

Management of a Congenitally Missing Lateral Incisor with Orthodontics, Bone Grafting (a New Method) and Single-Tooth Implant: A Case Report

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Abstract

Careful treatment planning, space management, augmentation of bone and attention to the details of implant surgical and prosthetic techniques are important factors when treating anterior maxilla specially replacement of missing teeth. This case report addresses a chair-side ridge augmentation procedure using autograft bone harvested with trephine drills and placed without using screws and the fundamental considerations related to replacement of a congenitally missing lateral incisor by a team approach.

Keywords: Case report, dental implant, lateral incisor, ridge augmentation procedure.

Introduction

Implants are successfully used to replace congenitally missing lateral incisors in adolescent orthodontic patients. Successful esthetic results of dental implant placement in the esthetic zone require knowledge of various concepts and techniques, and an interdisciplinary team approach is necessary to provide the most predictable treatment outcome. This interdisciplinary approach may involve preprosthetic orthodontic treatment following consultations with an oral surgeon or periodontist and restorative dentist to ensure orthodontic alignment will facilitate the surgical, implant and restorative treatment (1).

For patients with congenitally missing lateral incisors who have over-retained primary lateral incisors or canines, keeping the primary tooth as long as possible should be considered to preserve the supporting alveolar bone for future implants (2). When planning for the placement of a single-tooth implant, the orthodontist must ensure adequate space between the crowns and roots. Both the quantity and quality of alveolar bone must be assessed before implant placement is considered. To accommodate a standard implant there should be a minimum of 10 mm of inciso-gingival bone and a minimum of 6.0 mm of facial-lingual bone (2). In cases where there is insufficient alveolar bone for implant placement, ridge augmentation may be necessary in addition to orthodontic repositioning of adjacent teeth (3). Since routine ridge augmentation techniques and materials are expensive and require a

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lengthy healing time, we presented in this case report a chair-side ridge augmentation procedure using autograft bone harvested with trephine drills and placed without using screws.

Adequate space for the implant is also required between the adjacent roots. The average dental implant fixture is 3.75 mm wide, and 1 to 2 mm of space is necessary between the fixture and the adjacent roots (3). Typically, between 6 and 8 mm of bone between the central and canine roots is recommended. Creating adequate space between the roots must be specifically addressed since the central and canine roots may be brought into closer proximity when the teeth are initially aligned orthodontically (2). To create adequate space for the implant, further orthodontic treatment may be necessary to move the roots further apart. Space for the coronal restoration must also be assessed. The average implant platform, which is 4.0 mm wide, requires a space of 1.0 mm mesially and distally between the platform and the adjacent tooth to facilitate proper healing and the development of a papilla postoperatively, thus, a minimum of 6 mm of space for the lateral crown is required (4,5). The aim of this study was to report a case in which a congenitally missed lateral incisor was treated with orthodontic interventions, bone grafting and single tooth implantation.

Case Report

This case was a 20-year-old female who had congenitally missed maxillary left lateral incisor. Her chief complaint was diastema and missing her upper left lateral.

The treatment plan was:

- Initial therapy (SRP)
- Orthodontic therapy for alignment and achievement of sufficient space.
- Surgery: Ridge augmentation and implant placement.
- Prosthesis.
- SPT (Supportive periodontal therapy).

First by orthodontic therapy the space required for implant placement was achieved.

Materials and Methods: Autogenous bone grafts are the best materials for limited ridge augmentations. They can be obtained in a number of ways and from several donor sites. In the present case report, the recipient sites were limited in size, and trephine drills (Trephine Bur Bone Harvest) (6) were used to obtain the bone graft because the tomography showed that the ridge width was insufficient for implant placement. After anesthetizing the operation site with lidocaine (Daroopaksh, Iran), a crestal incision was performed. An envelope flap was retracted using blunt dissection to limit it to the graft site with no excessive extension. The

periosteum was raised, intact and undamaged, from the bone. The flap was extended laterally to obtain enough space for the bone graft, and no vertical incision was made. We obtained bone from the internal oblique ridge area. A lingual sulcular incision was made to expose the donor site from the distal end of the first molar to the distal aspect of second (or third, if present) molar. A number 5 or 6 trephine drill was used as needed to harvest one or two pieces of bone.

Next, the donor site was sutured and compressed with damp gauze sponge. The bone blocks were placed inside the envelope flap at the recipient site. In some cases, the shape of the bone graft was adjusted to enhance its adaptation to the recipient site. Due to the limited extension of the flap and the orderly setting of the bone blocks, there was no need to use screws to secure the bone grafts in place.

The recipient site was then sutured and covered with periodontal dressing (Copack, GC, USA). From 24 h prior to the operation, patients were administered Amoxicillin (500 mg) every 6 h, and the treatment continued for 5–7 d. Chlorhexidine mouthwash (0.2% solution) was prescribed for two weeks for all of the cases. Additionally, the patients were prescribed Acetaminophen plus Codeine. After a week, the sutures were removed. Six months later, the recipient site was reopened, and the bone width was measured, and one Implant (Implantium, USA) with 3.8 mm diameter and 10 mm length was placed. Three months later, second stage surgery and aesthetic surgery for leveling of gingival margins was performed and final restoration was placed (Figs. 1-26).

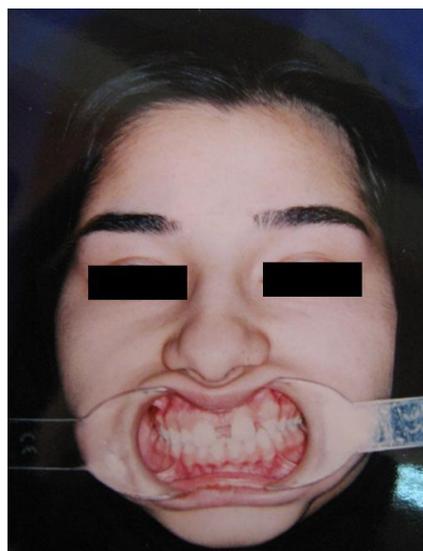


Figure 1. A 20 years old Female with missing of lateral incisor and diastema



Figure 2. Intraoral view of the patient



Figure 5. Orthodontic treatment for space management



Figure 3. Occlusal view of the patient



Figure 6. Orthodontic treatment



Figure 4. OPG of the patient



Figure 7. Orthodontic treatment

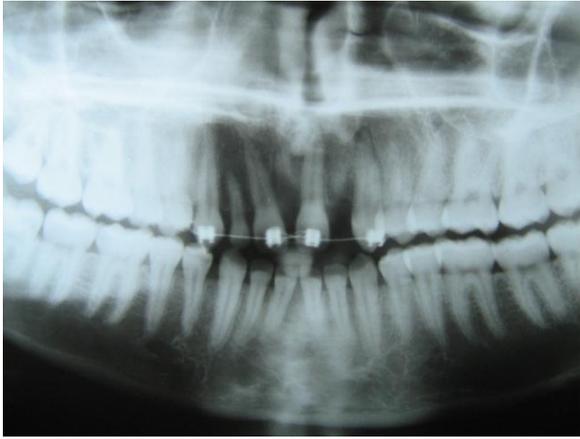


Figure 8. Orthodontic treatment



Figure 11. Donor site

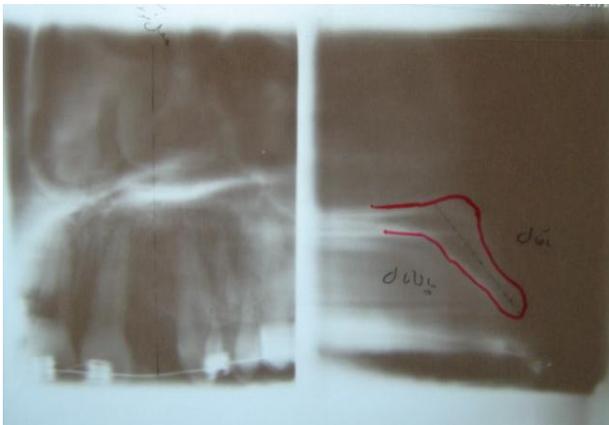


Figure 9. Tomography of the patient

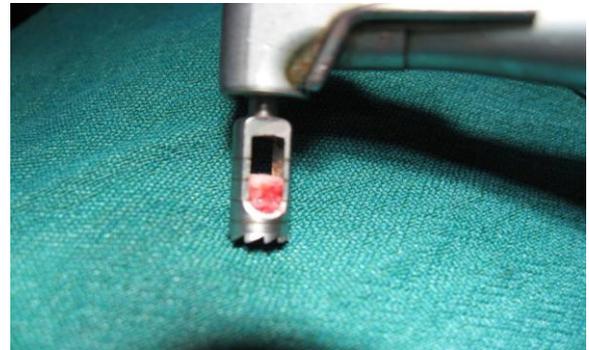


Figure 12. Trefine bone harvest

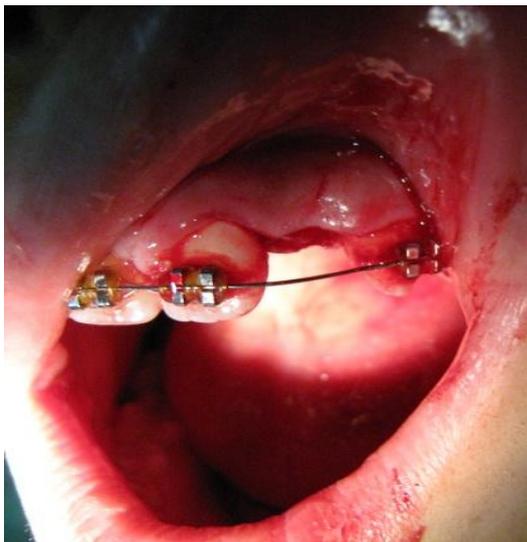


Figure 10. Envelop Flap



Figure 13. Authogenous bone



Figure 14. Recipient site after graft placement

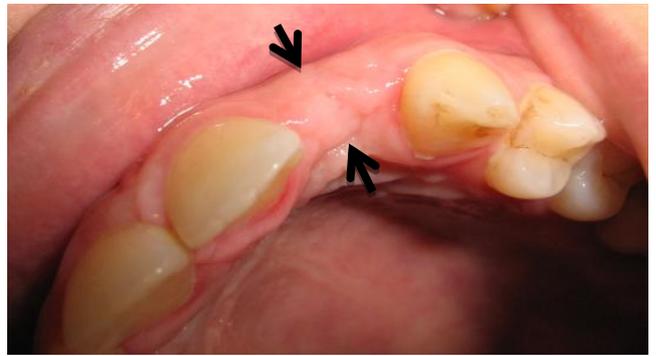


Figure 17. Healing of the recipient site after 6 month
(Continue)



Figure 15. PA radiography immediately after graft placement



Figure 18. Fixture used



Figure 19. Implant placement



Figure 16. Healing of the recipient site after 6 month



Figure 20. Gingival Former placement in second stage surgery



Figure 21. Abutment placement



Figure 24. Final Restoration



Figure 22. Abutment placement (Continue)



Figure 25. Final Restoration



Figure 23. Aesthetic surgery for leveling of gingival margins



Before



After

Figure 26. Final Restoration

Discussion

This case report was a simple method for ridge augmentation in limited edentulous areas. Titanium endosseous implants have become a successful treatment for tooth loss and have a high predictability for good prognoses. In some cases, implant placement is difficult or even impossible due to bone resorption. In such situations, the use of bone grafts, especially autogenous grafts, is an excellent solution with many advantages. However, one disadvantage of autogenous bone grafts is that they require two simultaneous surgeries.

In this study we harvested bone grafts from external oblique ridge areas. Verdugoe et al. (2009) previously evaluated different areas of the mandible as bone graft donor sites and found that the second and third molar regions could provide good bone graft pieces with a mean thickness of 2.8 ± 0.6 mm (7). We performed a simple, non-aggressive operation by designing an envelope flap limited to the edentulous area. The bone blocks that were harvested using trephine drills were placed into the envelope, and there was no need to secure the bone pieces.

In routine procedures, the recipient site is decorticated to enhance the blood supply. Using our method, the recipient site was not decorticated, and we believe this was unnecessary because of the small size of the blocks. If the periosteum remains undisturbed, then it can provide sufficient nutrients for the graft as a biologic membrane. In cases in which the periosteum was damaged when the flap was raised, the bone grafts were resorbed.

The advantages of this technique are its simplicity, the fact that there is no need for decortication of the recipient site, and no need for using screws. Previously, Acocella et al. (2009) used bone blocks obtained from the mandibular ramus for lateral augmentation and reported a 4 ± 0.77 mm increase in ridge width (8). Funaki et al. (2009) used distraction osteogenesis and bisection techniques to increase ridge width and reported a 2.7 mm increase for distraction and a 1.7 mm increase for bisection (9). Antal used the same method for achievement of optimal emergence profile (10).

Conclusions

Dental implants are the treatment of choice for most patients with congenitally missing laterals. An implant will preserve tooth structure and alveolar bone and provide esthetics and function. However, this case report demonstrate an acceptable increase in ridge width and this technique may be used successfully as an alternative to the current, invasive augmentation methods. Furthermore, successful restorative treatment involving implants depends on interdisciplinary

treatment planning, preprosthetic orthodontic tooth alignment for achievement sufficient space, bone grafting for augmentation ridge width and implant surgery and prosthesis.

Acknowledgment

The authors declare that they have no conflict of interest.

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