). After two

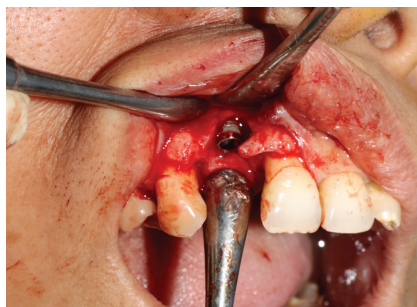


Figure 4a: 3.5 x 11.5mm implant inserted.



Figure 4b: Xenograft and collagen membrane.



Figure 4c : Horizontal mattress 3-0 silk suture placed.

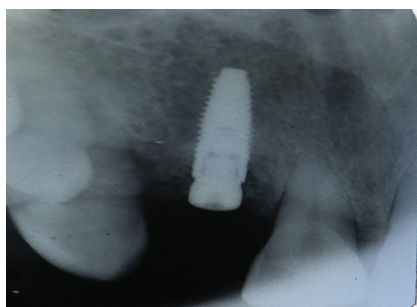


Figure 5: Post-operative intraoral periapical radiograph.



Figure 6: Natural tooth pontic splinted with ribbon fiber.



Figure 7: Four months follow-up.

weeks of soft tissue maturation, an impression was made using polyvinyl siloxane putty and light-body materials with an open-tray technique (Figure 8b, 8c). The definitive restoration consisted of a multilayered zirconia crown with pink porcelain in cervical region fabricated by the dental laboratory.

The final crown was cemented onto the implant

abutment using resin-modified glass ionomer cement (Figure 9a). Occlusion was adjusted to eliminate premature contacts. A postoperative intraoral periapical radiograph confirmed satisfactory seating of the restoration and implant integration (Figure 9b). Patient was advised to maintain oral hygiene by brushing twice daily with modified bass technique and was kept on regular follow up visits.

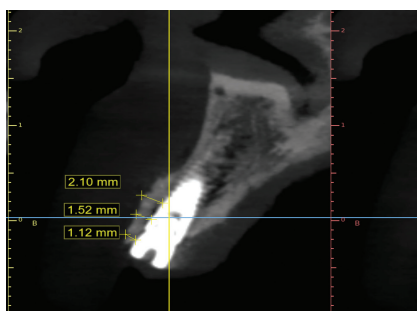


Figure 8a: Increased buccal bone thickness on eight months post-operatively.



Figure 8b: Peri-implant mucosa at eight months.



Figure 8c: Open tray impression coping.



Figure 9a: Final zirconia prosthesis

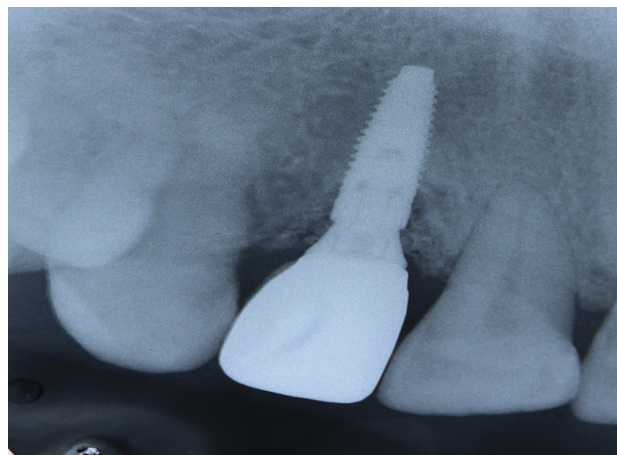


Figure 9b: Intra-oral periapical radiograph showing final prosthesis.

DISCUSSION

Bone regeneration has been performed either to increase alveolar ridge volume before implant placement or simultaneously with implant placement to support prosthetically driven rehabilitation.^{5,6} Jung et al. reported survival rates of 91.9%–92.6% for implants placed simultaneously with GBR using resorbable or non-resorbable membranes, demonstrating it as a safe and predictable procedure.⁷

Studies by Jan Lindhe and coworkers in beagle dogs observed rapid resorption of the buccal bone wall with vertical bone loss greater than 2 mm after extraction. Thin buccal bone wall, mainly composed of bundle bone, was believed to resorb due to avascular necrosis after extraction.⁸ This histological observation was confirmed in a clinical study using the CBCT technique. In addition, according to 4th International Team of Implantology (ITI) Consensus

Conference in 2013, sites with a thin buccal bone wall (<1 mm) demonstrated a median vertical bone reduction of 7.4 mm after 8 weeks of healing, whereas sites with a thick buccal wall (≥ 1 mm) had only 1.1 mm.^{9,10}

In the present case, simultaneous GBR approach was chosen due to buccal bone thickness being less than 1 mm and multilayered zirconia implant crown with pink porcelain in cervical region was used to replace missing gingival tissues and achieve a natural esthetic outcome. Although this is a well-established prosthetic solution, need for pink porcelain may potentially have been reduced or avoided with ideal implant positioning, ridge preservation, or soft-tissue augmentation, depending on the extent of tissue deficiency.

Conflict of interest: None

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