A Novel Method for Creating an Optimal Emergence Profile Adjacent to Dental Implants

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ABSTRACT

In order to establish an optimal esthetic implant result, creation of an optimal emergence profile is necessary. The purpose of this clinical report is to describe a new method for creating an emergence profile starting at the time of immediate implant placement. Clinical steps for creating the emergence profile are described from the time of implant placement to restoration.

CLINICAL SIGNIFICANCE

Prefabricated abutments that can be modified and used as healing abutments or for provisional restorations offer clinicians the opportunity to create emergence profiles during the healing phase after immediate implant treatment. This procedure eliminates the need for creation of an arbitrary emergence profile in the dental laboratory and eliminates the need for a surgical procedure prior to impression making.

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In 1989, Croll stated that one objective of restoration design is to accurately replace missing tooth structure by using a reliable anatomic model and that reproduction of the appropriate emergence profile is essential.[1] Creation of an anatomically correct emergence profile is one of the most important aspects in providing an esthetically pleasing implant-supported restoration. Osseointegration of dental implants is highly predictable, with reported survival rates around 90%.[2–4] The missing link in predictability is creation of an esthetically pleasing emergence profile. The major problems are the differences in shape and diameter between dental implants and the root shapes at the cementoenamel junction (CEJ). The former is round, whereas roots are ovoid. Complicating matters is the depth of the implant prosthetic table after implant placement. In the esthetic zone, the prosthetic table can range from 2 to 4 mm below the mucosal margin and at or slightly below the alveolar bone crest. Maintenance of this depth range allows clinicians to establish an esthetic, natural-appearing emergence profile surrounding the implant restoration. The difficulty is displacement of tissue adjacent to the implant at the time of impression making. There are numerous papers describing techniques for creating an emergence profile.[5–14] One method records the planned and proven soft tissue contours, which are then used by the dental laboratory to guide fabrication in the final prosthesis.[5] Others describe step-by-step procedures for fabricating an optimal emergence profile for the definitive restoration through modification of an impression cap.[15] To create an

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emergence profile at the second stage, soft tissue shaping may be necessary.[16] Seating of the final restoration also may require local anesthesia and displacement of tissue.

CLINICAL TECHNIQUE

Dental anatomy books were studied to verify size and shape of roots at the CEJ of maxillary bicuspids and maxillary anterior teeth.[17,18] This technique was developed in collaboration with the Neoss Implant System (Neoss Ltd, Harrogate, North Yorkshire, UK). Standard root measurements for the six maxillary anterior teeth at the CEJ were duplicated in PEEK material (poly etheretherketone), a manufactured resin.[19–22] This material is biologically acceptable, strong, and radiolucent. When fabricated into healing or provisional abutments, it easily can be reshaped and polished. Patients signed consent forms after review of the procedures, and all treatment that was rendered conformed to the Helsinki accords.[23] This report provides information on patients who received emergence profile-healing abutments.

All patients underwent a standard immediate implant protocol consisting of an oral cancer screening, medical health evaluation, comprehensive periodontal examination, panogram radiograph, an intraoral periapical film of site to be treated, study casts, and evaluation of patient expectations. Treatment plans were discussed and finalized with the patients' restorative dentists.

Patients were treated under intravenous conscious sedation and given an appropriate regional local anesthetic. Teeth were removed following a minimally invasive protocol. Flaps were not reflected. Once the teeth were removed, a curette was used to verify that the buccal plate was intact. Standard osteotomy procedures were followed according to manufacturer's suggestions. In the esthetic zone and posterior implant sites, the prosthetic table was 3 to 4 mm apical to the mucosal margin. The prosthetic table was either at or slightly apical to the crestal and interproximal bone levels. Prefabricated provisional PEEK abutments were screwed into the internal connection of the implant. The abutment-retaining screw can be interchanged with most implant systems. A diamond bur was used to contour the abutment to approximately 1 to 2 mm coronal to the mucosal margins. Figures 1A and 1B reveal PEEK abutments for maxillary central incisors. Figures 2A through 2H illustrate the procedure for a maxillary central incisor from implant placement through final restoration. Figures 3A through 3E illustrate creation of the emergence profile for a maxillary bicuspid. Provisional partials were adjusted to clear contact with the modified healing

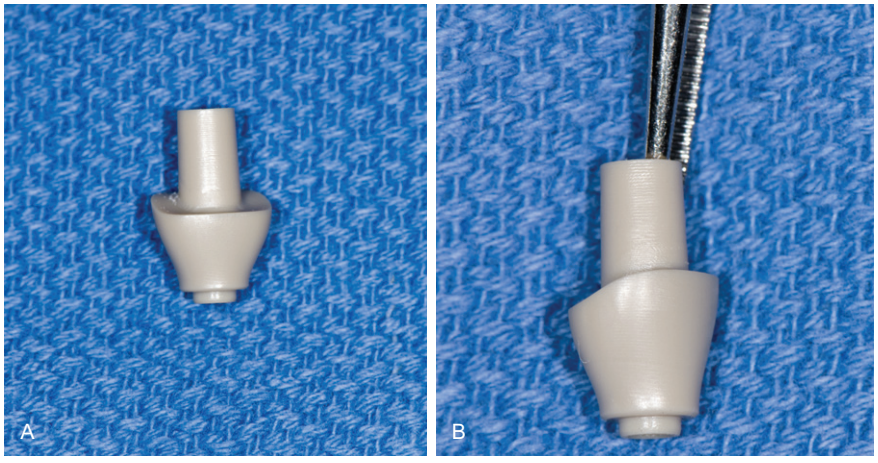

FIGURE 1. A, Facial view of emergence profile abutment. B, Lateral view of emergence profile abutment.

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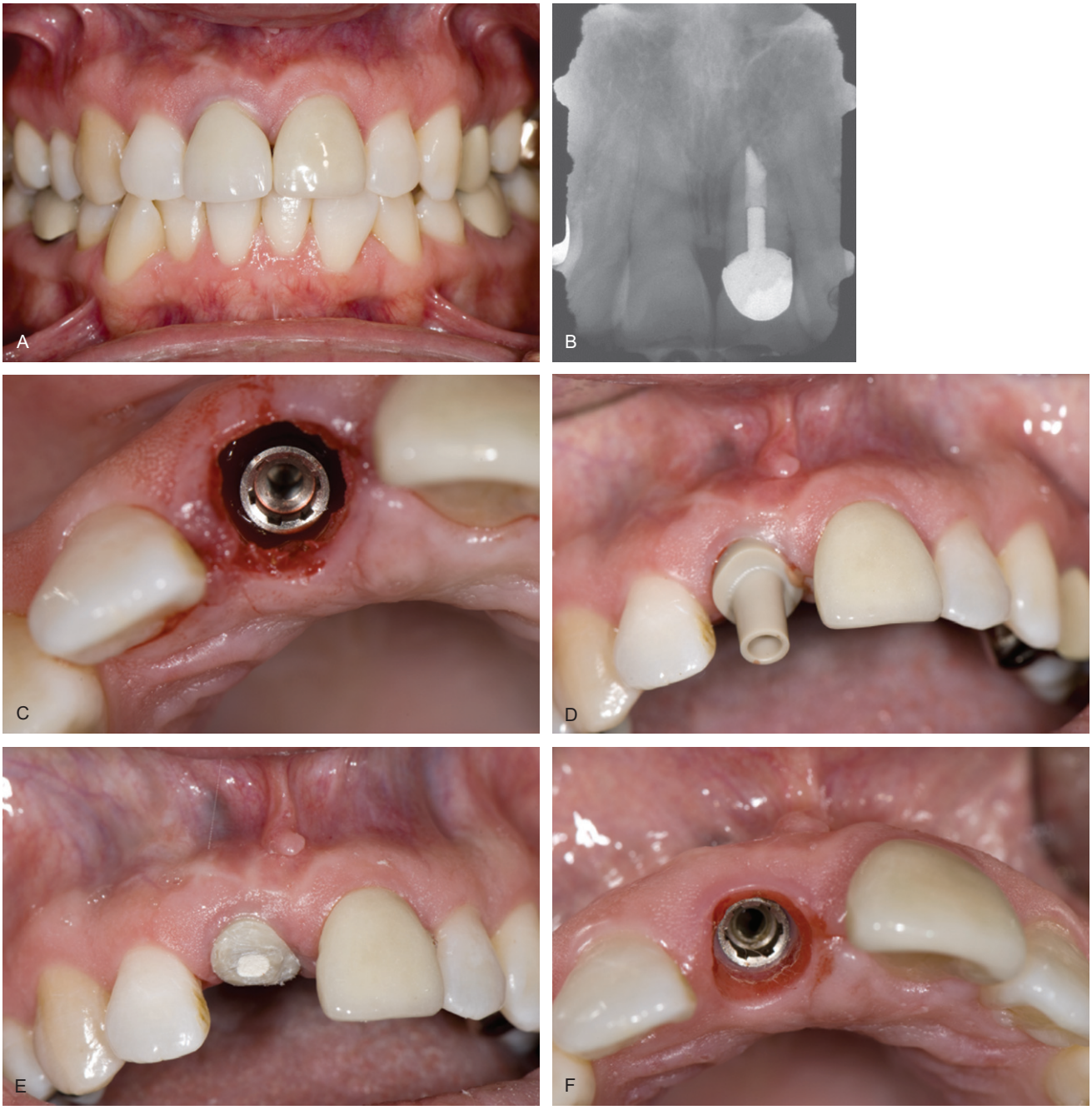

FIGURE 2. A, Preoperative view of the maxillary anterior sextant. The right maxillary central incisor has a failed restoration with inadequate tooth support for a new crown. B, Radiograph of the maxillary right central incisor. C, The maxillary right central incisor has been removed and an implant has been inserted into the prepared osteotomy. No augmentation was necessary. D, The provisional abutment has been screw retained into the implant. E, The chimney of the provisional abutment has been reduced with a diamond bur. The healing abutment is 2 mm apical to the mucosal margin. F, At 4 months, the healing abutment was removed, revealing the soft tissue emergence profile. At this time, impressions were made for a cement-retained implant restoration. (*Continued*)

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FIGURE 2. *Continued*. G, Frontal view was taken 3 years after implant restoration. H, Radiograph of restored implant restoration taken 3 years after implant restoration.

abutment. After a 3- to 4-month healing interval, a radiograph was made of the implant site, and the provisional healing abutment was removed in order to evaluate soft tissue healing and the emergence profile. Patients were appointed with their restorative dentists for construction of implant-supported restorations.

Therefore, the restorative dentist removes the provisional healing abutment and places a conventional impression coping into the implant. A final impression is made using either a stock or custom tray. The impression material adjacent to the impression coping captures the contoured tissue. After removal of the impression from the mouth, an analog is attached to the impression coping and the impression is poured in cast stone. The provisional healing abutment is replaced onto the implant and the model; occlusal records and shade are recorded and sent to the dental laboratory.

CONCLUSION

Restoration of an esthetically pleasing implant restoration requires proper implant placement and creation of an optimal soft tissue emergence profile. The profile is often arbitrarily designed on the cast in the dental laboratory. Provisional restorations are fabricated, and prior to placement, the tissues adjacent to the implant are anesthetized. In order to seat the provisional restoration, the surrounding interproximal tissues may be incised. In seating the provisional restoration, the surrounding tissues are dimensionally displaced, causing the tissues to blanche. Within a few weeks, the provisional molds the surrounding tissues, and the emergence profile is established. The emergence profile technique described in this report minimizes chair time, is not determined in the dental laboratory, and begins the day of implant placement. The procedure creates an emergence profile during the healing phase of implant treatment.

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FIGURE 3. A, Radiograph of the maxillary left quadrant. The second bicuspid is scheduled for extraction. B, The maxillary left second bicuspid was removed and an implant was placed at the time of extraction and a conventional healing abutment was placed. C, At 14 days, the healing abutment was removed and an emergence profile abutment was modified, creating an emergence profile-healing abutment. D, Lateral view immediately after placement of the emergence profile abutment. E, View taken 3 months after the emergence profile-healing abutment was removed. Note the excellent tissue health surrounding the implant. F, Clinical view of the implant restoration. Note the excellent emergence profile of the restored bicuspid. G, Clinical radiograph taken on a 6-month evaluation visit.

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REFERENCES

1. Croll BM. Emergence profiles in natural tooth contour. Part I: photographic observations. J Prosthet Dent 1989;62(1):4–10.
2. 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 1990;5(4):347–59.
3. Adell R, Lekhholm U, Branemark PI. A 15-year study of osseointegrated implants in the treatment of the edentulous jaw. Int J Oral Surg 1985;10:387–418.
4. Branemark PI, Hansson BO, Adell R, et al. Osseointegrated implants in the treatment of the edentulous jaw. Experience from a 10-year period. Scand J Plast Reconstr Surg Suppl 1977;16:1–132.
5. Neale D, Chee WW. Development of implant soft tissue emergence profile: a technique. J Prosthet Dent 1994;71(4):364–8.
6. Macintosh DC, Sutherland M. Method for developing an optimal emergence profile using heat-polymerized provisional restorations for single-tooth implant-supported restorations. J Prosthet Dent 2004;91(3):289–92.
7. Papazian S, Morgano SM. A laboratory procedure to facilitate development of an emergence profile with a custom implant abutment. J Prosthet Dent 1998;79(2):232–4.
8. Pissis P. Emergence profile considerations of implant abutments. Pract Periodontics Aesthet Dent 1994;6(7):69–76; quiz 8.
9. Azer SS. A simplified technique for creating a customized gingival emergence profile for implant-supported crowns. J Prosthodont 2010;19(6):497–501.
10. Bassiouny MA, Yearwood LL. Establishing the gingival emergence profile of restorations by using a resilient gingival replica. J Prosthet Dent 1996;76(4):386–9.
11. Blatz M, Gamborena I. Transferring an optimized emergence profile of anterior implant-supported restorations. Pract Proced Aesthet Dent 2005;17(8):542.
12. Elian N, Tabourian G, Jalbout ZN, et al. Accurate transfer of peri-implant soft tissue emergence profile from the provisional crown to the final prosthesis using an emergence profile cast. J Esthet Restor Dent 2007;19(6):306–14; discussion 15.
13. Lazzara RJ. Achieving critical emergence profile for the anterior single tooth implant. Dent Implantol Update 1993;4(11):88–92.
14. Grunder U, Gracis S, Capelli M. Influence of the 3-D bone-to-implant relationship on esthetics. Int J Periodontics Restorative Dent 2005;25(2):113–9.
15. Kuo SB, Hong HH, Tsai TP, Shen YF. Developing an optimal emergence profile of the definitive restoration with a modified impression cap technique for ITI solid abutment. J Prosthet Dent 2002;88(6):646–8.
16. Reikie DF. Restoring gingival harmony around single tooth implants. J Prosthet Dent 1995;74(1):47–50.
17. Wheeler RC. A textbook of dental anatomy and physiology, 2nd ed. Philadelphia: Saunders; 1950.
18. Wheeler RC. A textbook of dental anatomy and physiology, 3nd ed. Philadelphia: Saunders; 1958.
19. Ha SW, Eckert KL, Wintermantel E, et al. NaOH treatment of vacuum-plasma-sprayed titanium on carbon fibre-reinforced poly(etheretherketone). J Mater Sci Mater Med 1997;8(12):881–6.
20. Ha SW, Kirch M, Birchler F, et al. Surface activation of polyetheretherketone (PEEK) and formation of calcium phosphate coatings by precipitation. J Mater Sci Mater Med 1997;8(11):683–90.
21. Meenan BJ, McClorey C, Akay M. Thermal analysis studies of poly(etheretherketone)/hydroxyapatite biocomposite mixtures. J Mater Sci Mater Med 2000;11(8):481–9.
22. Cook SD, Rust-Dawicki AM. Preliminary evaluation of titanium-coated PEEK dental implants. J Oral Implantol 1995;21(3):176–81.
23. Schuklenk U. Helsinki Declaration revisions. Issues Med Ethics 2001;9(1):29.

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