The Art and Science of Implant Dentistry: Minimally Invasive Considerations for the Aesthetic Zone

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The Art and Science of Implant Dentistry: Minimally Invasive Considerations for the Aesthetic Zone

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ABOUT THE AUTHOR

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INTRODUCTION

Implant dentistry is a constantly evolving combination of science and art, and recent advancements have allowed dentists to better satisfy their patients’ demands for more predictable and conservative results, especially in the aesthetic zone. However, the placement and restoration of anterior implants continues to remain a challenge for the clinician.1-3 Careful attention must be given to extraction techniques and provisional restorations in order to ensure predictable results.4,5 One-stage or 2-stage implant placement are both acceptable techniques to replace anterior teeth that are missing for either iatrogenic or traumatic reasons.1-3,6,7 However, minimally invasive extraction techniques, with implant placement followed by successive provisionalization, have been shown to provide more successful outcomes after the loss of teeth within the aesthetic zone.4,5,7,8 Studies have shown the immediate implant placement is a valuable and predictable treatment option. In addition, it will help preserve the precious facial gingival margins to achieve better aesthetic results.3-5

Special attention must be given to the conservation of hard- and soft-tissue structures.5-10 Preservation of the hard tissue such as the interproximal alveolar bone, and the facial cortical plate over the roots of the maxillary teeth, which is thin and porous, is crucial to the success of the treatment in this region.10-12 This, in turn, will help keep the precious soft tissue available for contour and to ensure the correct emergence profile for the final restoration. In addition, we can save and develop the interdental papilla to avoid the dreaded black triangle.4,13

This article demonstrates the minimally invasive extraction of the anterior maxillary teeth (post-trauma), immediate implant placement with successive provisionalization, and the delivery of the final aesthetic restorations. The techniques as demonstrated herein will help maintain the hard and soft tissues to achieve a predictable result in the aesthetic zone.

CASE REPORT

Diagnosis and Treatment Planning

A 22-year-old female patient presented with a history of facial and dental trauma. Immediately after the injury occurred, the on-call dentist in the hospital stabilized the maxillary anterior teeth with brackets and wires (Figures 1 and 2). After careful clinical and radiographic examinations, teeth Nos. 8 and 9 were found to have vertical fractures and deemed hopeless. Teeth Nos. 7 and 10 had oblique supra-crestal fractures and asymptomatic vital pulps.

Figure 1. Pre-op, post-trauma 1:2 smile photo.
The presurgical information gathered comprised preliminary impressions, occlusal records, intra- and extraoral photographs, cone beam computed tomography (CBCT), and periapical radiographs.

**Clinical Protocol**

Local anesthesia (3 carpules of 2% lidocaine hydrochloride with 1:100,000 epinephrine [DENTSPLY Caulk]) was administered with a labial infiltration technique. Bone sounding confirmed normal gingival architecture in the surrounding dentition and an appropriate gingiva-to-underlying bone dimension (facially) of approximately 3.0 mm. The crowns of teeth Nos. 8 and 9 were reduced to create an ovate pontic design, and preliminary preparations for crowns on teeth Nos. 7 and 10 were completed (Figure 3). A final vinyl polysiloxane (VPS) (Take 1 Advanced [Kerr]) impression was taken at this stage. The pour-up from this impression would be used by the laboratory team to fabricate a long-term temporary. A straight blade Periotome (Miltex) was used to separate the periodontal ligament from the tooth in preparation for a dental implant. The Powertome Periotome 100s (Silfradent [Westport Medical]) was used so that the extractions could be done with minimal trauma and ridge preservation (Figure 4). Using this technique, the precious sulcular crest and the underlying bone structure on the facial and proximal aspects remained intact (Figure 5). After the extractions were completed, the sulci were curetted and the surrounding structures confirmed to be intact (Figure 6). Two self-tapping implants (AnyRidge [Mega’Gen Implant Company]) (4.5 mm fixture body diameter and 10 mm length) were inserted into the prepared osteotomy sites. The positions were confirmed to be more palatal in order to ensure the preservation of the facial crest of the bone and to accommodate any possible facial remodeling. Blood was drawn from the patient, centrifuged (Medifuge Silfradent [Young Dental]) and used for enriching the bone graft (1.0 cc of OSSIF-i sem Mineralized Cortical-Cancellous Allograft [Surgical Esthetics]) with plasma-rich protein. A concentrated growth factor (CGF) barrier was placed by compression of CGF fibrin block for primary closure of the sulci post-implant placement (Figures 7 and 8). The short-term immediate provisional was fabricated using an aesthetic temporary material (Integrity [DENTSPLY Caulk]), and cemented with a noneugenol temporary cement (Temp-Bond NE [Kerr]).

The patient presented 5 days later for a postoperative check and to change the temporary provisional with a long-term laboratory fabricated provisional (BioTemps [Glidewell Dental Labs]). Prior to cementation, gutta-percha was used to...
confirm that the cervical aspects of the pontics were not impinging into the sulci (Figure 9). After ensuring the proper positioning, the long-term provisionals were cemented with resin temporary cement (TNE Dual Syringe Temporary Cement [Temrex Corporation]) (Figure 10).

Despite primary implant stability, a 2-stage implant restoration was used to confirm the healing of the extraction site and remodeling. After 3 months of healing (Figure 11), the patient returned for the temporary restoration with plastic abutments and new provisionals in order to further develop the emergence profile and gingival contour. A hexed, plastic temporary abutment was screwed into the implant and tightened to 25 Ncm (Figure 12).

Resin material may be used in order to improve the fit accuracy of the temporary provisional as needed.

After one month of healing, the patient returned for the final impressions for the definitive restorations. Custom aesthetic abutments (for optimal aesthetics under the planned all-ceramic crowns) were delivered torqued to 35 Ncm (Figure 13). Lithium disilicate (IPS e.max [Ivoclar Vivadent]) crowns were fabricated by the dental lab team and returned to the dental office. When the patient returned for the crown delivery appointment, the crowns were cemented with resin cement (CLEARFIL ESTHETIC CEMENT [Kuraray America]), per the manufacturer's directions. Excess cement was thoroughly cleaned and then the occlusion was checked and adjusted as needed (Figures 14 to 16).

**CLOSING COMMENTS**

This case report shows that, by performing minimally invasive extractions and giving special attention to successive temporization post immediate implant placement, the hard and soft tissues can be respected and conserved, thereby achieving optimal and predictable results in the aesthetic zone. However, it should be noted that this case study did not evaluate the long-term stability of the dento-gingival alveolar tissue.

**REFERENCES**


Figure 10. Long-term provisional (BioTemp [Glidewell Dental Labs]) cemented.

Figure 11. Soft tissues after 3 months of healing and remodeling.

Figure 12. Temporary abutment/crown loaded to further develop the soft tissue.

Figure 13. Final custom aesthetic abutments torqued to 35 Ncm.

Figure 14. Post-op retracted photo.

Figure 15. Post-op 1:2 smile photo.

Figure 16. The happy patient with her aesthetic lithium disilicate (e.max [Ivoclar Vivadent]) restorations.

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1. One-stage or 2-stage implant placement are both acceptable techniques to replace anterior teeth that are missing for either iatrogenic or traumatic reasons.
   a. True    b. False

2. Studies have shown that immediate implant placement is a valuable and predictable treatment option. However, it does not help preserve the precious facial gingival margins.
   a. True    b. False

3. Preservation of the hard tissue, such as the interproximal alveolar bone and the facial cortical plate over the roots of the maxillary teeth, which is thin and porous, is crucial to the success of the treatment in the anterior region.
   a. True    b. False

4. In this case, despite primary implant stability, a 2-stage implant restoration was used to confirm the healing of the extraction site and remodeling.
   a. True    b. False

5. However, it should be noted that this case study evaluated the long-term stability of the dentogingival-alveolar tissue.
   a. True    b. False

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ANSWER FORM: VOLUME 33 NO. 12 PAGE 59

Please check the correct box for each question below.

1.  ☐ a. True  ☐ b. False
2.  ☐ a. True  ☐ b. False
3.  ☐ a. True  ☐ b. False
4.  ☐ a. True  ☐ b. False
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