

Rehabilitation of a Maxillary Lateral Incisor using Osseodensification and Guided Bone Regeneration

Dr. Min Bahadur Gurung,¹ Dr. Bhageshwar Dhama,¹ Dr. Sumiran Joshi,¹

Dr. Deepa Aryal,¹ Dr. Srishti Poudel²

¹Department of Periodontology and Oral Implantology, Kantipur Dental College Teaching Hospital and Research Centre, Basundhara, Kathmandu, Nepal;

²Belladent Dental Clinic and Implant Centre, Lagankhel, Lalitpur, Nepal.

ABSTRACT

Rehabilitation of a single anterior tooth with a dental implant requires careful management of both aesthetic and functional demands. This case report presents the implant placement of a maxillary left lateral incisor using osseodensification and guided bone regeneration techniques. A 22-year-old female with a seven-month history of tooth loss was treated with a 3.5 mm × 10 mm implant following osteotomy site preparation with Densah burs and augmentation using xenograft and collagen membrane. Six months post-operatively, satisfactory soft-tissue healing and implant stability were achieved and was followed by placement of a zirconia crown, resulting in excellent aesthetic and functional outcomes.

Keywords: Dental implant; guided bone regeneration; osseodensification; zirconia crown.

INTRODUCTION

Implant placement in post-extraction sites of single teeth in the aesthetic zone has been a topic of great interest in the field of implant dentistry. The placement of dental implants in the anterior maxilla is a challenge for clinicians because of patient's exacting aesthetic demands and difficult pre-existing anatomy.¹ Bone loss after tooth removal in both vertical and horizontal plane, more in horizontal plane has been evident in several studies.^{2,3} Various techniques like, guided bone regeneration (GBR)⁴ and ridge expansion via osseodensification (OD)⁵ has been implicated to enhance the availability of alveolar bone for implant placement.

CASE REPORT

A 22-year-old healthy female patient visited the Department of Periodontology and Oral Implantology, Kantipur Dental College, Basundhara, Kathmandu,

Nepal, with a chief complaint of missing tooth on the upper front region of the jaw for seven months. On examination, there was missing upper left lateral incisor (22, according to two-digit teeth numbering system) (Figure 1a, b).

Preoperative cone beam computed tomography (CBCT) measured buccolingual width of 4.5 mm in the crest and vertical height of 11 mm from the crest to the nasal floor and bone of D3 and D4 quality (150-630 HU) (Figure 2).

After explaining all the treatment options to the patient, dental implant placement was planned. So, the treatment plan included implant placement (3.5 mm x 10 mm) with osseodensification and GBR followed by a zirconia crown.

After obtaining written informed consent, the patient was given 500 mg of amoxicillin, one hour before the surgery, for surgical prophylaxis. The procedure was carried out under local anaesthesia (2% lignocaine with 1:200,000 adrenaline). A para-crestal incision slightly palatal to the alveolar crest was made from the mesial of 21 to 23 using #15 Bard Parker blade. Two vertical releasing incisions on the distal line angle of 21 and mesial line angle of 23 was made and a full-thickness mucoperiosteal flap was reflected.

Correspondence

Dr. Min Bahadur Gurung
Email: gajit112@gmail.com



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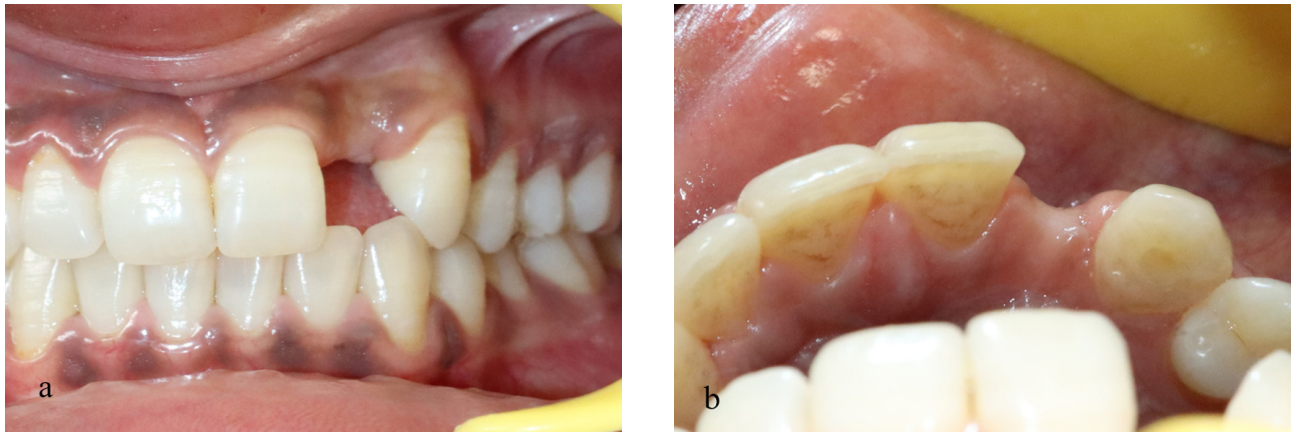


Figure 1: Preoperative clinical presentation of missing 22: (a) facial view; (b) occlusal view.

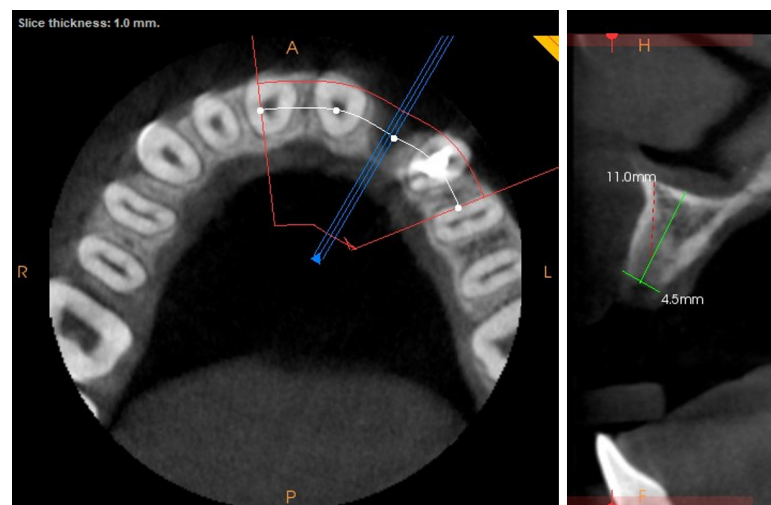


Figure 2: Preoperative cone beam computed tomography presentation of missing 22.

Buccolingual and mesiodistal width was measured with University of North Carolina (UNC) -15 probe which was 4.5 mm and 9 mm respectively (Figure 3 a, b).

At first, an osteotomy site was prepared by pilot drill at 800 rpm in clockwise direction and intraoral

periapical radiograph (IOPA) was taken to ensure the parallelism with the adjacent tooth (Figure 4). Then the sequential enlargement of osteotomy site was done using densah bur (Versah Tapered VT5 and Versah Straight VT8 series, VT1525, VS2228, and VT2535) simultaneously at 1000 rpm in counterclockwise direction, with copious irrigation of normal saline

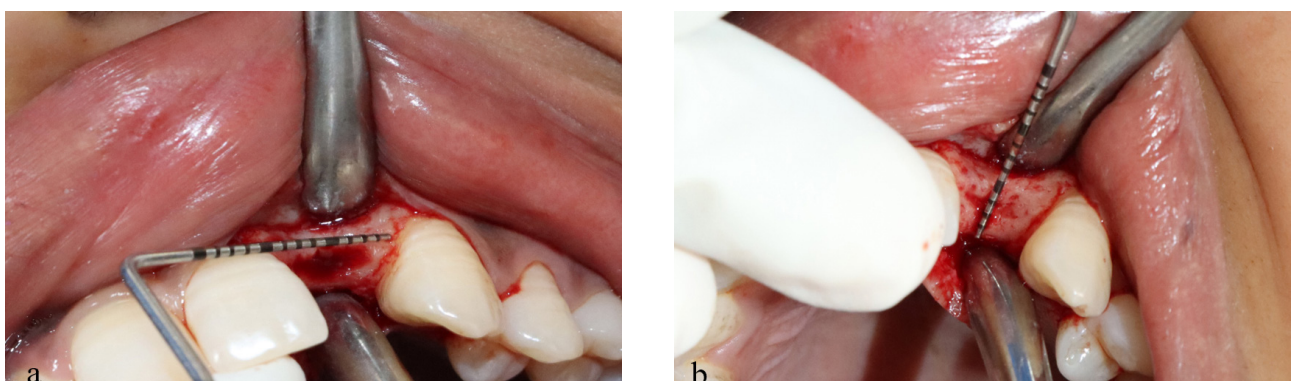


Figure 3: Clinical measurement of (a) mesiodistal distance between 21 and 23; (b) buccolingual width.



Figure 4: Intraoral periapical radiograph with precision drill to check the parallelism.

(Figure 5-a). Osteotomy site was checked for any granulation tissue and irrigated with normal saline. An implant measuring 3.5 mm x 10 mm (i-Fix) was placed with torque of 35 Ncm. The buccal bone was intact without any bony dehiscence and fenestration after implant placement (Figure 5-b). A healing abutment was placed over the implant. Using a small sized round bur, tiny cortical perforations were made on the buccal bone to induce bleeding points. Small sized Bio-Oss granules (0.25-1 mm xenografts) were placed over the perforated buccal bone with thickness of 2 mm approximately (Figure 6-a). A resorbable collagen membrane (Fix Gide) was placed

to cover the bone graft and the healing abutment and secured with horizontal mattress suture (Figure 6-b). Wound closure was done with 4-0 vicryl with multiple interrupted sutures (Figure 7-a). The IOPA was taken post-operatively (Figure 7-b). Patient was discharged with Amoxicillin and Clavulanic acid combination 625 mg eight hourly for seven days, Serratiopeptidase 10 mg six hourly for five days, Paracetamol 325 mg and Ibuprofen 400 mg combination eight hourly for three days. Patient was advised for mouth rinse with 10 ml of 0.2% Chlorhexidine twice daily for 30 seconds for two weeks. Patient was assessed after 10 days, the healing was uneventful and suture was removed.

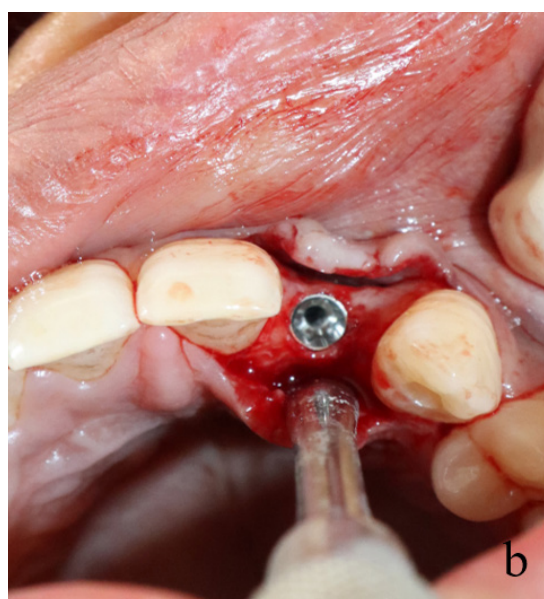


Figure 5: (a) Densah bur used for osteotomy; (b) implant in situ with intact buccal bone.



Figure 6: Guided bone regeneration done with (a) Bio-Oss xenograft placed over the decorticated buccal bone; (b) resorbable collagen membrane placed over the bone graft.

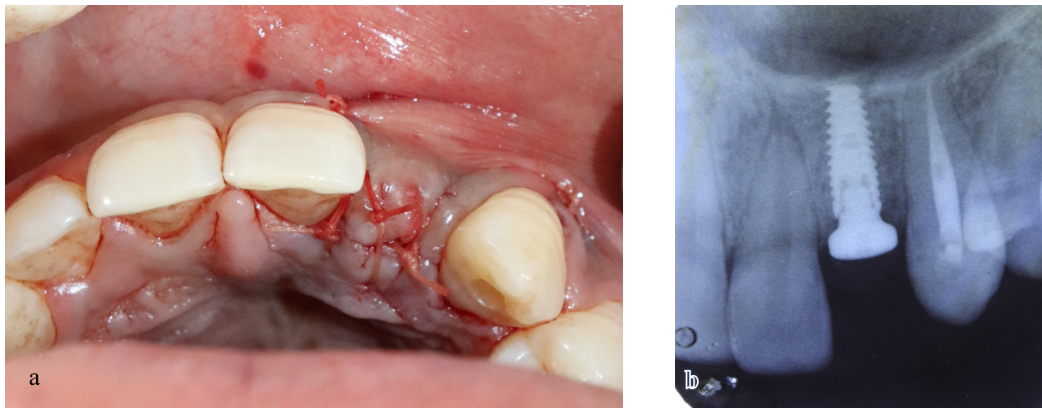


Figure 7: (a) Wound closure with 4-0 vicryl; (b) immediate post-operative intraoral periapical radiograph.

After six months, healing abutment was removed and soft tissue healing was found to be satisfactory (Figure 8-a). Impression coping was connected to the implant fixture and the final impression was made using putty and light body by a closed tray technique (Figure 8-b, c). The A2 shade selection was done, and the impression was sent to the lab for the zirconia

crown fabrication. After occlusal adjustments, the final prosthesis was cemented with dual cure resin cement. The CBCT radiograph was taken after final prosthesis (Figure 9-b, c). Patient was advised to maintain oral hygiene by brushing twice daily with modified bass technique and was kept on regular follow-up visits (Figure 10).

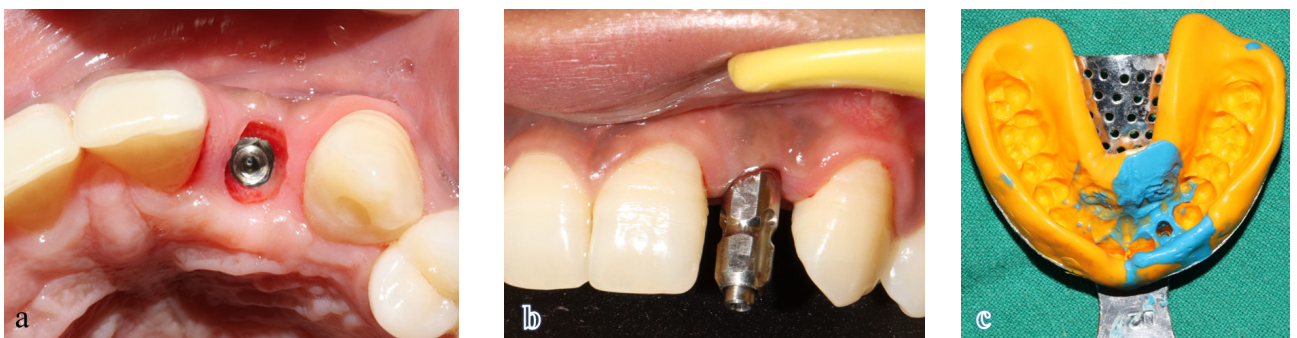


Figure 8: After six months (a) gingival cuff after removal of healing abutment; (b) impression coping attached to implant body; (c) impression taking with closed tray technique.

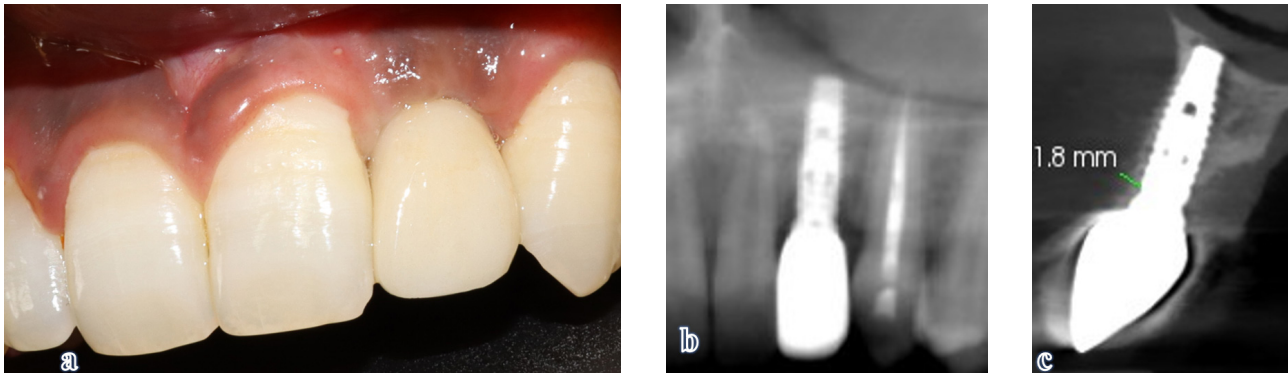


Figure 9: (a) crown placement; cone beam computed tomography (b) panorama view (c) axial view.



Figure 10: (a) Preoperative; (b) post-operative.

DISCUSSION

Successful implant rehabilitation in the anterior maxilla requires careful consideration of both functional and aesthetic outcomes. The optimal implant location and emergence profile are frequently jeopardized by post-extraction alveolar bone resorption, which is mostly in the horizontal dimension.⁶ GBR has been well-documented as a predictable technique for augmenting deficient alveolar ridges and achieving optimal hard and soft tissue contours.⁷ In the present case, osseodensification using Densah burs improved

the local bone density and primary stability by compacting bone particles laterally.⁸ The combination of osseodensification and GBR thus provided a synergistic effect preserving bone volume while compensating for buccal plate deficiency. This integrated approach allowed for successful implant osseointegration and favourable aesthetic results, consistent with previous literature emphasising the value of site preparation and contour augmentation in anterior implant therapy.¹

Conflict of interest: None.

REFERENCES

1. Buser D, Martin W, Belser UC. Optimising aesthetics for implant restorations in the anterior maxilla: Anatomic and surgical considerations. *Int J Oral Maxillofac Implants.* 2004;19 Suppl:43-61.
2. Van der Weijden F, Dell'Acqua F, Slot DE. Alveolar bone dimensional changes of post-extraction sockets in humans: A systematic review. *J Clin Periodontol.* 2009;36(12):1048-58.
3. Araújo MG, Lindhe J. Dimensional ridge alterations following tooth extraction. An experimental study in the dog. *J Clin Periodontol.* 2005;32(2):212-8.
4. Severi M, Trombelli L, Heitz-Mayfield L, Farina R, Simonelli A. Minimal invasiveness in lateral bone augmentation with simultaneous implant placement: A systematic review. *Periodontol 2000.* 2023;91(1):113-25.
5. Vorovenci A, Drafta S, Petre A. Horizontal ridge augmentation through ridge expansion via osseodensification, guided bone regeneration and ridge split: Systematic review and meta-analysis of clinical trials. *Biomed Rep.* 2024;21(4):139.
6. Tan WL, Wong TLT, Wong MCM, Lang NP. A systematic review of post-extraction alveolar hard and soft tissue dimensional changes in humans. *Clin Oral Implants Res.* 2012;23 Suppl 5:1-21.
7. Buser D, Urban I, Monje A, Kunrath MF, Dahlin C. Guided bone regeneration in implant dentistry: Basic principle, progress over 35 years, and recent research activities. *Periodontol 2000.* 2023;93(1):9-25.
8. Tushar, Ananya, Rani P, Prakash J, MB J, Jayaprakash PK. Horizontal ridge expansion: A comparative study of motorised ridge expanders versus osseodensification techniques. *Cureus.* 2024;16(11):e73875.