Clinical Management of Type 3 Recession Defects With Immediate Implant and Provisional Restoration Therapy: A Case Report

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Abstract: Type 3 extraction sockets present a unique challenge in that they possess gingival recession indicative of facial hard- and soft-tissue loss. When teeth present with prior disease requiring removal and implant replacement, the treatment strategy incorporates palatal implant positioning as well as proper restorative contour management to compensate for the recession defect, thereby allowing the gingival tissues to heal in the correct 3-dimensional position. This article describes the case of a patient with a nonrestorable maxillary right central incisor with internal resorption. The case demonstrates the use of immediate implant and provisional restoration therapy in type 3 (recession) clinical situations.

Several extraction socket classifications have been published in the dental literature; however, a simple treatment approach for maxillary anterior teeth was reported in 2007 that categorized whether the labial bone plate and associated soft tissues were present or absent.[1] According to this classification system, type 1 sockets were identified as intact; all the hard and soft tissues were present. Type 2 sockets were identified as having the soft tissue present, but part of the labial bone plate was absent, indicative of a dentoalveolar dehiscence defect. Type 3 sockets were classified as having midfacial recession where portions of the soft and hard tissues were absent. This classification system served to distinguish esthetic risk for gingival recession in treatment of single-tooth implant sites in the esthetic zone. Other extraction socket classifications have been published incorporating loss of interdental tissue, which is a separate clinical scenario.[2]

Treatment of Types 1, 2, or 3 Sockets

The treatment of type 1, or intact, extraction sockets with immediate tooth replacement therapy has shown consistent outcomes in regard to implant survival, osseointegration, and esthetics since its introduction to implant dentistry in 1998.[3-10] Implant position and diameter are critical factors to maintaining buccal gap distance for the potential of new labial plate formation.[7] Hard-tissue grafting in conjunction with immediate implant therapy and provisional restoration is important for avoiding gingival recession and buccal ridge collapse and enabling positive esthetic outcomes.[5,8-10]

Type 2 clinical situations present greater challenges in treatment because there is partial or complete absence of the labial bone plate.[11] Type 2 sockets should be approached cautiously because the risk of midfacial recession is always present, especially in the esthetic zone. The size and extent of the pre-existing defect are defining factors in clinical and esthetic success.[12] Several authors have proposed clinical techniques to regenerate dehiscence defects, seen on radiographic examination, using various graft techniques and materials, with or without barrier membranes; however, they all have advocated and employed a flapless surgical approach.[13-15] The key clinical determinants to achieve a predictable outcome are implant primary stability and graft containment with a provisional crown or custom healing abutment in non-occlusion.[14]

Type 3 extraction sockets present a different challenge because they already possess gingival recession indicative of facial hard- and soft-tissue loss. Gingival recession is often associated with a thin periodontal phenotype, cervical abrasion or erosion, or tooth malposition. Historically, facial overcontour of a restoration was typically associated with gingival recession.[16,17] Excessive labial tooth position is also frequently the cause of recession and can be addressed by altering tooth position through orthodontic therapy. However, when teeth present with prior disease requiring removal and implant replacement, the treatment strategy incorporates palatal implant

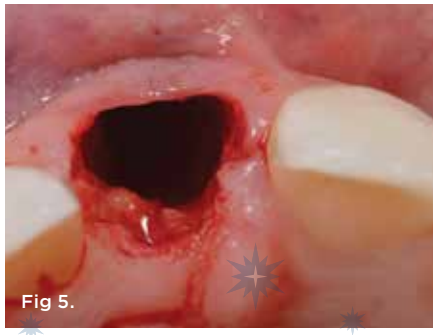

Fig 1. Preoperative extraoral view of tooth No. 8 in labial malposition with midfacial gingiva recession relative to adjacent teeth. **Fig 2.** Patient presented with a low smile line that did not expose the recession defect from an esthetic perspective. However, she was dissatisfied with the discrepancy in tooth and incisal edge position. **Fig 3.** The labial malposition of tooth No. 8 was apparent from the occlusal incisal view. The fact that the tooth was malpositioned allowed the strategy of palatal implant positioning within the dental arch and restorative undercontouring to correct the gingival profile and free gingival margin location. **Fig 4.** Periapical radiograph showed internal resorption of tooth No. 8 and possible ankylosis of the root. **Fig 5.** Tooth No. 8 was carefully excised in a flapless surgical approach. **Fig 6.** The removed tooth showed the internal resorption lesion had perforated the palatal aspect of the root.

positioning as well as proper restorative contour management to compensate for the recession defect, thereby allowing the gingival tissues to heal in the correct 3-dimensional position.[18,19]

The following report describes the case of a patient with a nonrestorable maxillary right central incisor tooth with internal resorption.

Case Report Discussion

A 26-year-old woman presented with existing veneer restorations on teeth Nos. 7 through 10, with tooth No. 8 in a more apical position relative to the adjacent dentition (Figure 1). Although the patient had a low midfacial smile line, she was concerned about the incisal edge discrepancy and the negative gingival architecture due to tooth malposition in both vertical and buccolingual directions (Figure 2). Prior dental history embraced the use of orthodontic treatment to reposition tooth No. 8 into the dental arch; however, this treatment proved futile because the tooth may have been ankylosed from trauma (Figure 3). Radiographic examination of tooth No. 8 revealed internal root resorption (Figure 4).

The tooth was removed very carefully in a minimally invasive, atraumatic, flapless manner (Figure 5). Upon removal of the tooth, the resorption lesion was evident on the palatal aspect (Figure 6). The vertical implant depth was placed relative to the midfacial crest of bone, roughly 3 mm from the free gingival margin (Figure 7). In addition, the implant was placed in a palatal position—where the existing and correct tooth position should have been—to manage the proper restorative contour of the provisional restoration.

The diagnostic key in the predictable treatment of a type 3 recession defect is the height of the palatal tissues,[20] which in this case were in a coronal position and consistent with the adjacent interdental tissues (Figure 8). An acrylic gingival sleeve, or shell, was fabricated and milled from a prefabricated polymethylmethacrylate block using a CAD/CAM digital file.[21] This sleeve was then luted to a prefabricated implant abutment post using an autopolymerizing acrylic resin (Super-T, American Consolidated Manufacturing) to create a screw-retained provisional restoration (Figure 9). Proper contour and spatial gingival undercontour were created in the provisional restoration to allow the facial gingival margin to migrate to a more incisal position (Figure 10).

After provisional restoration fabrication and its removal, a tall, flat-contoured titanium healing abutment was connected to the implant to allow a small-particle mineralized cancellous bone allograft material (Puros®, Zimmer Biomet, zimmerbiometdental.com) to be placed into the facial gap. The dual-zone technique was used to graft not only the bone zone (palatal to the labial bone plate), but also the soft-tissue zone (peri-implant soft tissues) (Figure 11).[8]


Fig 7.


Fig 8.


Fig 9.


Fig 10.


Fig 11.


Fig 12.

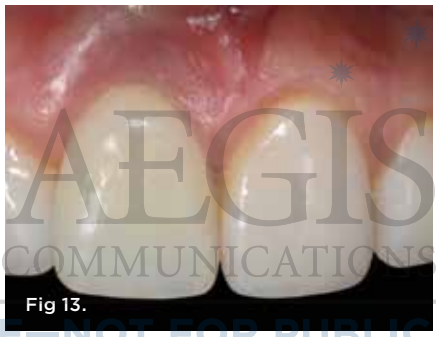
Fig 13.


Fig 14.

Fig 7. The implant was placed in a palatal position 3 mm from the free gingival margin. **Fig 8.** The palatal tissues were coronal and equivalent to the adjacent interdental tissues. **Fig 9.** CAD/CAM-fabricated gingival acrylic sleeve used to construct the provisional crown restoration. It was placed in the peri-implant tissues to support them in its pre-extraction state and then joined with the implant screw-retained abutment post. **Fig 10.** The provisional restoration was fabricated, properly contoured at the gingival level, and verified in the extraction socket; hence the heme visible on the acrylic material. **Fig 11.** The provisional was removed after contour verification, and a tall, flat-contoured titanium healing abutment was placed to allow access to the labial gap and the condensation of bone allograft material using the dual-zone technique. **Fig 12.** The provisional restoration was replaced after dual-zone grafting to contain and protect the material during the healing phase. Note the facial gingival undercontouring, or proper contouring relative to the corrected implant location, versus the labial malposition of the existing tooth. **Fig 13.** The undercontoured provisional restoration allowed the peri-implant soft tissues to collapse and migrate incisally to a normal free gingival margin position after 3 weeks of healing. **Fig 14.** The hard and soft tissues were given 5 months to heal before first abutment disconnection for final impression making. The level of the midfacial free gingival margin was re-established and stable.

After removal of the titanium healing abutment, the non-occlusal loaded provisional crown restoration was replaced to contain and protect the graft material during the 4- to 6-month healing phase of treatment. The restorative contour of the provisional restoration was significantly undercontoured relative to the original malposition of the tooth before extraction (Figure 12). This allowed the gingival tissues to migrate to a more palatal and incisal position to re-establish the correct midfacial free gingival margin location after 3 weeks of healing (Figure 13). The bone and soft tissues matured around the implant and provisional restoration; at 5 months healing the gingival tissues showed excellent shape and fullness (Figure 14). In the authors' opinion, tissue maturation is both understated and underestimated in the overall process of achieving esthetic success of implants placed into anterior extraction sockets. In their experience, hard tissues require 6 months and soft tissues 3 months for maturation.

The provisional restoration was first disconnected from the implant after 5 months of healing (Figure 15). An implant-level impression coping was seated onto the implant, and a colored resin (Pattern Resin™, GC America, gcamerica.com) was used to capture the soft-tissue profile (Figure 16). A polyvinylsiloxane material (Flexitime®, Heraeus Kulzer, kulzer.com) was used to transfer the spatial location of the implant. An implant replica, or analog, was


Fig 15.


Fig 16.


Fig 17.


Fig 18.


Fig 19.


Fig 20.

Fig 15. First provisional restoration disconnection showed the corrected facial ridge dimension and profile mimicking that of the adjacent central incisor tooth No. 9. Through proper implant positioning and restorative subgingival contour, the recession defect was corrected. **Fig 16.** An implant-level impression transfer coping was seated and pattern resin used to register the soft-tissue profile of the peri-implant soft tissues as well as the ridge dimension and shape. **Fig 17.** A metal-ceramic crown was fabricated on the soft-tissue gypsum cast. **Fig 18.** The screw-retained metal-ceramic noble alloy crown was gold-plated to improve the color tone of the peri-implant soft tissues. **Fig 19.** Intraoral view of the inserted definitive crown in maximum intercuspal position. The level of the free gingival margin was corrected equivalent to and harmonious with the adjacent dentition. **Fig 20.** Periapical radiograph of the definitive restoration exhibiting adequate bone levels around the immediate implant.

placed onto the implant-level impression coping, and a gypsum soft-tissue hybrid master cast was created to allow laboratory fabrication of a screw-retained definitive restoration.

Metal-ceramic was selected as the definitive material of choice due to its optimal strength and esthetics with regard to the final screw-retained restoration (Figure 17).[22] This material allowed proper subgingival contouring while maintaining maximum strength of the restoration with a platform-switched design. Gold plating the noble metal alloy also enhanced the esthetic outcome with respect to gingival color tone (Figure 18).[23] The final screw-retained restoration was inserted according to the manufacturer's recommendation of screw preload.

One year after surgery, the tissue contour and gingival tone of the implant restoration of tooth No. 8 integrated well with the adjacent teeth (Figure 19). Additionally, periapical radiography showed positive bone levels (Figure 20).

Conclusion

The use of immediate implant and provisional restoration therapy in type 3 (recession) clinical situations can result in predictable esthetic outcomes. The diagnostic keys for success are: (1) pre-existing labial tooth malposition; (2) flapless tooth removal with the palatal tissues at the proper height; (3) palatal implant placement; (4) dual-zone bone grafting; (5) provisional restoration placement in non-occlusal function; and (6) proper tissue healing for 4 to 6 months.

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