

CREATION AND PRESERVATION OF NATURAL SOFT TISSUE EMERGENCE PROFILES AROUND DENTAL IMPLANTS IN THE ESTHETIC ZONE



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ABSTRACT

The integration of restorative and cosmetic dentistry principles into the discipline of implant dentistry has allowed for esthetic implant restorations to be achieved on a more predictable basis. Incorporation of these principles into the surgical phase of implant treatment, along with adoption of more minimally invasive surgical placement and bone grafting protocols, in addition to placing an immediate provisional restoration, can simplify the implant treatment process, and increase the probability for preservation of natural soft tissue emergence profiles around implants in the esthetic zone. This article presents a conservative treatment approach to the replacement of the natural tooth system in the esthetic zone, allowing for natural soft tissue emergence profiles to be maintained and/or sculpted from the initial surgical visit, throughout the healing phase, and into the post-treatment phase of the implant process.

This article presents a conservative treatment approach to the replacement of the natural tooth system in the esthetic zone.

INTRODUCTION

CLINICAL SIGNIFICANCE

Esthetics in implantology are becoming increasingly important in the contemporary reconstructive and surgical dental practice. Preservation and/or creation of natural soft tissue emergence profiles lead to the foundations for esthetics in the final implant-supported restoration. Provisionalization at implant placement supports the preservation of these natural tissue emergence profiles.

The use of dental implants for the replacement of the natural tooth system has become widely accepted as a viable treatment option in the contemporary restorative, cosmetic, and surgical dental practice.¹⁻³ Implants' use for tooth replacement have been well documented in the dental literature, and

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they have allowed many patients to enjoy a more comfortable and fulfilling lifestyle.¹⁻³ The conventional, multistage approach to implant reconstruction has accounted for the bulk of implant placement and restorative protocols that have amassed the success rates that are routinely referred to when discussing the use of dental implants, and their long-term success. While the multistage protocol is predictable and reliable for long-term success, due to the multiple surgical procedures they usually require, soft tissue contours are often compromised and the esthetics of the final restoration can be put in jeopardy. This is a complicating factor in the esthetic zone, where the balance and symmetry of the gingival margin and emergence profile of the restoration are imperative for the esthetic result of the case.⁴ Additionally, conventional surgical protocols usually require extended healing phases and removable provisional appliances, and do not allow for parameters of the final restoration to be worked out in the provisional phase.

To address some of the concerns that exist with the conventional multistage implant approach, advancements in surgical protocols were developed that have allowed the implant surgeon to provide the patient and restorative/cosmetic dentist with an immediate provisional restoration at the surgical visit.⁵⁻⁹ The insertion of a fixed provisional at implant placement has been shown to contribute to the formation of natural soft tissue emergence profiles and contours throughout the healing phase and into the final treatment phase of the implant process.⁵⁻⁹

The foundation for these procedures must start in the treatment-planning phase. In addition to maxillary and mandibular study models being obtained, a facebow transfer is recommended to correctly align the models. Once this has been accomplished, the dental laboratory creates a diagnostic waxing of both the hard and soft tissue contours that need to be replaced/altered.¹⁰⁻¹¹ This allows for the implant team to properly plan for the dimensions of the final restoration, and its translation to a surgical visit. A surgical guide can be constructed from the waxing obtained—converted into a provisional restoration—and possess all the parameters of a surgical guide and its use in implant placement. This guide should be a duplicate of the diagnostic wax-up, and can be converted at the surgical visit into an esthetic provisional restoration.¹⁰⁻¹¹

The foundation for these procedures must start in the treatment-planning phase.

Clinical examination should include a full periodontal analysis and radiographic examination (periapical/panoramic radiographs), and a cone beam image of the planned treatment site is also recommended. Evaluation of papillary height contours,¹² interproximal heights of bone,¹³⁻¹⁴ and risk factors for peri-implant esthetics¹⁵ are contributing pieces of information that allow the implant team to properly understand, interpret, and formulate a treatment sequence that allows for the predictable management of the extraction/edentulous site.¹²⁻¹⁵

Assessment of the aforementioned information allows for the implant team to determine whether adequate amounts of alveolar structure exist to proceed with the implant placement procedure; or whether a separate bone replacement, and/or soft tissue procedure will be necessary prior to implant placement.¹²⁻¹⁵ With proper alveolar structure present to stabilize the implant fixture, and allow for the proper angulation of the implant for correct emergence profile formation to be obtained, minimally invasive surgical protocols for implant placement and bone grafting are recommended.⁹ These protocols allow for the maintenance of existing soft tissue contours, contained areas for graft placement, and less traumatic postoperative healing phases.⁹

After implant placement, selection of an appropriate provisional abutment is made. The provisional abutment should help support the pre-existing soft tissue contours, or help to sculpt and create those contours in the edentulous site, which usually has lost papillary contours and interproximal heights of bone. Retro-fitting of the surgical guide/provisional restoration completes the immediate restoration procedure. This can be done by the implant surgeon, or in conjunction with the restorative/cosmetic dentist. The provisional restoration must be properly contoured; the line angles of the provisional should allow for passive support to the facial/mesial and distal-free gingival margins. The facial emergence profile of the restoration should be balanced and symmetrical to that of the contralateral tooth to be replaced, and should be free of contact in the protrusive, centric, and lateral excursive move-

	IMPLANT SITES	IMPLANTS, NON-INTEGRATED PRIOR TO FINAL LOADING	INITIAL RATE OF SUCCESS
IMMEDIATE EXTRACTION/ IMPLANT PLACEMENT	1,636	15	99%
EDENTULOUS RIDGES	1,053	5	99.5%

Table 1: Immediate restoration procedure success rates (eight-year period).

ments (immediate non-functional load). The provisional restoration should remain in place for a three-month healing phase, at which time the provisional and abutment are removed and a fixture-level impression is obtained. Fabrication of a ceramic or zirconia abutment and final esthetic restoration complete the streamlined implant treatment process.

Table 1 shows the success rates I have observed over an eight-year period utilizing an immediate restoration protocol previously published in the dental literature.⁷⁻⁹

The following case studies demonstrate the immediate restoration procedure outlined above in an immediate extraction site and an edentulous site. Minimally invasive protocols for implant placement, bone grafting, and emergence profile formation are described, while demonstrating the blending of the surgical and restorative/cosmetic disciplines of the implant treatment process.

CASE 1

A 34-year-old, non-smoking female presented for replacement of an externally resorbing left central

incisor (Figs 1 & 2). The patient's chief concern was to preserve the natural appearance of the gingival complex, and for the final restoration to duplicate the existing left central. Due to the patient's esthetic concerns and high lip line, a fixed provisional was desirable.

After gathering the necessary preoperative information (which consisted of digital periapical radiographs, a digital panoramic radiograph, periodontal analysis with bone-sounding measurements of the right and left maxillary central incisors, and study models mounted on an articulator), a diagnostic waxing of the maxillary left central incisor was obtained. Utilizing the wax-up, a surgical guide was fabricated that would also serve as an esthetic provisional restoration, should the natural tooth shell be damaged in the removal of the tooth.

Due to the patient's esthetic requirements, it was decided to utilize the existing natural tooth shell (which had had a facial bonding procedure at some time in the past) as the esthetic provisional restoration, and retro-fit that back to the provisional abutment at the initial

surgical visit. After review of all the preoperative information, the decision was made to proceed with a minimally invasive surgical protocol to replace the left central incisor, preserving the pre-existing gingival architecture present.

After administration of an appropriate local anesthetic, an incisal edge registration was obtained across the maxillary anterior sextant with bite registration material. This registration served to index the contact points, buccal-palatal spacial alignment, incisal edge, and facial emergence profiles of the preoperative site, and would aid in the retro-fitting of the tooth shell for the esthetic provisional restoration. Following the incisal edge restoration, sounding measurements were reconfirmed prior to tooth removal. The sounding measurement was important as the depth of the collar of the implant was placed at a line drawn from the facial height of contour of bone of the contralateral tooth to be replaced.¹⁶ Therefore, the sounding measurement of 4 mm at the facial height of contour of bone at the right central incisor dictated the implant collar being placed approximately 4 mm above the facial



Figure 1: Preoperative clinical view.



Figure 2: Preoperative digital periapical radiograph.

of the free gingival margin of the left central incisor. Following confirmation of the sounding measurements, the tooth was removed by atraumatic means (Fig 3), preserving the natural soft tissue contours present. Once the tooth had been removed, debridement of the extraction socket was accomplished by mechanical (curette) and rotary instruments (coarse diamond with water irrigation) means, removing all remnants of the periodontal ligament, granulation, or infected tissues.

Evaluation of the buccal plate's integrity was accomplished utilizing a petro 1 or petro 2 elevator (Salvin Dental; Charlotte, NC). This elevator was inserted underneath the facial gingival tissue, and a full-thickness "pouch" was created over the buccal plate, or an existing dehiscence and/or fenestration. In the minimally invasive protocol, evaluation of the buccal plate must be accomplished in these means by tactile sensation, as the buccal tissues are not elevated aggressively in this technique.

The pouch is carried to the mucogingival junction, or in the case of a fenestration and/or dehiscence, 2 to 3 mm past the margin of the defect noted.

Once the dimensions of the buccal plate of bone were established, the surgical guide was placed, and initial site development was accomplished. Widening the site to receive a 3.7-mm implant preceded the placement of a 3.7 mm x 13 mm length tapered screw vent implant (Zimmer Dental; Carlsbad, CA). The implant was placed to the appropriate depth predetermined by the sounding measurements (Fig 4). Under-sizing the final drill prior to implant seating allowed for the implant to seat by self-tapping means when it was inserted, and to register a torque measurement of 30 Ncm.

Removal of the implant carrier preceded the placement of the cover screw to aid in the minimally invasive grafting procedure. Figure 5 shows the occlusal view of the implant placed into the ex-

traction socket. Note the optimal position of the implant placement in relationship to the outline of where the natural tooth root was positioned. Fabrication of the graft complex—a mineralized bone graft and cancellous chips (1- to 2-mm particle size)—was rehydrated with an activated platelet-rich plasma (PRP) solution harvested presurgically from the patient. The PRP/graft complex was then heavily condensed into the peri-implant defect from the implant surface to the mesial-buccal and distal aspects of the extraction socket (the buccal plate was intact) (Fig 6). The graft was condensed to the collar of the implant (Fig 6). The larger particle cancellous chips and heavy condensation added support to maintain the buccal dimension of the emergence profile that was to be obtained.

Removal of the cover screw preceded the insertion of a contoured abutment (Zimmer Dental) that was placed into the implant and hand-tightened, allowing for the friction-



Figure 3: Atraumatic extraction, left central incisor.



Figure 4: Minimally invasive implant placement.



Figure 5: Pregrafted peri-implant defect.



Figure 6: Minimally invasive peri-implant grafting.



Figure 7: Contour abutment placement.



Figure 8: Final contouring of the emergence profile on the immediate provisional.



Figure 9: Immediate postoperative clinical view, left central incisor.



Figure 10: Immediate postoperative protrusive management.

fit internal connection to provide for initial stability of the abutment (Fig 7). Altering a provisional coping and applying bonding agent to the acrylic coping aided in the retro-fitting process by registering the margins of the abutment.

After removing the root of the tooth from the clinical crown at the cemento-enamel junction (CEJ) and hollowing out the natural tooth shell, bonding agent was applied to the internal aspect of the crown. The crown was then filled with composite (Filtek, 3M ESPE; St. Paul, MN) and placed into the incisal edge index obtained presurgically. The crown was then placed over the coping/abutment complex, and the complex cured with a curing light. The initial alignment of the natural tooth was transferred to the implant site in this process.

The provisional complex was then removed from the abutment, placed on a lab analog, and the margins of the provisional contoured with Filtek Flow and discs (Shofu Dental; San Marcos, CA) (Fig 8). Note the facial emergence profile of the provisional, which would help to place passive pressure on the fa-

cial gingival margin and support the emergence profile in the tissue. The provisional restoration was then cemented with a strong temporary cement.

The immediate postoperative view can be seen in Figure 9. Note how the provisional restoration possesses the correct contact point relationships, and the facial emergence profile mimics that of the preoperative view in Figure 1.

Figure 10 shows the protrusive relationship. The provisional restoration is free from occlusion in the centric relation, protrusive, and right/left excursive movements.

The seven-day postoperative clinical view can be seen in Figure 11. Note the appearance of the papillary contours, and how they fill the embrasure spaces of the provisional restoration. A two-month postoperative view is shown in Figure 12. Note the natural appearance of the soft tissue emergence profile.

After a three-month healing and observation phase, the patient was referred back to the restorative clinician for construction of a zirconia abutment and all-ceramic restorations. After routine fixture-

level impressioning techniques were performed, a CAD-CAM zirconia abutment (Atlantis; Cambridge, MA) was created, followed by the laboratory fabrication of an all-ceramic restoration for the left central incisor.

Figure 13 shows the one-year post-treatment cone-beam image. Note the alveolar structures present on the facial aspect of the implant. Figure 14 shows the one-year post-treatment clinical view; and Figure 15, the one-year post-treatment periapical radiograph view. Compare Figure 14 to Figure 1, and how preservation of the interdental tissues, the facial emergence profile, and the mesial and distal line angles have allowed for an esthetic implant restoration to be obtained.

CASE 2

A 32-year-old, non-smoking female presented for treatment of an edentulous maxillary left central incisor (Figs 16 & 17). The patient had an existing resin bonded bridge that failed, and the pontic tooth temporarily bonded into place at the initial consultation visit. Esthetics were of primary concern to the patient, and

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Figure 11: Seven-day postoperative clinical view.



Figure 12: Two-month post-implant placement tissue emergence profile.



Figure 13: One-year postoperative cone beam image.



Figure 14: One-year postoperative clinical view.



Figure 15: One-year postoperative digital periapical radiograph.



Figure 16: Preoperative clinical view, left central incisor.



Figure 17: Preoperative digital periapical radiograph, edentulous site, left central incisor.



Figure 18: Creation of the planned soft tissue esthetic emergence profile.



Figure 19: Minimally invasive implant placement, left central incisor.



Figure 20: Minimally invasive peri-implant grafting, pregrafted view.



Figure 21: Minimally invasive peri-implant grafting, allogenic graft/prp complex into "pouch" created.



Figure 22: Contour abutment placement.

the cosmetic/reconstructive dentist had planned for esthetic enhancement of the adjacent teeth, as well as an esthetic implant-supported restoration at the edentulous site. After gathering the necessary preoperative information (as previously described), a diagnostic waxing was obtained for the teeth to be altered, and of the edentulous site. The diagnostic waxing, in addition to the radiographic analysis, dictated that a bone replacement procedure would be necessary at the facial of the left central incisor, in addition to implant placement, in order to allow

for the natural emergence profile of the restoration and soft tissues to be obtained.

The treatment protocol decided upon by the implant team was to treat the edentulous central incisor site by minimally invasive means, and utilize the "pouch" grafting procedure previously described to reconstruct the natural soft tissue emergence profile that had been lost from the previous tooth removal procedure. Additionally, the immediate provisionalization of the implant would allow not only for a fixed provisional option, but also

help to sculpt and maintain the desired emergence profiles.

After administration of an appropriate local anesthetic, the pontic was removed. The surgical guide/provisional system utilized by the author was then inserted, and an initial site marked in the pontic site. Following this marking, the natural emergence profile was created in the soft tissue utilizing a football-shaped diamond, mimicking the appearance as if the tooth were just removed (Fig 18). This reshaping of the gingivae aids in the reconstruction of the emergence profile of the planned



Figure 23: Provisional coping analog appearance.



Figure 24: Provisional complex after final contouring, custom staining, and marginal correction.

restoration. Additionally, by reshaping the tissue, the depth of the pontic site now has access to the crest of the ridge, allowing for evaluation of the buccal plate, and for implant placement by minimally invasive means. Utilizing a petro 2 elevator, a full-thickness elevation of the facial tissue was accomplished past the muco-gingival junction, thereby creating the “pouch” in which the graft complex would be placed. The concavity noted presurgically in the facial tissue was accentuated at this point, and would be reconstructed after implant placement.

Reinsertion of the surgical guide/provisional system allowed for appropriate site development, which was followed by the placement of a 3.7 mm by 13 mm in length tapered screw vent (Zimmer Dental) implant (Fig 19). Following the procedure previously mentioned, the collar of the implant was placed at the level of the crest of bone at the facial height of contour of the contralateral tooth. After removal of the car-

rier mechanism, reconstruction of the facial defect was accomplished. Figure 20 shows the position of the implant in relationship to the concavity of the buccal tissues. Insertion of the graft complex (as previously described) was performed into the full-thickness “pouch” created prior to implant placement (Fig 21). Note how the distal contour of the facial aspect of the grafted site resembles that of the distal aspect of the right central incisor (Fig 21).

Once the grafting was completed, removal of the cover screw preceded placement of a 341s contour abutment (Zimmer Dental), which was hand-tightened (Fig 22). A provisional coping was then roughened, bonding agent applied, and the internal aspect of the initial surgical guide/provisional restoration also roughened and bonding agent applied. This was followed by Filtek composite being placed into the provisional, and the provisional restoration being placed over the coping, which had previously been placed

over the abutment. Once the provisional complex was cured, it was removed and placed on an analog to achieve marginal integrity, and the proper management of the facial emergence profile and line angles (Fig 23). Figure 24 shows the final appearance of the custom-stained, properly contoured provisional restoration. The immediate postoperative view can be seen in Figure 25. Note the proper contact point relationships, and the management of the mesial and distal line angles. The 11-day postoperative view can be seen in Figure 26. Note how the papillary tissues have migrated to fill the interproximal spaces at this short time frame postoperatively.

After a three-month healing and observation phase, the patient was referred back to the restorative dentist for final restorations. The restorative clinician utilized a contour zirconia abutment for the final abutment, and completed full-coverage ceramic restorations on teeth #4-13. Figures 27 and 28 show the con-



Figure 25: Immediate postoperative view, left central incisor.



Figure 26: Eleven-day postoperative view.



Figure 27: Contour zirconia abutment, laboratory casts, adjacent restorations.



Figure 28: Final all-ceramic restoration on the laboratory casts.



Figure 29: Completed case, smile view.



Figure 30: Completed case, clinical view.



Figure 31: Complete case, digital periapical radiograph.



Figure 32: Completed case, cone-beam image, left central incisor.

tour zirconia abutment and adjacent restorations on the laboratory casts. The completed case clinical view of the patient's smile can be seen in Figure 29, and a close-up view of the full-coverage, all-ceramic restoration on the implant at the left central incisor can be seen in Figure 30. Figure 31 shows the completed case digital periapical view, and Figure 32 the completed case cone-beam image. The one-year postoperative view can be seen in Figure 33. Compare Figure 30 to Figure 33 and observe how the soft tissue contours have been maintained in the healing phase.

CONCLUSION

The presence of natural tissue emergence profiles around teeth and dental implants in the esthetic zone is paramount to the overall clinical success of the esthetic enhancement of the natural dentition, as well as

to tooth replacement procedures. Minimally invasive surgical protocols have been demonstrated clinically to decrease surgical trauma to both hard and soft tissue, and to allow for a more rapid healing phase to occur.

Incorporation of restorative principles into the surgical phase of implant dentistry has allowed for immediate provisionalization of dental implants to become a more simplified procedure for the implant team to accomplish, allowing the patient to have an esthetic, fixed provisional throughout the healing phase. The additional benefits of a properly contoured immediate implant provisional are as follows:

- proper contouring of the facial gingival emergence profile
- proper contact point relationships, which can lead to the

formation and maintenance of interproximal tissues

- proper contouring of the line angles of the provisional, which leads to a natural soft tissue emergence profile result.

Maintaining the soft tissue emergence profile and, subsequently, the alveolar contours, allows for a mature dento-implant-gingival complex to be established prior to the final implant restoration being seated; this is a common procedure for the alteration of the natural tooth prior to partial and full-coverage procedures.⁹ This allows for the dental laboratory to be more predictable when creating the contact points, line angles, and emergence profiles of the final restoration, as these parameters have already been worked through in the healing phase.

I have performed the procedure described above on more than 2,600



Figure 33: One-year postoperative clinical view.

sites over a period of eight years. Additional clinical studies are necessary to document and substantiate the long-term success of the procedure outlined in this article.

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References

- Adell R, Lekholm U, Rockler B, et al. A 15-year study of osseointegrated implants in the treatment of the edentulous jaw. *Int J Oral Surg* 10(6):387-416, 1981.
- Adell R, Eriksson B, Lekholm U, et al. Long-term follow-up study of osseointegrated implants in the treatment of totally edentulous jaws. *Int J Oral Maxillofac Implants* 5(4):347-359, 1990.
- Babbush CA. *Dental Implants: The Art and Science* (pp. 201-216). Philadelphia, PA: W.B. Saunders; 2001.
- Kois JC. Altering gingival levels: The restorative connections. Part 1: Biological variables. *J Esthet Dent* 6:3-9, 1994.
- Worhle PS. Single-tooth replacement in the aesthetic zone with immediate provisionalization: Fourteen consecutive case reports. *Pract Perio Aesthet Dent* 10(9):1107-1114, 1998.
- Saadoun AP, Le Gall MG. Periodontal implications in implant treatment planning for aesthetic results. *Pract Perio Aesthet Dent* 10:655-664, 1998.
- Petrungaro PS. Immediate implant placement and provisionalization in edentulous, extraction, and sinus grafted sites. *Compend Contin Educ Dent* 24(2):95-113, 2003.
- Petrungaro PS. Implant placement and provisionalization in extraction, edentulous, and sinus grafted sites: A clinical report on 1500 sites. *Compend Contin Educ Dent* 26(12):879-890, 2005.
- Petrungaro PS. An update on implant placement and provisionalization in extraction, edentulous and sinus grafted sites: A clinical report on 3200 sites over 8 years. *Compend Contin Educ Dent* 29(5):288-300, 2008.
- Petrungaro PS. Using the TempStent technique to simplify surgical stent and esthetic temporary fabrication in immediately restored implants in the aesthetic zone. *Contemp Esthet Rest Pract* 6(5)84-90, 2002.
- Petrungaro PS, Maragos C, Matheson O. Using the Master Diagnostic Model® to enhance restorative success in implant treatment. *Compend Contin Educ Dent* 21:33-42, 2000.
- Tarnow DP, Magne AW, Fletcher P. The effect from the distance from the contact point to the crest of one on the presence or absence of interproximal dental papillae. *J Periodontol* 53(12):995-996, 1992.
- Tarnow DP, Cho SC, Wallace S. The effect of inter-implant distance on the height of the inter-implant bone crest. *J Periodontol* 71(4):546-549, 2000.
- Salama H, Salama MA, Garber D, et al. The interproximal height of bone: The guidepost to predictable aesthetic strategies and soft tissue contours in anterior tooth replacement. *Pract Perio Aesthet Dent* 10(9):1131-1141, 1998.
- Kois JC. Predictable single-tooth peri-implant esthetics: Five diagnostic keys. *Compend Contin Educ Dent* 25(11), 895-905, 2004.
- Petrungaro PS. Immediate restoration of implants utilizing a flapless approach to preserve interdental tissue contours. *Pract Proced Aesthet Dent* 17(2)A-H, 2005. *AP*

