

The Use of Transitional Implant Support Fixed Partial Dentures for Improving the Outcomes of Ridge Augmentation and Implant Placement



Fig 9. Final Restoration on Final Implants

function similar to those of the definitive prosthesis. 4. Allowing the marking and transfer of jaw dimensions and measurements from the patient to the articulator in a precise and stable manner. 5. Providing a stable resting position for the implant surgical template(19).

Although the transitional implants have been used with great success, there are some limitations to their use. Excessive loading on transitional implants may result in their fracture. However with the increase in strength of the new narrow diameter implants (20), there is 60-90% of bone to implant contact (21) and with bicortical stabilization chances of fracture are very minimal. Another potential limitation is the placement of transitional implants in too close proximity to the definitive fixtures which may prevent complete integration of the implant and the surrounding hard tissues. (13)

CONCLUSION

The use of TISFD during the healing of ridge augmentation and implant osseointegration allows for undisturbed healing of the surgical site. TISFDs also help to maintain soft tissue architecture and ensure the final implants will be in the ideal esthetic position. Experience in the use of TISFD dictates a thorough diagnosis of projected permanent implant and TI position through the use of CAT-scan analysis and surgical templates. In the present study good treatment planning resulted in 100% survival of TIs, fixed provisionals and conventional implants.

REFERENCES

1. Jemt T, Lekholm U, Adell R. Osseointegrated implants in the treatment of partially edentulous patients: A preliminary study of 876 consecutively placed fixtures. *Int J Oral Maxillofac Implants* 1989;4:211-217.
2. Jemt T, Pettersson P. A 3-year follow-up study on single implant treatment. *J Dent* 1993;21:203-208.
3. Adell R, Lekholm U, Rockler B, Branemark PI. A 15-year

- study of osseointegrated implants in the treatment of the edentulous jaw. *J Oral Surg* 1981;10:387-416.
4. Lindquist LW, Carlsson GE, Jemy T. A prospective 15 year follow up study of mandibular fixed prosthesis supported by osseointegrated implants. *Clin Oral Implants Res* 1996;7:329-336.
5. Misch CM, Misch CE. The repair of localized severe ridge defects for implant placement using mandibular bone grafts. *Implant Dent* 1995;4:261-267.
6. Buser D, Dula K, Belser U. Localized ridge augmentation using guided bone regeneration I. Surgical procedure in the maxilla. *Int J Perio Rest Dent* 1993;13:29-45.
7. Buser D, Dula K, Belser U, Hirt HP, Berthold H. Localized ridge augmentation using guided bone regeneration. II. Surgical procedure in the mandible. *Int J Perio Rest Dent* 1995;15:10-29.
8. Pikos M. Alveolar ridge augmentation with ramus buccal shelf autografts and impacted third molar removal. *Dental Implantology Update* 1999;10:27-31.
9. Zinner ID, Panno FV, Pines MS, Small SA. First-Stage Fixed Provisional Restorations for Implant Prosthodontics. *J Periodontol* 1993;2:228-232.
10. Markus SJ. Interim esthetic restorations in conjunction with anterior implants. *J Prosthet Dent* 1999;82:233-236.
11. Moskowitz EM, Sheridan JJ, Celenza F Jr, Tovilo K, Munoz AM. Essix appliances. Provisional anterior prosthesis for pre and post implant patients. *New York State Dental J* 1997;63:32-35.
12. Froum SJ, Emtriaz S, Bloom M, Scolnick J, Tarnow D. The Use of Transitional Implants For Immediate Fixed Temporary Prosthesis in Cases of Implant Restorations. *Prac Periodontics Aesthet Dent* 1998;10:737-746.
13. Piattelli A, Corigliano M, Scarano A, Costigliola G, Paolantonio M. Immediate loading of titanium plasma-sprayed implants: an histologic analysis in monkeys. *J Periodontol* 1998;69:321-327.
14. Zubery Y, Bichacho N, Moses O, Tal H. Immediate loading of modular transitional implants: A histologic and histomorphometric study in dogs. *Int J Perio Rest Dent* 1999;19:341-352.
15. Jovanovic S, Spiekermann H, Richter EJ. Bone regeneration around titanium dental implants in dehiscence defect sites. *Int J Oral Maxillofac Implants* 1992;7:233-245.
16. Verardi S, Simion M. Management of the exposure of e-PTFE membranes in guided bone regeneration. *Prac Periodontics Aesthet Dent* 2007;19:111-117.
17. Pikos, MA. Atrophic Posterior Mandibular Reconstruction Utilizing Mandibular Block Autograft; Risk Management. *Int J Oral Maxillofac Implants* 2003;18:765-766.
18. Bichacho N, Landsberg C, Rohrer M, Davidovich Y. Immediate Fixed transitional Restoration in Implant Dentistry. *Prac Periodontics Aesthet Dent* 1999;11:45-51.
19. Petrungrato P. Fixed Temporization and Bone Augmented Ridge stabilization With Transitional Implants. *Prac Periodontics Aesthet Dent* 1997;9:1071-1078.
20. Froum SJ, Cho SC, Cho YS, Elian N, Tarnow D. Narrow-diameter implants: a restorative option for limited interdental space. *Int J Perio Rest Dent* 2007;27:449-455.
21. Froum SJ, Simon HH, Cho SC, Elian N, Rohrer M, Tarnow DP. Histologic evaluation of bone-implant-contact of transitional implants loaded for various time periods. *Int J Oral Maxillofac Implants* 2005;20:54-60.

The Use of Transitional Implant Support Fixed Partial Dentures for Improving the Outcomes of Ridge Augmentation and Implant Placement

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“...transitional implant supported fixed partial dentures provide uninterrupted healing at the implant site and/or bone grafted ridge...”

INTRODUCTION

Implants have been shown to be a predictable prosthetic treatment with high success rates for restoring patients who are partially (1,2) and completely edentulous (3,4).

Ridge deficiencies in the edentulous alveolar ridges may preclude ideal implant placement (5). Today, bone and soft tissue augmentation materials and techniques are available to create an appropriate implant site. Ridge augmentation procedures such as guided bone regeneration (GBR), (6,7) ridge expansion (5), and block grafts (8) may be required prior to or at the time of implant placement (5). However, undisturbed healing is critical to the success of any augmentation procedure. One method of providing undisturbed healing is utilizing fixed provisionalization during the healing period (9).

There are many types of provisionals that can be used during implant, bone or soft tissue healing. These include removable provisionals (i.e. removable partial dentures (10) or Essix appliances (11)), or fixed provisionals which include tooth supported restorations (i.e. resin bonded bridges or fixed partial dentures (9)), and implant supported restorations such as transitional implant supported fixed partial dentures (TISFD)(12).

The use of TISFD prior to ridge augmentation provides the clinician with a stable fixed interim prosthesis throughout the treatment period, while allowing undisturbed healing of the grafted alveolar ridge.

This paper reviewed 10 cases that used TISFD in

augmented alveolar ridges and discuss the clinical advantages of fixed provisionalization and the importance of undisturbed healing on the success of augmentation and implant procedures.

MATERIAL & METHODS

Clinical data was obtained from the Implant Database (ID) at the Ashman Department of Periodontology and Implant Dentistry, New York University College of Dentistry (NYUCD) Kraser Dental Center. This data set was extracted as de-identified information from the clinical information obtained from the routine treatment of patients. The ID was certified by the Office of Quality Assurance at NYUCD. This study was in compliance with the Health Insurance Portability and Accountability Act (HIPAA) requirements.

Ten patients, 3 females and 7 males with an age range of 32-73 years, received a total of 22 transitional implants supporting 10 TISFD (Anew Narrow Body Implant, Dentatus USA Ltd, New York, NY). Ridge augmentation procedures were performed on patients with ridge deficiencies using guided bone regeneration (GBR), ramus block graft (RBG) and/or allogenic block grafts (J-Blocks). After a healing period, final implants were placed. Transitional implants were removed when permanent implants received final restorations. Patients were followed for a period of 4 to 36 months post permanent implant loading. The following measurements were recorded: survival of transitional and final implants, success or failure of TISFD until final restoration delivered, success or failure of final restorations from time of initial loading to final follow-up, success or failure of ridge

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Fig 1. Removable Partial Denture



Fig 2. Buccal Ridge Deficiency

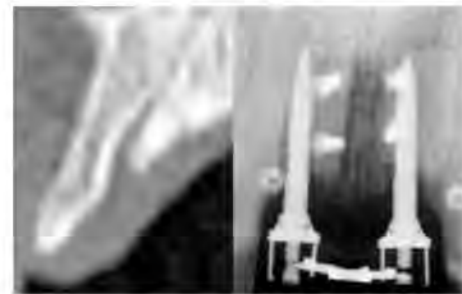


Fig 3. Narrow Alveolar Ridge



Fig 4. TISFD in Place Prior to Ridge Augmentation

augmentation procedures and patient satisfaction for esthetics and function of their TISFD.

RESULTS

There was 100% survival rate of all transitional and final implants. All fixed provisional restorations were successful throughout the treatment period. All final restorations were also successful from the time of initial loading until the final follow-up. All ridge augmentation procedures, GBR, RBG, and J-blocks were successful. All patients reported high satisfaction for esthetics and function of their TISFD (Table 1).

DISCUSSION

The healing phase of hard and soft tissue augmentation procedures requires that no pressure be placed on the grafted ridge tissues. However, when support for a removable prosthesis is being provided by the underlying soft tissue, undesired pressure may be applied to the surgical site. This may be detrimental to the final implant survival. In ridge augmentation and implant procedures sloughing or migration of graft material may occur if premature pressure is placed on the submerged implants or augmented sites(13). Moreover, a removable provisional is not always accepted by the patient due to its removable nature. Provisionals utilizing fixed partial dentures may be preferred because they eliminate transmucosal loading and are not removable. However, the adjacent teeth must be prepared for these fixed provisional restorations. To address the need for undisturbed healing, TISFDs have also been used. TISFDs provide uninterrupted healing at the implant site and/or bone grafted ridge and restore function and esthetics during the time the patient is required to wear the provisional.

In this paper, the use of TISFDs has been documented in 10 treated patients to address the issue of undisturbed graft and implant healing. Patients reported increased comfort and satisfaction with their TISFDs in comparison to removable provisionals, as illustrated in Table 2. All the bone augmentation procedures were successful regardless of the material used. The transitional implants were inserted according to the manufacturer's protocol and fitted with a non-occlusally loaded fixed acrylic provisional. In all ten patients, transitional implants were successful

and none were lost (Table 1). All final implants osseointegrated and were eventually loaded with a fixed PFM restoration, with a follow up time of 4 to 36 months (Table 3). Fixed provisionalization with transitional implants allowed time for the healing and maturation of the graft, maintaining the patient aesthetically and functionally. In a similar case report by Froum et al in 1998 they found 72 of the 78 transitional implants that were placed were successful in supporting the fixed prosthesis until loading of the final implants. Transitional implant failures were attributed to loosening that occurred within the first month(12). In a dog study Zubery reported that when transitional implants were placed and immediately loaded osseointegration of the transitional implants depended on the initial bone density at the implant site and not on whether they were loaded or not(14). Loading of transitional implants, as in a TISFD, does not affect their ability to osseointegrate and provide a basis for fixed provisionalization.

In undisturbed regenerated areas, the space created by the bone graft and membrane will allow osteoblasts to replace the bone graft with alveolar bone. Maintenance of this space is of primary importance for the success of regeneration(15). However if healing is disturbed, movement of the regeneration-membrane complex favors fibroblast proliferation which can compete with the osteoblasts for the space created by the graft material and lead to fibrous encapsulation of the materials(16). In addition, if healing is disturbed this may cause the graft to lose blood supply from the donor site and also lose its osteoconductive properties(17). Thus, for success of the ridge augmentation procedure, it is essential that the bone graft not only be immobilized but also the space must be maintained. This can only be accomplished if undisturbed healing can occur.

While there are many ways to restore function and aesthetics while the patient is healing from a graft or implant procedure, fixed provisionalization is more advantageous than removable. A fixed provisional can be either tooth born or implant supported. Fixed provisionalization favors immobilization versus a removable mucosa supported device that can cause graft displacement by chewing forces. Complications that can arise when forces impair healing include opening of the flap, necrosis and infection from a poor vascular supply, tearing of the tissues and sutures, food entrapment and compression of the graft membrane(18). These complications can cause failure and rejection of the transplant complex.

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Fig 5. Well Contoured Soft Tissue



Fig 6. Ramus Block Graft



Fig 7. TISFD Successful Throughout Treatment



Fig 8. One Week Post-op of Protected Grafted Site

There are many advantages to using TISFD in addition to allowing uninterrupted healing of the implant site and/or bone grafted ridge. These include: 1. Prevention of premature loading of

the definitive implant fixtures. 2. Elimination of the requirement for a removable appliance during the healing phase. 3. Permitting the patient to utilize a provisional restoration with form and

Case	Age, Gender	Survival of Fixed Provisional %	Previous Prosthesis	Site	Loading (Months)	Esthetics	Function
1	49, F	100	RPD	#8,9	32	+++	+
2	33, M	100	RPD	#7,8,9,12	32	+++	++
3	73, M	100	Flipper	#8,9	14.5	+++	++
4	45, M	100	RPD	#8,9	11	+++	++
5	32, M	100	RPD	#7,9	3.5	+++	++
6	86, M	100	Teeth	#7,9	24	++	++
7	54, M	100	Teeth	#8,9	6	+++	++
8	37, M	100	Teeth	#23,26	24	++	+++
9	65, F	100	Teeth	#23,26	7.5	+++	+++
10	55, F	100	Teeth	#23,26	7	+++	+++

Table 1. Results of clinical cases

	Esthetics	Function	Phonetics	Support	Comfort	Transmucosal Loading
Flipper	+	-	-	-	-	Yes
Essix	-	-	-	-	-	No
Bonded Tooth	0	0	+	+	+	No
Bonded Bridge	0	0	+	+	+	No
Tooth Supported Bridge	+	+	+	+	+	No
TISFPR	+	+	+	+	+	No

Table 2. Comparison of types of provisionalization

Case	Type of RA	Survival of Fixed Provisional %	Survival of Final Implants %
1	GBR	100	100
2	RBG, J-Block	100	100
3	RBG	100	100
4	RBG	100	100
5	None	100	100
6	None	100	100
7	None	100	100
8	RBG	100	100
9	None	100	100
10	GBR	100	100

Table 3. Results of clinical cases