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One-stage implant surgical protocol with immediate connective soft tissue graft

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Topic: Implant therapy outcomes, surgical aspects

Abstract

BACKGROUND: With the increasing popularity of one-stage dental implants in fresh sockets, came the need to create protocols specifically for single-stage surgery. This single surgical protocol shows that with proper implant positioning and immediate provisional restoration, the buccal gingival level can be maintained in association with connective tissue grafting, regardless of the initial gingival biotype, using a minimally invasive technique with virtually no need for flaps or sutures. Nevertheless, careful patient selection and treatment planning, as well as spotless execution by skillful clinicians, are required to achieve a successful result.
AIM: The aim of this report is to present a one-stage dental implant surgical protocol for highly demanding cases with the use of an immediate implant placement with connective soft tissue graft and immediate restoration. This technique optimizes implant placement and soft tissue esthetics while providing the patient with an immediate fixed restoration.
MATERIAL AND METHODS: Thirteen implants were placed in esthetically demanding sites in thirteen patients (6 women, 7 men; age range of 20 to 59 years, mean 37.7 years, non-smokers), following a one-stage approach. All implants were placed immediately after extraction. Provisional titanium (n=11) and zirconia (n=2) abutments were used, and a provisional crown immediately placed. All patients were clinically observed at 1, 2, 3, 4, 6, 12, 18, and 24 months, and photographs were made perpendicularly to the facial aspect of the teeth at abutment placement to record soft tissue changes.
RESULTS: Thirteen implants in total were evaluated to present date. Two over a period of 6 years, three over 5 years, two over 4 years, four over 3 years and two over 1 year. All implants were successfully osseointegrated and definitive restoration was placed after 4 months. For all cases, the gingival level remained stable at 24 months. Meaning, no significant soft tissue volume reduction was observed.
CONCLUSIONS AND CLINICAL IMPLICATIONS: Within the limits of this study, this protocol seems to be reliable and to allow above-average soft tissue outcomes, together with immediate patient satisfaction.


Fig. 1 - Before - Initial smile


Fig.2 - After - Final smile

Background and Aim

Single tooth replacement in the aesthetic zone is probably the most challenging procedure in implant dentistry.[1,2,3] Buccal volume loss due to bone resorption is assured, following tooth extraction.[4-11] Techniques have been developed to prevent tissue loss or minimize its occurrence [1,12-15]; but despite the use of barrier membranes or bone grafts, horizontal resorption of 13% to 25% still occurs.[4,16,17] Immediate implant placement in a fresh extraction socket fails to preserve hard tissue ridge dimensions [4-6]; but has the great advantage of shortening the recovery process, improving patient's confort.[18,19] Narrow implants were used (Ø3.3/3.5mm) to increase distance between tooth/implant, placed palatally, predicting buccal bone resorption. Marginal gaps occurring between the implant surface and socket wall may predictably heal with bone formation.[4,7-11]
The present study describes and evaluates a surgical protocol for immediate implant placement in a fresh extraction socket and a simultaneous connective tissue graft [1-3] with immediate provisional tooth replacement [1,3,20,21] in 13 patients. No bone grafts or barrier membranes were used.

Methods and Materials

Thirteen patients (6 women, 7 men) with a mean age of 38 years (range, 20 to 59 years) were included from July 2005 to August 2010 with the latest follow-up at present date. All patients were healthy and non smokers. Pre-surgical clinical and radiologic examinations (ortopantomography and intra-oral X-ray) revealed healthy conditions of the surrounding tissues.
All surgical procedures were performed under local anaesthesia (4% Articaine with epinephrine 1:100.000 Inibsa® S.A.). Preoperative antibiotics were orally administered 2 hours before surgery (Amoxicilin and Clavulanic acid 875+125 mg). Two implant systems were used (Nobel Biocare™ Brånemark System™ and AstraTech™ Osseo Speed™).
A preliminary impression was taken to register the anathomy of the failing tooth. The tooth was then carefully extracted, in an attempt to preserve bone plates, without flap reflection. Flapless implant placement helps to preserve site morphology by protecting and supporting existing hard and soft tissues while minimizing surgical trauma to the adjacent tissues.[18,22]
Implants were placed in the sockets, leaned to the palatal plate, predicting buccal bone resorption.[4, 7-11] The minimum insertion torque accepted in this protocol was 35 Nm/cm2. Implant depth was 2 to 4mm below the amelocemental junction of the adjacent teeth. A connective tissue graft originated from the palatal mucosa was placed on the buccal surface to increase volume and compensate the decrease in bone volume, using the Bilaminar Envelope Technique and sutured with a monofilament, non-absorbable 4-0 suture (Cytoplast® PTFE Suture). A provisional crown restoration was immediately placed and carefully relieved of both centric and extrusive occlusal contacts, using the preliminary impression. It has to enclose the socket to retain the blood clot. Suture is not used but to fix the connective tissue graft. The definitive impressions were taken approximately 4 months after surgery along with an intra-oral x-ray and all-ceramic crowns placed.
Non-steroidal anti-inflammatory drugs were prescribed for 3 days and antibiotic treatment was continued for 5 days postoperatively. Sutures removed 5 to 8 days after surgery. No postoperative changes were noteworthy; no infections were recorded. Monthly clinical observations were performed for the first four months and every 6 months after.

Results

No major adverse reactions or complications were observed during the period of the report. No implant or connective soft tissue graft failed after insertion, resulting in a 100% survival rate. In 3 cases, connective tissue graft was repeated due to a volume reduction. A screw-loosening was observed (n=1) in a provisional abutment and another in a definitive abutment (n=1). Two fractures of the provisional restoration occurred in the same patient. Marginal gaps between the implant surface and socket wall were confirmed to be absent as observed in the 4 months radiographic control.

Conclusions

The present study evaluated the buccal volume maintenance after tooth extraction and immediate implant replacement without any but autogenous connective graft. This technique intents to replace the lack of volume by bone resorption for soft tissue.
Conective tissue graft is stable over time [23] unlike autogenous bone grafthard that suffers resorption.[4,16,17]
Narrow implants appear to be a good option. It provides space for soft tissue between implant/ tooth [24] and socket gap is healed by new bone. (4, 7-11) Thin gingival biotypes should have a connective tissue graft proper in thickness or might as well be repeated when necessary (in this study the 3 cases repeated were fitted into this type). The immediate prostheses can act as a scaffold to support the adjacent mucosa and papilla, thus facilitating the creation and maintenance of the soft tissue profile around implants.
This one-stage approach simplifies the overall implant procedure, preserves patients' aesthetic appearance at all stages of treatment and should be considered for preservation of tissue volume and architecture.

Surgical Protocol


Fig. 3 - Non-restorable radicular fracture – Xray


Fig. 4 - Initial case - buccal view

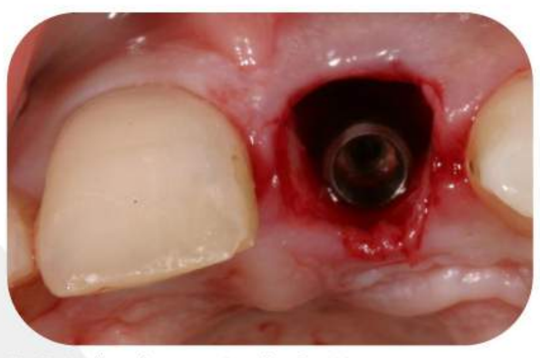
Fig. 5 - Implant placement in palatal position


Fig. 6 - Abutment conection at implant surgery – Xray


Fig. 7 - Abutment conection at implant surgery


Fig. 8 - Autogenous connective soft tissue graft separated from epithelium


Fig. 9 - Connective soft tissue graft placement using Bilaminar Envelope Technique


Fig. 10 - Soft tissue graft - buccal view with provisional crown restoration at surgery


Fig. 11 - Soft tissue graft - occlusal view with provisional crown restoration at surgery


Fig. 12 - Provisional crown fabrication at surgery


Fig. 13 - Soft tissue graft - buccal view with provisional crown restoration one week after surgery


Fig. 14 - Soft tissue graft - occlusal view with provisional crown restoration one week after surgery


Fig. 15 - Three month implant follow-up


Fig. 16 - Soft tissue contour at three month follow-up

Clinical Cases


Fig. 17 - Initial case - Non-restorable radicular fracture due to trauma


Fig. 18 - Soft tissue contour at definitive crown placement - occlusal view


Fig. 19 - Soft tissue contour at definitive crown placement - buccal view


Fig. 20 - Final case - Soft tissue contour at present date - buccal view


Fig. 21 - Initial case - Radicular perforation due to Prosthodontic failure


Fig. 22 - Soft tissue contour at definitive crown placement - occlusal view


Fig. 23 - Final case - Soft tissue contour at present date - buccal view


Fig. 24 - Final case - Soft tissue contour at present date - buccal view


Fig. 25 - Initial case - Non-restorable radicular fracture due to trauma


Fig. 26 - Soft tissue contour at definitive crown placement - occlusal view


Fig. 27 - Final case - Soft tissue contour at present date - buccal view


Fig. 28 - Soft tissue contour at present date - occlusal view

References

1. J. Y. et al. Facial gingival tissue stability after connective tissue graft with single immediate tooth replacement in the esthetic zone: consecutive case report. Journal of Oral and Maxillofacial Surgery 2009; 67(11):40-8.
2. J. Y. et al. Bilaminar subepithelial connective tissue grafts for implant placement and provisionalization in the esthetic zone. Journal of the California Dental Association 2005; 33:865.
3. J. Y. et al. Site development for anterior implant esthetics: The dentulous site. Compendium of Continuing Education in Dentistry 2001; 22:221.
4. B. Gökçen-Röhlig et al. Clinical and radiographic outcomes of implants immediately placed in fresh extraction sockets. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology & Endodontics 2010; 109(4):e1-7.
5. M. G. Araújo et al. Modeling of the buccal and lingual bone walls of fresh extraction sides following implant installation. Clinical Oral Implants Research 2006; 17:606-14.
6. M. G. Araújo et al. Tissue modelling following implant placement in fresh extraction sockets. Clinical Oral Implants Research 2006; 17:615-24.
7. D. Boticelli et al. The jumping distance revisited: an experimental study in the dog. Clinical Oral Implants Research 2003; 14:35-42.
8. D. Boticelli et al. Appositional bone formation in marginal defects at implants: an experimental study in the dog. Clinical Oral Implants Research 2003; 14:1-9.
9. D. Boticelli et al. Hard tissue alterations following immediate implant placement in extraction sides. Journal of Clinical Periodontology 2004; 31:820-8.
10. D. Boticelli et al. The influence of biomaterial on the closure of a marginal hard tissue defect adjacent to implants. An experimental study in the dog. Clinical Oral Implants Research 2004; 15:285-92.
11. D. Boticelli et al. Resolution of bone defects of varying dimensions and configuration in the marginal portion of peri-implant bone. An experimental study in the dog. Clinical Oral Implants Research 2004; 31:309-17.
12. P. S. Wohrle. Single-tooth replacement in the aesthetic zone with immediate provisionalization: Fourteen consecutive case reports. Prac Periodont Aesthet Dentisuto 1998; 10:1107.
13. U. Grunder et al. Influence of the 3-D bone-to-implant relationship on esthetics. 2005; 25:113.
14. U. Grunder. Stability of the mucosal topography around singletooth implants and adjacent teeth: 1-Year results. 2000; 20:11.
15. J. C. Hois et al. Predictable peri-implant gingival esthetics: Surgical and prosthodontic rationales. Pract Proced Aesthet Dent 2001; 13:711.
16. V. Lekovich et at. A bone regenerative approach to alveolar ridge maintenance following tooth extraction. Report of 10 cases. Journal of Periodontology 1997; 68(6):563-70.
17. J. M. Iasella et al. Ridge preservation with freeze-dried bone allograph and a collagen membrane compared to extraction alone for implant side development: a clinical and histologic study in humans. Journal of Periodontology 2003; 74(7):990-9.
18. Jeong et al. A 1-year prospective clinical study of soft tissue conditions and marginal bone changes around dental implants after flapless implant surgery. Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology & Endodontics 2011;111:41-46.
19. Sclar AG. Guidelines for flapless surgery. J Oral Maxillofac Surg 2007;65:20-32.
20. J. Y. et al. Immediate placement and provisionalization of maxillary anterior single implant: A surgical and prosthodontic rationale. Pract Periodontics Aesthet Dent 2000; 12:817.
21. D. A. Garber et al. Immediate total tooth replacement. Compendium of Continuing Education in Dentistry 2001; 22:210.
22. I. Turkyilmaz et al. Immediate implant placement and provisional crown fabrication after a minimally invasive extraction of a peg-shaped maxillary lateral incisor: a clinical report. 2009; 10(5):E073-80.
23. J. A. Shibli et al. Restoration of the Soft-tissue Margin in Single-tooth Implant in the Anterior Maxilla. Journal of Oral Implantology 2006; 6(32): 286-290.
24. J. F. Gastaldo et al. Effect of the vertical and horizontal distances between adjacent im

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