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Optimizing Aesthetic Outcomes in the Maxillary Region: A Case Report on the Role of Autogenous Bone and Connective Tissue Grafts

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Abstract
Achieving optimal aesthetic outcomes in the maxillary region can be challenging, particularly when addressing horizontal alveolar ridge defects and peri-implant soft tissue deficiencies. These deformities may result from various factors, such as tooth loss due to extraction, advanced periodontal disease, or trauma. Dehiscence and fenestration defects can also contribute to these challenges. Implant placement in alveolar deficiencies may lead to adverse angulations, mechanical overload and compromised esthetic and functional outcomes of the dental prosthesis. As a result, augmentation of the deficient bone is often necessary to reconstruct the residual alveolar ridge, allowing for ideal implant placement. Among the available techniques, autogenous bone grafting remains the gold standard for horizontal ridge augmentation due to its osteogenic, osteoconductive, and osteoinductive properties. This method provides predictable bone regeneration, ensuring sufficient bone volume for implant placement in cases of ridge atrophy. However, the success of implant therapy in the aesthetic zone is influenced not only by bone volume but also by the quality and quantity of the peri-implant soft tissue. To address this, the use of a connective tissue graft offers a dual advantage: enhancing soft tissue thickness and contour while promoting long-term stability of the peri-implant mucosa. The aim of this report is to present a clinical approach that combines autogenous bone graft for horizontal ridge augmentation with connective tissue graft to improve soft tissue contours around dental implants in the aesthetic zone. We present a successful case of horizontal ridge augmentation in the anterior maxilla using block bone autografts harvested from the mandibular symphysis. Six months post-surgery, the implant was placed, and after a healing period of five months, the final prosthetic restoration was successfully completed.
Keywords: aesthetic, anterior, autogenous bone graft, connective tissue graft, dental implant, ridge defect

Introduction

Achieving optimal aesthetic outcomes in the anterior maxilla can be challenging, particularly when addressing horizontal alveolar ridge defects and peri-implant soft tissue deficiencies. These deformities often arise from tooth loss, periodontal disease, or trauma, leading to compromised aesthetics and function. Dehiscence and fenestration defects further complicate these challenges.(1–3) This case report presents a successful approach to restoring form and function in the anterior maxilla using a combination of autogenous bone and connective tissue grafts. By addressing both hard and soft tissue deficiencies, we aimed to achieve predictable and aesthetically pleasing results for our patient.

Case Presentation

A 28-year-old male presented to the Oral Medicine and Oral Surgery Department at Farhat Hached University Hospital with a chief complaint of a missing upper front tooth. The tooth loss was attributed to childhood trauma. Clinical and radiographic examinations, including cone beam computed tomography (CBCT), revealed significant horizontal bone loss and vestibular concavity in the anterior maxilla. (Figures 1-3)

Figure 1: Clinical examination : Vestibular view

Figure 2: Clinical examination: Occlusal view

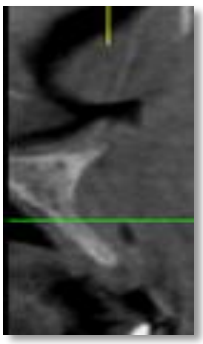

Figure 3: Radiographic examination (CBCT): Sagittal slice demonstrating vestibular concavity and horizontal bone loss

To address the significant bone deficiency, a bone graft procedure was planned, followed by implant placement and prosthetic rehabilitation. The treatment protocol involved the following steps:

Recipient Site Preparation: A full thickness mucoperiosteal flap was elevated to expose the alveolar ridge. (Figure 4)

Figure 4: Full-thickness flap reflection

Preparation of donor site: Osteotomy outlines were created using piezosurgery to prepare the recipient site for the bone graft. A block bone graft was harvested from the mandibular symphysis, combined with platelet-rich fibrin (PRF) and bone chips mixed with autologous blood. (Figures 5-7)

Figure 5: Preparation of donor site: Osteotomy outline using piezosurgery

Figure 6: Preparation of donor site: Harvesting of bone block from symphysis

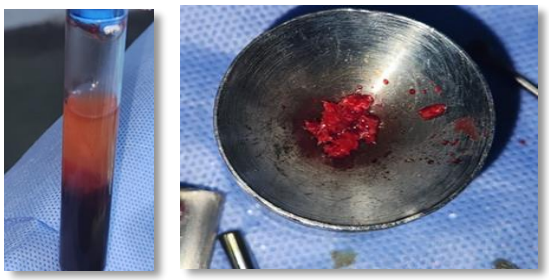

Figure 7: PRF and bone chips mixed with autologous blood

Preparation of recipient site: Graft Placement: The bone block was secured at the recipient site using osteosynthesis screws, followed by tension-free suturing. (Figures 8-9)

Figure 8: Graft Placement: Block graft fixed with osteosynthesis screws

Figure 9: Tension free sutures

Implant placement: 4 months post operative Removal of fixation screw and implant placement followed by Healing abutment placement. A CBCT after implant placement was performed and showed alveolar ridge augmentation. (Figures 10-13)

Figure 10: 4 months post operative: Removal of fixation screw

Figure 11: 4 months post operative: Implant placement

Figure 12: Healing abutment placement

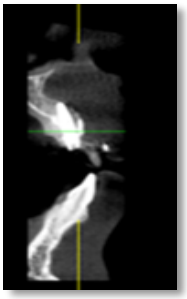

Figure 13: CBCT after implant placement

Connective Tissue Grafting: After a healing period, a tunnelization technique was used to place connective tissue grafts, optimizing the peri-implant emergence profile. (Figure 14)

Figure 14: Connective tissue graft using tunnelisation technique

Prosthetic Rehabilitation: A provisional prosthesis was utilized to refine the emergence profile, culminating in a natural aesthetic outcome. (Figures 15-16)

Figure 15: Provisional prosthesis in place: outcome

Figure 16: Emergence profile optimization with provisonal prosthesis

Outcome: Four months postoperatively, clinical and radiological evaluations revealed successful ridge augmentation and soft tissue improvement, enabling implant stability and optimal prosthetic aesthetics.

Discussion

Bone loss, often resulting from trauma, periodontal disease, or tooth extraction, necessitates grafting procedures to restore adequate bone volume for successful implant placement.(2) Bone loss in the anterior maxilla can significantly compromise the aesthetic and functional outcomes of implant-supported restorations.(4) In this case, a combination of autogenous bone grafting and connective tissue grafting was employed to successfully address a significant horizontal ridge defect. Numerous graft materials are available, including autogenous, allogeneic, xenogeneic, alloplastic, and engineered grafts.(5,6)

Autogenous bone grafts remain the gold standard for ridge augmentation due to their inherent osteogenic, osteoinductive, and osteoconductive properties, minimizing the risk of immune reactions and disease transmission. While offering several advantages, autogenous bone grafting is associated with potential donor site morbidity and limitations in harvesting large volumes. They are harvested from various sites such as the iliac crest, tibial plateau (extra-oral), mandibular symphysis, ramus, maxillary tuberosity, extraction sockets, tori, or exostoses (intra-oral).(1,2,7) In this case, the use of the mandibular symphysis as a donor site minimized morbidity while providing adequate bone volume for the reconstruction. The addition of platelet-rich fibrin (PRF) to the graft site further enhanced bone regeneration and tissue integration.(8) However, autogenous grafting is associated with potential donor site morbidity, increased surgical time, and limitations in harvesting large volumes without significant donor site deficits.(1)

Achieving optimal aesthetic outcomes requires careful consideration of peri-implant soft tissues. Enhancing soft tissue thickness and contour through techniques like connective tissue grafting is crucial to promote long-term stability and improve the aesthetic appearance of the peri-implant mucosa.(4,9,10) In this case, the tunnelization technique allowed for minimally invasive placement of connective tissue grafts, further enhancing the aesthetic outcome.

Conclusion

This case report demonstrates the successful application of autogenous bone grafting and connective tissue grafting techniques for the rehabilitation of a complex anterior maxillary defect. The combination of these techniques allowed for the restoration of both hard and soft tissue deficiencies, resulting in improved implant stability, enhanced aesthetics, and ultimately, improved patient satisfaction. While autogenous bone grafting remains the gold standard,

ongoing research and clinical experience will continue to refine techniques and explore novel approaches to optimize outcomes in challenging cases of maxillary reconstruction.

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