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IP International Journal of Periodontology and Implantology

Journal homepage: https://www.ijpi.in/

Case Report

Desirable outcome after bone grafting and implants in atropic anterior maxilla with reverse architecture

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ARTICLE INFO

Article history:
Received 05-02-2024
Accepted 25-03-2024
Available online 01-05-2024

Keywords:
Bone graft
Prosthesis

ABSTRACT

A significant advancement in dentistry has been made with the successful use of implants to replace missing teeth. Bone volume is frequently deficient in the anterior maxilla, and either the quality and quantity of accessible bone is frequently varying. But nowadays, implants are also being inserted in sites where ridge deficiency vary dimensions. For placing implants in deficient ridges, the surgical specialist has a variety of treatment options thanks to the numerous reconstruction techniques involving bone graft, guided bone regeneration, orthognathic surgery, or bone distraction. Almost every complicated situation involving jaws deficient bone can be effectively treated with these methods if performed appropriately. This case discusses the sequential steps taken in a situation where the anteriors were missing and replaced by implant with placement of bone graft.

1. Introduction

Tooth loss can occur due to variety of causes.[1] Some of main causes of loose teeth are dental caries, periodontal disease[2,3] and trauma. Trauma is an additional factor which could contribute to missing teeth in the anterior maxilla due to its larger anatomical projection and susceptibility to this form of injury. Gingiva and alveolus are lost due to minor trauma. Large-scale loss of both vertical and horizontal bone may occur after major trauma.[4] It is difficult to restore anterior maxillary teeth that are missing due to the aesthetic shortcoming brought on by tooth loss and the slow resorption of alveolar bone, which exacerbates the aesthetic problem.[5]

The immediate functional and structural connection that exists between the surface of a load-bearing implant and its structured reside bone is known as osseointegration.[6] Permit osseointegrated dental implants to be employed in the replacement of eliminated anterior teeth because of their outstanding predictability.

Complete osseous implant covering with bone was necessary for successful outcomes. Insufficient bone volume can be met by augmenting the local lack of the alveolar ridge with bone grafts.

A variety of surgical techniques are available to generate sufficient bone volume, including autogenous bone grafts, which simply involve grafting, interpositional bone grafts, directed bone regeneration, and combinations of these

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https://doi.org/10.18231/j.ijpi.2024.011

techniques.[7,8]

The mucosal contour may cover the actual alveolar ridge dimension, making it difficult to determine the degree of bone deficiency. However, CBCT, Denta Scan, and ridge mapping can all be useful.

In this case, a bone grafting using particulated hydroxyapatite was used to cover exposed implant Swiss implant threads and provide a well-defined labial bone contour for enhanced aesthetics. Soft tissue management is another pre-request for this case in order to get the best outcome possible for aesthetic and functional enhancement.

2. Case Report

A 18 years male patient reported, reported to clinic for treatment of his missing front teeth. He lost his anteriors 8 years back in a road accident and had been using removable partial denture since then. The patient was in good health with non-contributory medical history, good oral hygiene and a strong desire to restore the area with a permanent fixed prosthesis. [Figure 1]

Figure 1: Preoperative labial view

Clinical and radiographic examination revealed severe vertical ridge resorption in maxillary anterior region with highest resorption in incisor region, leading to reversal of architecture. Decrease in horizontal width of alveolar ridge was evident in incisor region. [Figure 2] The amount of bone available was inadequate for implant supported bridge. Hence, vertical and horizontal alveolar bone augmentation with simultaneous placement of Implant Swiss implants in 12,21,22 was planned. For horizontal bone augmentation, Geistlich Bio-Oss® and CREOS^{TM}membrane was planned.

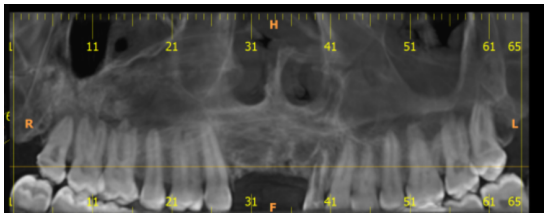

Figure 2: CBCT

2.1. Surgical procedure

The surgical procedure was performed in sterile surgical field. Preoperative decontamination of oral cavity with chlorhexidine 0.2% mouth rinse for 1 min and perioral skin disinfection with 5% povidone-iodine solution was done. Site was anesthetized using 2% Lidocaine with 1:80000 adrenaline. [Figure 3]

Figure 3: Administration of local anaesthesia

Horizontal incision on the alveolar crest and two vertical releasing incisions were given and a full thickness flap was reflected. A knife edge type ridge was seen on reflection of flap [Figure 4A-C].

Figure 4: A,B,C: Flap reflection

Tooth extraction was done w.r.t 22. [Figure 5A] Blood was collected for harvesting bone chips. [Figure 5B]

Figure 5: A,B:Tooth extraction followed by blood collection for harvesting bone chips

Meanwhile, 3 Implant Swiss implant were placed in 12,21,22 of size 4.3 X 14 ,3.7 X 12 ,3.3 X 14 to restore that segment with fixed prosthesis. More than 30 NCM Insertion torques was achieved.ISQ was also in desired rang. After implant placement bone saucerization was done.[Figure 6]

The implant was placed within bordering sidewalls of defect (within the osseous envelope) to maintain adequate space for graft. The gap distance from the implant surface to

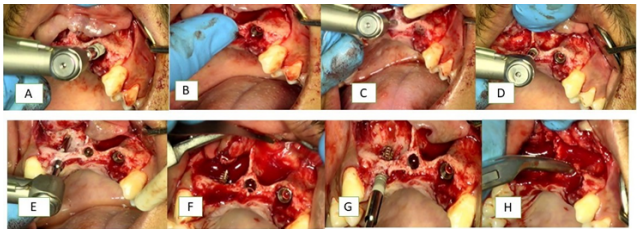

Figure 6: Implant placement

the buccal bone plate should be at least 2 mm. Autologous bone chips were harvested using a trephine drill from the retromolar area and were placed onto the implant surface. Geistlich Bio-Oss® was mixed with blood and applied onto the bone chips to prevent primary resorption of the autologous bone. The regenerated hard tissue provided the basis for stable soft tissue architecture. [Figure 7]

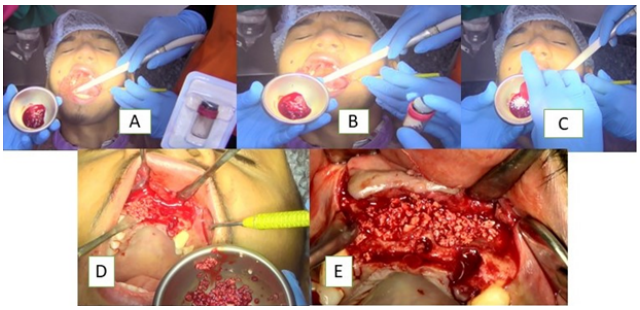

Figure 7: Autologous bone chips placement

The augmented area was covered with the CREOS^{TM}membrane to provide stable protection for bone regeneration.In order to guarantee a tension-free closure the flap was mobilized by a split-flap technique.[Figure 8]

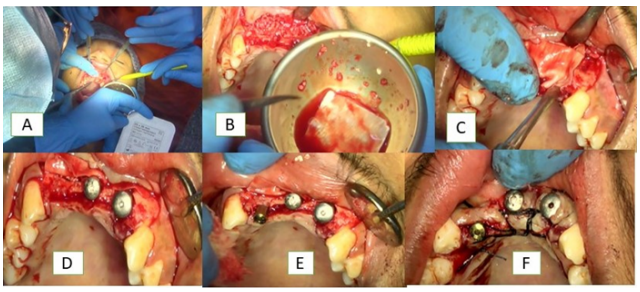

Figure 8: Membrane and suture placement

Medicine were prescribe for 5 days. After 7 days patient was recalled for suture removal.

Impression was taken for fabrication of RPD.Post-surgical and Oral hygiene instructions were given to the patient. Patient was recalled after 4 months for prosthetic procedures and adequate amount of interdental papilla and the buccal contours were observed similar to the adjacent tooth, the abutment was removed and an impression coping placed, followed by a digital impression. The impression coping was removed and abutment was replaced.[Figure 9A,B]

Figure 9: A,B: Abutment placement

Digital impression was taken as an alternative to a conventional, rubber-based technique, a angulated stock abutment was attached to the implant after removal of the provisional crown. With a digital scanner capturing the position of the scan body, a digital file was created, facilitating CAD/CAM fabrication of a custom zirconia abutment.

The final crown, porcelain pressed to an all-zirconia core was seated on the final abutment. Then the final crown was cemented onto the custom abutment. Excess cement was removed and the occlusion was again verified.[Figure 10 A-C]

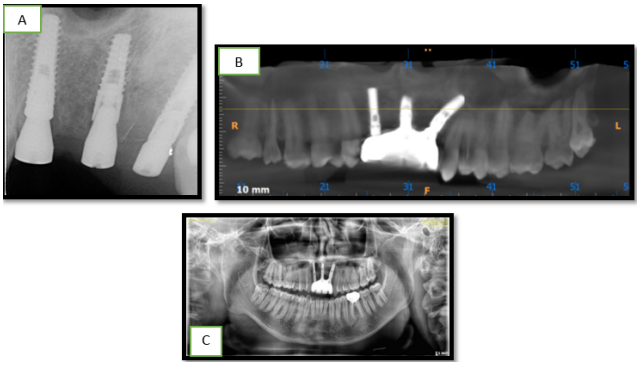

Figure 10: A-C: Post operative x-ray and CBCT

After 7 days, patient was recalled for follow up. The patient was very happy with the final aesthetic and functional outcome. [Figure 11A,B]

Figure 11: A,B: Follow -up

Comparison of bone defect before and after graft placement was done [Figure 12]

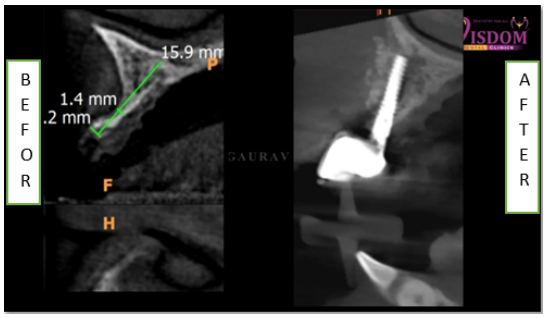

Figure 12: Before and after comparison of bone defect

3. Discussion

Many people's oral health and quality of life can be enhanced by endosseous dental implants, an effective way of tooth replacement. The success and survival rate of dental implants inserted in the front maxilla are nearly identical to those in other jaw segments, according to many studies carried out by numerous researchers.[9] But frequently, there is not enough bone to accept and support implants. Trauma, periodontal disease, endodontic infection, post-extraction ridge abnormalities, usage atrophy, etc., can all cause this.[10]

In order to successfully place an implant in a planned site, there needed to be enough bone volume and density for the implant of the right size to be positioned in the desired orientation. When used in conjunction with endosseous dental implants, bone graft placement reduces treatment duration without impacting success rates.[11] Numerous studies have been conducted on the crucial interaction between the graft and the surrounding host bone.[12] The amount of bone grafting required for implant insertion ranges from conditions involving localized deficiency to those requiring complete arch form and/or jaw relationship modification. In order to achieve sufficient bone volume, augmentation can be achieved through the use of autogenous bone grafts, including onlay grafts,[13,14] interpositional bone grafts,[15] guided bone regeneration (GBR)[16,17], or combinations of these procedures. The following clinical scenarios, which can be built together using these grafting materials, can be applied.[18–21]

1. Regeneration of periodontal bone and furcation defects.
2. Osseous defect regeneration.
3. Regeneration of extraction sockets
4. Regeneration of gaps around block grafts
5. Horizontal alveolar crest augmentation
6. Sinus augmentation

For the purpose of properly placing dental implants, guide bone regeneration is used to construct bone deficiencies using dependable procedures for the regeneration of sufficient bone volume. These might be done concurrently by using a phased method or implant placement. The outcome of the therapy will be influenced by the use of a certain dental implant with a particular body design and surface characteristic.[22]

The gingival shape that encircles the prosthesis is known gingival contour.[23,24] Preservation of the gingival edge and the interdental papilla, which are symmetrical with the surrounding gingival architecture.[25,26] In planned restoration, an interproximal bone crest of 5 mm at the estimated site of contact is necessary to achieve the aesthetic goal of interdental papilla, which is to completely fill the area between teeth or implants.[27,28]

Implant placement in three dimensions is required to achieve an ideal emergence profile.[29] Implant mesiodistally placing necessitated 1.5 mm of gap between implant and neighbouring teeth or in the space between implants.[30] The placement of the labio-papillae is also crucial; a labillay that is too much forward might cause recession because the buccal bone becomes thinner and over contour the crown.[31] However, ridge lap caused by palatal positioning restricts the sort of design that can be used and makes maintenance more difficult.[32,33]

The third location is apicoronal, and if the implant is positioned too far apically, bone resorption occurs gingival resection. Conversely, in cases where coronal placement is used, implant shoulder visibility may compromise aesthetics. For best implant aesthetics, the implant should be positioned 1.5–3.0 mm below the CEJ. Tissue training aids in the restoration of normal gingival tissue contours and interdental papillae, as well as the development of an appropriate emergence profile and natural tooth appearance.[38] Enhancing the final prosthesis' appearance by fabricating a provisional restoration first.

In this case, a bone grafting using Geistlich Bio-Oss bone chips and CREOS^{TM}membrane membrane exposed with implant Swiss implant threads and provide a well-defined labial bone contour for enhanced aesthetics. Soft tissue management is another pre-request for this case in order to get the best outcome possible for aesthetic and functional enhancement.

4. Conclusion

Combination of Geistlich Bio-Oss bone chips CREOS^{TM}membrane for horizontal and vertical augmentation with simultaneous placement of implants resulted in better functional and aesthetic restorations.

5. Source of Funding

None.

6. Conflict of Interest

None.

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Cite this article: Gupta G, Gupta DK, Gupta P, Chandra N, Sankhla D, Gupta R. Desirable outcome after bone grafting and implants in atropic anterior maxilla with reverse architecture. *IP Int J Periodontol Implantol* 2024;9(1):51-55.