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Fixed Provisionalization in Atrophic Ridge Utilizing Transitional Implants: A Case Report

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ABSTRACT

Purpose: Ridge deficiencies in the edentulous alveolar ridge may be preclude ideal implant placement. To solve this problem, a variety of ridge augmentation procedures have been proposed. Regardless of the surgical modality, undisturbed healing for grafted ridges and subsequent implant placement is critical to achieving a successful result. The use of transitional implants **(TIs, Anew Narrow Body Implant, Dentatus USA Ltd, New York, NY)** before ridge augmentation allows the clinicians to a provide stable fixed temporary prosthesis throughout the treatment period, while avoiding transmucosal forces on the grafted ridge. The TIs supported provisional also maintains soft tissue architecture and ensures that the final implant is in the ideal esthetic position. Moreover, the TIs placed with immediate loading may enhance the quality of surrounding bone. The purpose of this report is to evaluate the clinical advantages of fixed provisionalization utilizing TIs for augmented alveolar ridges and replacing them with NobelReplace Tapered Groovy implants using a flapless placement procedure.

Materials and Methods: A clinical case is presented in which a patient's removable prosthesis was converted to a fixed provisional prosthesis following ridge augmentation procedure using an autogenous block bone graft. After a 4 months healing period, 2 NobelReplace Tapered Groovy implants were placed in the central incisor areas and immediately provisionalized.

Results: The TIs supported provisional was maintained throughout the ridge augmentation surgery and healing period until the permanent implants were used and loaded. The TIs also guided the permanent implant placement using a flapless protocol.

Conclusion: Transitional implants are a useful modality to support fixed provisionalization, avoid transmucosal loading during ridge augmentation and serve as guides for placement with a flapless surgical approach.

PRE-OP X-RAY

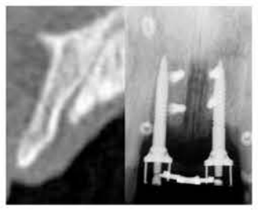

Fig 1. Before Ridge Augmentation

POST-OP X-RAY

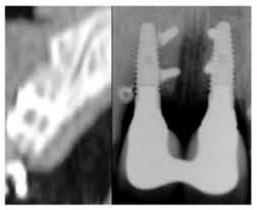

Fig 2. After Block Bone Graft

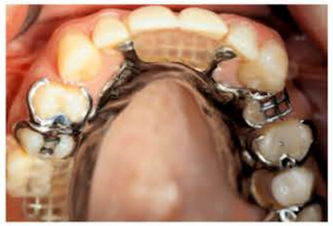

Fig 3. Removable Prosthesis before Treatment

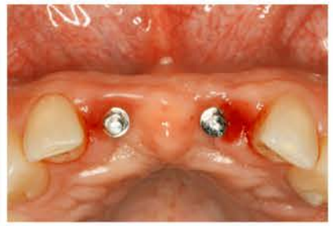

Fig 4. Placement of TIs before Block Bone Graft

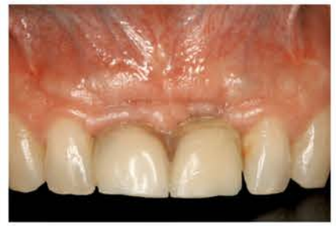

Fig 5. TIs Supported Fixed Provisional from RPD

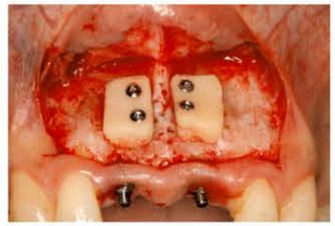

Fig 6. Autogenous Ramus Block Bone Graft

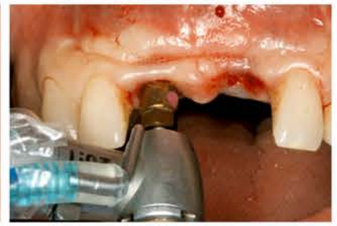

Fig 7. Placement of Nobel Replace Tapered Groovy

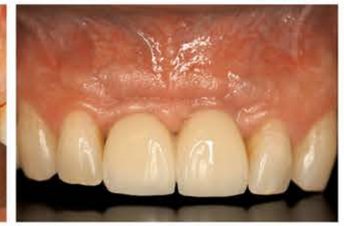

Fig 8. Final Restoration

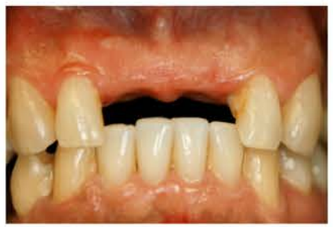

Fig 9. Undeveloped Soft Tissue before Treatment

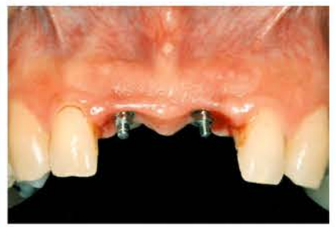

Fig 10. Soft Tissue Architecture after 2 Months of TIs

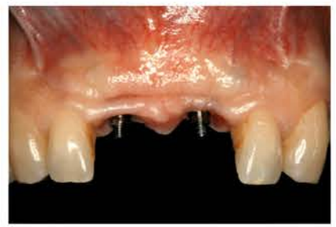

Fig 11. Soft Tissue Architecture for Block Bone Graft

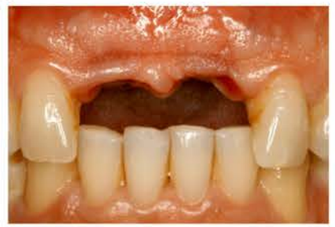

Fig 12. Soft Tissue Architecture when Removal TIs

Fig 13. Soft Tissue Architecture when Removal TIs

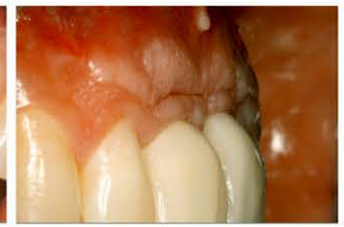

Fig 14. Aesthetic Emergence Profile

DETAILS OF THERAPY

Pre-surgical assessment

A 45 year old male patient, presented to the Ashman Department of Periodontology and Implant Dentistry, College of Dentistry, New York University with the history of trauma from an accident that occurred 30 years ago in which he lost both his upper central incisors (# 8, 9). A removable partial denture was worn to replace the two missing teeth (Fig 3). He reported that was uncomfortable with this prosthesis. He could not chew and had difficulty speaking. A full mouth examination and periapical radiographs for caries and periodontal disease were performed. Informed consent was obtained orally and in writing. The patient was informed about the alternative options for restoring this edentulous area including a removable or fixed prosthesis. An implant option was discussed and the morbidity and possible complications of the surgery were also reviewed. Impressions were taken using alginate impression material, study models made, and a radiographic guide was fabricated from an ideal wax up. The patient was then referred for computerized axial tomographic (CAT) scanning. The edentulous area was measured clinically and on the CAT scan using Simplant technology (Materialise Dental Inc, USA) (Fig 1). Computerized Axial Tomographic scan evaluation of the central incisor (#8, 9) areas showed horizontal deficiencies of bone. The width of the ridge at a distance 1mm below the crest was 2.68mm and 2.36mm on the #8 and #9 edentulous areas respectively (17). Measurements were performed using Simplant software. The ideal implant positions of Nobel Biocare implants (4x13mm) were planned on Simplant. However the implant could not be placed in the ideal esthetic position because of the bone defect present. Therefore a horizontal ridge augmentation procedure using autogenous block bone grafts were planned prior to implant placement.

Premedication

The patient was premedicated with Clindamycin 600mg 1 hr prior to surgery because of a penicillin allergy and told to take clindamycin 150mg four times a day for 7 days following surgery. The patient was placed on Chlorhexidine 0.2% (Peridex, Zila Technical) rinses twice a day for 3 weeks starting 2 days prior to surgery. Patient was instructed to avoid hard contact on the implant restoration for 3-4 months following surgery, and also advised to lightly brush and gently floss the surgical area starting 3 weeks following surgery. The patient returned 2 weeks for 2 months following surgery, then monthly for maintenance and monitoring of the area.

Surgery for transitional implant placement

The patient was anesthetized facially and lingually by infiltration utilizing lidocaine with 1:100,000 epinephrine. The potential sites for implant placement were marked after palpating the residual alveolar ridge. The implant placement was performed as a flapless procedure using the CAT scan and surgical guide. Using a 1.3mm twist drill 7, 10, 14mm laser markings, osteotomies were drilled to a depth of 14mm through the soft tissue at 1,500 revolutions per minute using copious irrigation. Using the handpiece adapter and manual driver that are contained in the surgical kit, the implants **(2.2mm x 10mm, Anew Narrow Body Implant, Dentatus USA Ltd, New York, NY)** were inserted to the desired depth at 30 revolutions per minute. A manual tactile driver was used to achieve the final insertion depth (Fig 4).

Converting the patient's interim prosthesis to a fixed prosthesis

The patient's removable prosthesis was checked for any occlusal interference using articulating paper. Resin teeth which were part of the removable denture were cut with a diamond disc. Self curing acrylic resin was then injected around the non hygroscopic resin, abutment retention screws and the prosthesis was maintained in position. After final set of the self curing resin, any excess material along with the clasps and the areas that extended into the contact points of the tooth were cut using laboratory acrylic burs (3, 12, 13). Final polishing was performed prior to insertion. The prosthesis was inserted and the occlusion was adjusted so as to avoid contact in centric and excursive movements. The patient was instructed to avoid hard contact on the implant restoration.

Autogenous Block Bone Graft from the Ramus

Two months following the transitional implant surgery, infiltration and block anesthesia using 2% lidocaine with 1:100,000 epinephrine was obtained from the lower midline to left retromolar pad on the donor site. A midcrestal incision was made on the lower left edentulous ridge and a full thickness flap was elevated. An autogenous bone block was harvested from left lower mandibular body and ramus with piezo surgical instruments (Mectron, Italy). Using an OT-7 surgical tip, the initial corticotomy was performed along the body and ramus of the mandible. These initial cuts were further extended to the cancellous part with an OP-3 surgical tip. After finishing the osteotomy, the bone block was detached from donor site using a mallet and bone chisel. The harvested bone block size was approximately 20mm in length, 7mm in height, 5mm in depth. At the recipient site, a horizontal incision was made 2mm apical to the crest of residual ridge to avoid compromising the overlying keratinized tissue. Vertical releasing incisions were made at the distal line angles of the right and left upper cuspid teeth. A full thickness mucoperiosteal flap was elevated extending to anterior nasal spine. The recipient bed was prepared using a piezo OT-1 surgical tip and decorticated with a high speed handpiece and #4 round bur for better blood supply. The harvested autogenous block bone was then cut into two equal parts and their edges were rounded. The autogenous block bone grafts were then stabilized using 2 offset stabilizing screws in each block to avoid rotational micromovement. The spaces between the block bone grafts and the recipient sites were filled with 0.25-1.0mg mineralized allogenic bone graft material (Purous, Zimmer). The grafted site was then completely covered with a resorbable membrane (Biomend Extend, Zimmer) that was stabilized using tacks and stabilizing sutures. Primary closure was achieved using 4.0 chromic gut sutures for both donor and recipient site (Fig 5). After a 4 month healing period, the patient was again referred for a CT scan to evaluate the gain in horizontal width of alveolar bone (Fig 2).

Post operative CAT scan evaluation

The post operative CT scan was evaluated using Simplant. The width of ridge at a distance 1mm below the crest was now 8.54mm and 8.72mm on #8 and #9 areas respectively (17). This represents a gain in width of 5.86mm and 6.32mm respectively (Fig 2).

Flapless Nobel Biocare implant placement

The patient was anesthetized facially and lingually by infiltration utilizing lidocaine with epinephrine 1:100,000 to obtain local anesthesia. The fixed provisional prosthesis was unscrewed and the TIs were removed using a reverse torque with a hand ratchet (Fig 6). The Nobel Biocare surgical protocol was followed to prepare the osteotomies. Two NobelReplace Tapered Groovy implants (3.5 mm x 10 mm) were placed in the # 8 and # 9 areas, from where the TIs were removed (Fig 7). The provisionals were remade using temporary abutments and the previous provisionals were relined using temporary self curing resin (Alike, GC). These provisionals were checked for any occlusal interference using articulating paper. All interferences were eliminated with carbide low speed bur in protrusive and lateral movements (12, 13).

Following immediate provisionalization

An impression for new provisionals was taken on the day of the implant surgery using medium bodied polyether hydrophilic impression material (3M, USA). New provisional restorations were fabricated and delivered 2 weeks after impression. Using the same master cast, porcelain fused to metal restorations were fabricated and the final prosthesis was delivered and cemented with temp-bond (Fig 8). The restorations were then checked for any occlusal interference both in protrusive and lateral movements.

CLINICAL SIGNIFICANCE OF TREATMENT

Implant rehabilitation in the anterior maxilla (esthetic zone) represents a challenge to the clinician (11). An esthetic implant restoration involves correct positioning of the implant with regard to the buccopalatal, coronoapical and mesiodistal directions to achieve an ideal emergence profile (10). A variety of surgical techniques have been described to enhance the bone volume both vertically and horizontally and to prepare the ridge for correct placement of oral implants. The most common methods to increase the bone volume include guided bone regeneration procedures (GBR) using allografts or xenografts with resorbable or non-resorbable membranes (19, 18), autogenous or allograft block grafts, and distraction osteogenesis. The use of osseointegrated implants together with autogenous block bone grafts was first discussed by Branemark and colleagues, and is still considered the gold standard for ridge augmentation procedures (1, 2). However strict surgical protocols and a healing period completely free of transmucosal loading are considered essential prerequisites for success. A removable prosthesis is typically fabricated as an interim restoration for these patients. This prosthesis may be less than favorable due to its lack of stability, interference with soft tissue healing and transmucosal loading. Transitional implants (TIs) were developed as method of providing fixed provisional restorations for a patient in order to avoid having them function with a removable appliance during healing (6). A fixed provisional prosthesis supported by TIs can provide the patient with improved esthetics and function during the healing period in the areas of ridge augmentation or the final implants (7, 8). Transitional implants which were maintained during the entire surgical and provisionalization phase of the treatment also helped in contouring the soft tissue (9) (Fig 9-14). According to the literature, immediately loaded implants can enhance bone quantity and quality within implant thread (14, 15). This poster presents a technique of converting the patient's removable prosthesis to a fixed interim prosthesis using transitional implants prior to block bone graft procedures (16). The TIs also served as a guide for placement of the permanent implants with a flapless surgical protocol which were immediately temporized on the day of placement.

CONCLUSIONS

The techniques available today for temporization in implant cases include removable, tooth supported and implant-retained provisional restorations (4, 5). The selection of the type of provisional prosthesis should be based on esthetic demands, functional requirements, duration and ease of fabrication. Distinct advantages and disadvantages of each approach should be evaluated in light of the specific needs of each patient. The following conclusions can be derived from this case report.

1. Transitional implant support provisionalization allows block grafts to heal without transmucosal loading while providing support for a fixed temporary restoration.

2. Comparison of pre and post operative CT scan showed that horizontal ridge augmentation can be achieved successfully using autogenous block bone graft.

3. Transitional implants for fixed provisionalization may help to develop favorable soft tissue contour and also allow the final implants to be placed by a flapless surgery in ideal esthetic position.

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