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Multi-Modality Anterior Extraction Site Grafting Increased Predictability for Aesthetics

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The extraction of teeth creates a documented loss of bone. In the anterior maxilla, the aesthetic loss of hard and soft tissue can be minimized through the inclusion of the latest grafting procedures and materials available. In this article, an aesthetically challenging grafting case is presented that includes the use of demineralized freeze-dried bone allografts (DFDBA), platelet-rich plasma (PRP), xenograft, and connective tissue grafting. A review of the principles, materials, and techniques is presented.

CASE STUDY



Figure 1. Pretreatment condition of 56-year-old female patient.



Figure 2. Original radiograph showing periodontal condition of lateral and central incisors.

A 56-year-old female patient presented with a request to improve the condition of her mouth and the appearance of her smile (Figure 1). The health history of the patient was unremarkable. Examination revealed periodontal disease localized in the anterior maxilla. The maxillary central and lateral incisors had a hopeless prognosis, with class II mobility and extensive bone loss (Figure 2). The remaining maxillary teeth had 2- to 3-mm pocketing and mobility within normal limits. Teeth Nos. 2 through 4, 13, and 14 had crowns with defective margins that required replacement. The patient presented with a low maxillary lip line. The mandibular arch had remaining teeth with a hopeless prognosis.

Treatment Plan

The available treatment options were discussed with the patient. The treatment options all addressed removal of the maxillary central and lateral incisors and the options to replace them. The ideal plan included dental implants to replace the extracted teeth. Financial constraints and the desire to avoid surgical appointments negated the option for implants. The option of a removable appliance was also dismissed through the patient's desire to avoid dentures. The fixed partial prosthesis was the option of choice. The financial costs, stability, and aesthetics of provisionalization, and reduced appointments versus implant surgery were the primary determining factors.

It was explained to the patient that extraction of teeth in the anterior region has the potential to create a compromised aesthetic result due to bone loss and soft tissue changes. The treatment plan would therefore include many of the available techniques to allow for the most predictable outcome. The techniques for postextraction ridge preservation discussed were utilizing DFDBA (including PRP and xenograft), placing connective tissue as a membrane, and utilizing ovate pontics to preserve papillae form. The mandibular arch was treatment planned for extraction of the remaining teeth and a fixed implant-borne prosthesis. This article focuses on the maxillary arch.

Treatment Sequence



Figure 3. Laboratory-processed maxillary provisional restoration.



Figure 4. Ovate pontic form of laboratory-processed provisionals.



Figure 5. Atraumatic extraction of lateral and central incisors.



Figure 6. Examination of extraction sites to ascertain the remaining walls of bone.



Figure 7. Provisional restorations seated.

Prior to atraumatic extraction of the maxillary anterior lateral and central incisors, laboratory-processed temporary prostheses were fabricated (Biotemps, Glidewell Laboratories) (Figure 3). The central and lateral incisor pontic areas were created in an ovate shape to support the papillae and form the adjacent tissue for aesthetics and hygiene¹ (Figure 4). Treatment sequence began with atraumatic extraction of the central and lateral incisors (Figure 5). Forcep rotation and the use of Periostomes best allow for predictable atraumatic extraction.² The next step after tooth extraction was examining the socket site for the remaining walls of bone (Figure 6). Maintaining the buccal wall of bone is imperative for preserving soft tissue aesthetics and determines whether a membrane is needed to maintain any graft material. Once it was determined that the buccal walls of bone were preserved, the laboratory-processed provisionals were seated and the ovate pontic form was checked for tissue fit (Figure 7).



Figure 8. Cleaning and decortication of extraction sites.



Figure 9. DFDBA grafting material.



Figure 10. DFDBA combined with xenograft material.

The extraction sites were debrided of granulation tissue and then decorticated with a large round bur by using sterile saline irrigation. Decortication allows the blood supply in the surrounding bone to produce osteoprogenitor cells that aid in hard tissue formation³ (Figure 8). The decorticated and degranulated extraction sites were then ready to receive graft material. DFDBA putty (Grafton, Osteotech, Inc) and xenograft (Osteograph N 300, DENTSPLY Ceramed) were chosen as the graft materials (Figures 9 and 10). The DFDBA putty offers the graft site osteoinductivity, ease of handling, and an excellent carrier for the xenograft material.⁴ Another advantage of DFDBA putty is the ability to form ovate pontic shape with minimal resistance. The xenograft material offers the graft site radiopacity and increased mineralization for a pontic area.

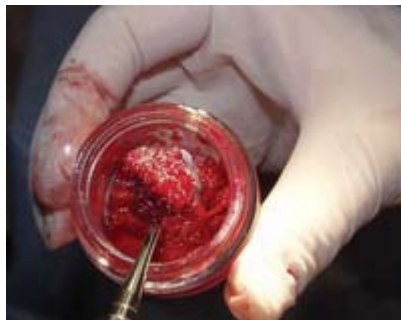


Figure 11. DFDBA xenograft and PRP combined.



Figure 12. Placement of DFDBA xenograft and PRP.



Figure 13. Maxillary tuberosity connective tissue donor site.



Figure 14. Coverage of graft with connective tissue.



Figure 15. Collagen membrane with



Figure 16. Provisional prosthesis

PRP covering connective tissue.

cemented after surgery.

To further enhance the DFDBA–xenograft graft combination, PRP was added (Figure 11). PRP is a centrifuged concentration of platelets derived from a 45-cc sample of the patient's own blood and has been shown to improve soft and hard tissue healing.⁵ The combination of graft materials and PRP was then placed into the extraction sockets (Figure 12). Connective tissue obtained from the patient's right and left maxillary tuberosities was then sutured over the graft sites as a membrane (Figures 13 and 14). Autologous connective tissue was chosen to contain graft material and enhance soft tissue healing and keratinized tissue. PRP was then placed over the connective tissue grafts via a collagen carrier (Collatape, Centerpulse Dental) (Figure 15). The PRP was placed over the connective tissue to enhance further soft tissue healing. The lab-processed provisionals were then cemented by using a provisional cement (Figure 16). The graft sites with provisional coverage were then allowed to heal for a period of 6 months.



Figure 17. Provisional prosthesis at 6 months postoperative.



Figure 18. Ovate pontic form at 6 months postoperative.



Figure 19. Final restoration cemented.

At 6 months, healthy tissue formation around the provisionals could be seen (Figure 17). After removal of the provisional prosthesis, ovate pontic form and aesthetic tissue maturation could be seen (Figure 18). The final PFM restoration can be seen at 7 months postextraction, exhibiting healthy tissue formation (Figure 19).

Conclusion

Through utilization of the latest grafting techniques, stabilization of an anterior ridge for aesthetics and function becomes more predictable. The case presented included the use of atraumatic extraction, DFDBA, xenograft, connective tissue grafts, and ovate pontic form. Through application of these materials and techniques, both hard and soft tissue form was preserved for a fixed partial prosthesis.

References

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