

Replacement of an Implant and Prosthesis in the Premaxilla Due to a Malposition and Prosthetic Failure: A Clinical Case Letter

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INTRODUCTION

In the early years of modern implantology, the chief concerns of implantation success were tissue health and implant survival.¹ Over the last decade, there has been an increasing appreciation for how the resulting esthetics can be equally as important to the success of the final restoration as is health. Achieving an esthetic and functional implant-supported restoration in the maxillary anterior region can be challenging.

In a review of the recent literature, Belser and colleagues reported that dental implants in the anterior maxilla have an overall survival and success rate similar to those reported for other segments of the jaw.² Traditionally, the criteria of implant success rate was based upon an absence of persistent or irreversible signs and symptoms such as pain, infections, neuropathies, paresthesia, or violation of the mandibular canal. Implantation success can be further substantiated by vertical bone loss of <0.2 mm annually after the first year of service of the implant and also that the implant does not demonstrate any evidence of peri-implant radiolucency.³ However, the American Dental Association Council on Dental Material Instruments and Equipment revised the criteria to include not only the patient's emotional and psychological attitude

and satisfaction, but also the esthetic result of the implant.⁴

Undesirable outcomes relating to an implant's location may affect the success and longevity of a prosthetic rehabilitation. These sequelae arise when implants are not optimally placed in one or more geometric planes (eg, buccolingually, mesiodistally, and apicocoronally).⁵ Increasing the apicocoronal position adds to the available running room and facilitates the staging of a restoration with gradual axial contours. However, an excess amount of running room can result in an elongated clinical crown with heightened potential for recession around the implant. In contrast, inadequate running room will result in a crown with a poor emergence profile.

When the implant platform is positioned <2 mm below the cemento-enamel junction (CEJ) of the adjacent teeth, the porcelain of the crown may not be subgingival enough to mask the titanium color of the abutment. Therefore, the ideal position for an implant placed in the premaxilla should be 2 mm below the CEJ of the adjacent teeth. A site at this position corresponds to approximately 3 mm below the free gingival margin of the implant crown,⁶ a location that provides a proper emergence profile. Often an implant with inadequate running room in the aesthetic zone that does not have a proper emergence profile would have to be removed due to neglect of the aforementioned criteria.

The object of this study is to present a case in which a failed implant due to poor esthetics and malposition was removed and replaced by an implant with appropriate running room and thus was restored with proper esthetics.

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CASE DESCRIPTION

A 25-year-old male presented to the dental implant clinic at Brookdale University Hospital with a primary complaint of "my front tooth is too short and is chipped." Upon further discussion, the patient revealed that he had the implant placed 2 years prior, along with a bone graft. Radiographs revealed an endosseous implant tooth #8 with >50% bone loss (Figure 1). Intraoral examination showed a chipped porcelain fused to metal crown that is aesthetically unpleasing. The #8 crown is mesiodistally wider than #9 in an apparent attempt to close the diastema space. In addition, the crown exhibits a very poor emergence profile, with a short clinical height (Figure 2). Removal of the crown and abutment showed an implant platform in a supergingival position (Figure 3). Probing depths were 8–9 mm circumferentially. The patient denies pain or discomfort.

It was determined that the implant was non-restorable and thus required extraction, bone graft, a new implant, and a new restoration. The patient agreed and gave both verbal and written consent. The patient was premedicated with 2 g of amoxicillin and 0.12% chlorhexidine rinse (Xttrium Labs, Chicago, Ill). Adequate local anesthesia of the site was obtained using 2% lidocaine with 1:100 000 epinephrine (Darby Dental, Jericho, NY). The implant was carefully removed using the counter-torque ratchet technique.⁷ After determining that the site had enough available bone for an immediate implant, a new osteotomy was prepared, and a 4.2 × 13-mm MIS "Seven" implant (Shlomi Industrial Park, Shlomi, Israel) was threaded into a position 3 mm below the facial CEJ of #9. The implant was buried, a MinerOss corticocancellous allograft bone (BioHorizons, Birmingham, Ala) was placed on the buccal defect (Figure 4), and the site was covered with a Mem-Lok resorbable membrane (BioHorizons). Primary closure was then obtained, and an essex type appliance was delivered to the patient.

After 3 months of healing, a subepithelial connective tissue graft was harvested from the left posterior palate (Figure 5). A split thickness flap was raised around the #8 implant site, and the connective tissue (CT) graft was sutured to the periosteum (Figure 6). The healing abutment was replaced with a transmucosal stock abutment. Healing was uneventful.

Three months post-CT grafting, an immediate temporary was fabricated on an MIS plastic cylinder as described by Babbush et al.⁸ (Figure 7). Sculpting of soft tissue was accomplished over a 2-month period by carefully modifying the acrylic on the temporary (Figure 8). The soft tissue-free gingival margin was pushed apically to match the adjacent central incisor. When soft tissue contouring was completed, an open tray final impression was done and an Atlantis abutment (Astra Tech Inc, Waltham, Mass) (Figure 9) and an IPS e.max crown (Ivoclar Vivadent, Amherst, New York) were ordered from the lab. The lab was told to leave the diastema in place and contour to match #9. The crown and abutment were seated and cemented with Temp-Bond (Kerr Dental, Orange, Calif). The patient was satisfied with the aesthetics and function of the restoration (Figures 10 and 11).

DISCUSSION

In the present case, the previous implant position in the apical–coronal direction was the direct cause for failure of both the implant itself and its esthetics. Removal of the implant was deemed necessary to achieve an optimal result. Placement of the new implant and crown helped to restore the patient to proper aesthetics and complete patient satisfaction. The apical–coronal position of the implant should be 2–4 mm apical to the expected gingival margin position.⁹ To prevent recession and improve esthetics, there should be 1–2 mm of facial bone. The new implant was placed 3 mm below the free gingival margin and followed an imaginary line that touched the incisal edges of the adjacent teeth. Grafting an area that is deficient in height is only as predictable as the height of the interdental bone of the adjacent teeth.

After obtaining a radiograph from the prior dentist, it was apparent that there was an attempt to graft the exposed threads above the crest at the time of implant placement. As seen in this radiograph, the graft was unsuccessful because the interdental bone was inferior to the implant platform.

After adequate healing time, the zone of keratinized tissue can often be deficient. As a result, esthetics and protection can be compromised due to bacterial and mechanical challenges. Block and Kent¹⁰ have shown a correlation between the



FIGURES 1–11. **FIGURE 1.** Radiograph demonstrating 50% bone loss around implant. **FIGURE 2.** Poor emergence profiles of crown, short clinical height. **FIGURE 3.** Supergingival position of implant. **FIGURE 4.** Bone graft to implant site #8. **FIGURE 5.** Connective tissue harvested from palate. **FIGURE 6.** Connective tissue sutured to recipient site. **FIGURE 7.** Plastic coping prepped for temporary. **FIGURE 8.** Temporary in place. **FIGURE 9.** Custom abutment in place. **FIGURE 10.** Final prosthesis in occlusion. **FIGURE 11.** Final prosthesis.

presence of keratinized mucosa and the health of soft and hard tissues around implants. Therefore, based on this correlation, a subepithelial connective tissue graft was harvested from the palate and grafted to the #8 implant site.

The proper sculpting of peri-implant soft tissue is required to obtain an aesthetically pleasing result. Numerous studies have discussed the method of fabricating sequentially fixed temporaries.^{11,12} However, we decided to sequentially modify the acrylic

temporary chairside, biweekly over a 2-month period. By adding a small amount of acrylic to the facial of the temporary, we were able to push the free gingival margin apically until we acquired our intended result (Figure 11).

For this case, we decided to use a CAD/CAM titanium milled abutment (Atlantis; Astra Tech Inc), as these abutments provide the most ideal emergence profile to support the peri-implant soft tissue contours. As the final restoration, we used an IPS

e.max crown (Ivoclar Vivadent) that is a lithium disilicate glass ceramic that provides optimal translucency, durability, and strength. The final restoration was evaluated on the working model for accuracy. Once proper fit and occlusion were established, the custom-fabricated abutment was placed on the implant fixture, secured, and torqued to 35 Ncm. Digital radiography was used to verify fit and integration. The e.max crown was tried in place and inspected for accuracy, contour, and shade match. Once the restoration was determined to be acceptable, it was cemented. A digital radiograph was taken to ensure no excess cement.

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