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Importance of the Quality of Tissue Supporting Dental Implants

This article discusses the importance of soft tissue around implants, in terms of overall treatment success, and the management of peri-implantitis using various methods, with emphasis placed on coordinated treatment.

Sufficient bone mass and keratinized soft tissue should surround implants, with adequate separation from other implants and adjacent teeth.¹ Keratinized soft-tissue deficiencies around dental implants can result from multiple factors, including anatomical remodeling after tooth extraction, long-term missing teeth, implant placement without consideration of adequate quality and quantity of hard and soft tissues, poorly designed prostheses, or occlusal trauma to the area that leads to tissue thinning or shrinking around the implant-supported restoration.^{2,3}

Peri-implantitis is a form of periodontal disease in which the successful outcome of a dental implant is affected by inflammation of both the soft and hard tissue surrounding the implant. The implant eventually loses surrounding bone and soft-tissue support, resulting in the detachment of gingiva.^{4,5} According to Baltacioğlu et al,⁶ “for ideal dental implant rehabilitation, an adequate bone volume, optimal implant position, aesthetic soft-tissue contours, and stable and healthy soft tissue are required.” Soft tissue in both partially and fully edentulous patients should be assessed comprehensively before, during, and after the placement of restorative implants to ensure their long-term success.

Advances in periodontal plastic surgery have led to countermeasures against the adverse effects of implant complications. The treatment of peri-implantitis typically includes a combination of soft- and hard-tissue regeneration. Stiller et al⁷ concluded that “an adequate keratinized mucosa at the implant site leads to a reduced plaque accumulation, a reduced inflammatory mucosal infiltration, and a pro-inflammatory mediator release.” Gingival grafting to correct soft-tissue recession around implants not only satisfies the patient in terms of aesthetics but also prevents increased plaque buildup and progression of peri-implantitis.⁸

Correct diagnosis and patient home care, followed by individualized treatment planning and coordinated treatment, are key for a more predictable outcome of implant-supported restorations. According to Jivraj and Chee,⁹ “the successful integration of an implant, however, is not sufficient to declare success; implants placed in poor restorative positions result in unaesthetic restorations that provide little satisfaction for the clinician or the patient.”

Correct diagnosis includes a detailed clinical exam and proper documentation with photographs and 2-D and/or 3-D x-ray imaging to understand the defects in the skeleton morphology and any previous restorative work. Patient home care and frequent dental checkups and cleanings are a prerequisite for the most successful and satisfying results of implants. In this way, both patient and clinician are responsible for reducing the incidence of peri-implantitis. The treatment is customized and coordinated based on the patient’s diagnosis.

This case report elaborates on the importance of soft tissue around implants and on the management of peri-implantitis using various methods, with emphasis placed on coordinated treatment.

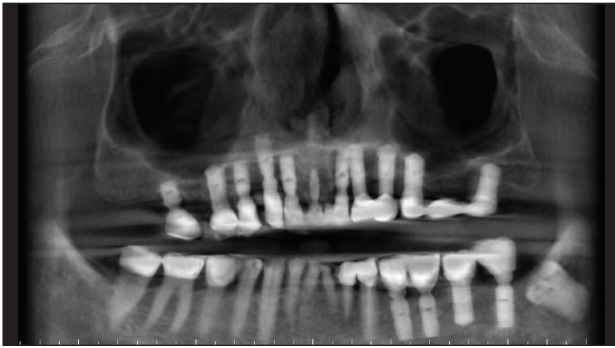


Figure 1. Pretreatment panoramic view.

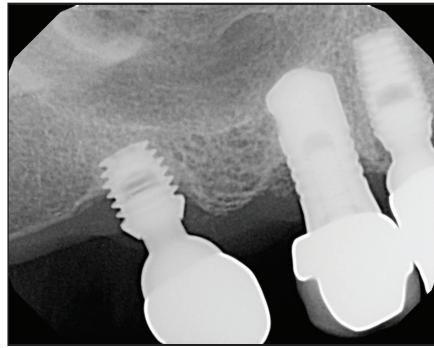


Figure 2. Pretreatment radiograph, from the maxillary right side.



Figure 3. Pretreatment closeup view.

CASE REPORT

Diagnosis and Treatment Planning

An 88-year-old male was referred to our office for periodontal evaluation and treatment. The patient's chief complaint was pain and swelling on the maxillary right side that would not go away with antibiotics and pain medication. Clinical and radiographic evaluation, including cone beam computed tomography (CBCT), disclosed peri-implantitis and a mucogingival deformity associated with an implant-supported prosthesis (Figures 1 to 4). The patient pointed to implant No. 4 as the source of pain. We proposed flap surgery to evaluate the maxillary right posterior region, remove implant No. 4, and improve the prognosis of existing implants (Nos. 2, 3, and 5), followed by mucogingival surgery to improve the quality of tissue supporting the dental implants.

Implant No. 2 showed major bone loss but was solid and had zero mobility. Although an implant-supported prosthesis was not conducive to self-performed oral hygiene and most implants were splinted, with long contact points and zero interproximal papilla (Figures 3 to 5), we needed to formulate a treatment plan to resolve the pain and swelling and improve the patient's existing condition rather than remove the implant-supported fixed prosthesis, which would have become a very expensive treatment. The patient's age, health, and financial concerns were kept in mind during the treatment plan presentation. The patient and family accepted the treatment plan, which included scaling and root planing, occlusal adjustment, gingival grafting, and a new implant-supported bridge (#2-x-x-5), following removal of the No. 4 implant.

Clinical Treatment

The patient was given the following medications prior to surgery: an antibiotic (clindamycin 150 mg, orally 3 times daily), an analgesic (Motrin 800 mg, 3 times daily, as needed), anti-swelling medication (methylprednisolone [Medrol Dosepak]), and a chlorhexidine rinse (Acclean 0.12% oral rinse USP [Henry Schein], twice daily). Vertical incisions were made on the mesial of teeth Nos. 1 to 6 to enable full access to the bony defects. A horizontal incision was made with a No. 12 blade (Carbon Steel [Benco Dental]).

Periodontal flap surgery enabled access to the implant and bony defect for diagnosis and treatment. Significant bone loss was noted along with missing buccal plates (Figure 6). The area was debrided and decontaminated with chlorhexidine. The bony defect was grafted with a particulate freeze-dried bone allograft (Maxxeus Dental cortical bone, Ref. 1113482-0197/0309, 1113420-0154) and covered with an absorbable membrane (Bioguide; lot 00130291). Five months later, mucogingival surgery was performed to replace the mucosa surrounding the implants with keratinized gingival mucosa. The grafted tissue was mobilized from the neighboring right

palate, pushed to the facial aspect of the maxillary right posterior region (Figure 7), and stabilized with 5-0 PTFE sutures.

DISCUSSION

The pretreatment photo of the maxillary and mandibular right side (Figure 4) allows a comparison of the shallow vestibule, frenum pull, and moveable non-keratinized mucosa supporting the maxillary implants and of the attached keratinized mucosa supporting mandibular teeth. This comparison demonstrates that implant integration and survival cannot be satisfactory and acceptable if it's not accompanied by quality tissue supporting the implant, which is essential for the ease of home care and the long-term health and stability of the implant.

The soft-tissue graft provided tough, healthy keratinized tissue that would be strong enough to support an implant. The new connective tissue will resist toothbrush and occlusal trauma and prevent gingival recession. Without soft-tissue grafting, the site would have been unstable and poorly suited for loading implants.⁷ Keratinized and dense peri-implant soft tissue around implants has been associated with better tissue health, reduced bone loss, and improved aesthetics.¹⁰ The influence of soft-tissue thickness on peri-implant marginal bone loss has been discussed by Suárez-López Del Amo et al,¹¹ who suggested that implants placed in areas with initially thicker peri-implant soft tissue exhibit less radiographic marginal bone loss.

Supportive periodontal therapy has been recommended as necessary to maintain the stability and healthy condition of implants.^{12,13} Giannobile and Lang¹⁴ and Tarnow¹⁵ recommend keeping natural teeth and resisting the urge to propose extraction and implant placement in the case of teeth with endodontic or restorative problems since implant complications are on the rise. Tarnow¹⁵ recommends the use of a patient consent form prior to implant surgery that stresses the necessity for excellent patient hygiene to prevent complications. Tarnow¹⁵ also recommends the use of a prosthetic design that allows long-term success, as patients cannot perform basic home care when the implant-supported prosthesis is poorly designed. In addition, preserving patients' functional natural dentition is a skill that our profession should not lose.¹⁴

In this case, mucogingival surgery provided the quality tissue needed to support the implant, and the patient is now much more comfortable performing routine home care. Management and an interdisciplinary approach offered good long-term solutions to the patient's problem, which is maintainable with 3-month maintenance care (Figure 8). The management of mucogingival defects includes remodeling and reconstructive therapies to successfully reduce the severity of soft-tissue complications around implant-supported prostheses. Having keratinized and



Figure 4. Pretreatment photo of the maxillary and mandibular right side. In comparison with the mandibular right posterior gingiva, the maxilla has no keratinized mucosa and exhibits a shallow vestibule with frenum pull.



Figure 5. Pretreatment view of the maxillary right posterior region.



Figure 6. A surgical treatment photo, demonstrating bone loss.



Figure 7. Mucogingival surgery was performed to generate quality tissue supporting the dental implants. Implant No. 4 was removed.



Figure 8. Three months post-treatment, exhibiting the generation of quality tissue.



Figure 9. Three years post-treatment, showing excellent-quality tissue surrounding the implants with favorable results for a new implant-supported bridge.

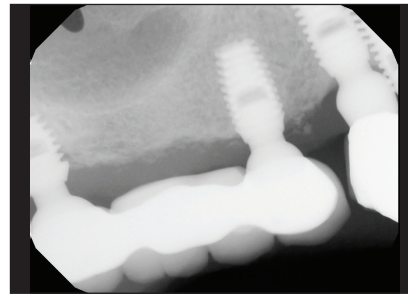


Figure 10. Three years post-treatment radiograph, showing excellent improvement in the maxillary right region.

firm soft tissue around an osseointegrated implant has a tremendously positive impact on patient satisfaction and the aesthetic outcome, in addition to the health and stability of the implant.

Soft-tissue grafting procedures result in more favorable peri-implant health when they utilize autogenous grafts to gain keratinized mucosa, leading to significantly reduced and only marginal bone loss.⁸ The autogenous graft can be a free gingival graft or a free periosteal graft. Either of these techniques can be used for rehabilitation during peri-implant plastic surgery.^{6,16} The technique used in this case was a modified form of the pedicle flap (Figure 7), used to deepen the vestibule and to increase the amount of keratinized tissue, which was non-existent at the beginning. This technique provides excellent odds of healing because it maintains the connectivity of the graft to blood vessels, allowing rapid

revascularization of the donor site.¹⁷

CONCLUSION

Implant surgery involves understanding the physiological aspects and clinical needs of the patient.¹ The success of implant therapy depends on the experience and training of the practitioner who placed and restored it.¹⁵

If the goal of implant therapy is to provide replacement teeth that mimic natural dentition, then quality tissue around the dental implant is essential. Our patient is happy because our treatment provided tough, resilient, attached, keratinized gingival mucosa that has a deep vestibule and is free from frenum pull, inflammation, bleeding, pockets, and suppuration (Figure 9). He requires similar treatment in another area. Figure 10 shows the improvement in the bone supporting the implants post-treatment.

The patient feels good about the maxillary right side and about the interdisciplinary management of his

case. He is comfortable with his home care protocol because the surgical treatment deepened the vestibule and replaced the mucosa with broad, keratinized mucosa, which is conducive to self-performance of oral hygiene and essential to the long-term health and stability of the tissue surrounding the implant.¹⁸ This case could have benefited from periodontal-prosthetic treatment planning prior to the original implant surgery. A prosthodontist and periodontist should handle the treatment planning and management of difficult cases to incorporate the experience and skills that increase the probability of success.♦

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