Minimally Invasive Treatment of Soft Tissue Deficiency Around an Implant-Supported Restoration in the Esthetic Zone: Modified VISTA Technique Case Report

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The horizontal and vertical soft tissue dimension around an implant-supported restoration in the maxillary anterior is one of the determining factors for achieving an esthetic result. In this case report, the patient presented with a deficiency in both dimensions around a single-tooth implant-supported restoration in the anterior maxilla. The soft tissue defects were augmented with a connective tissue graft that was placed underneath the buccal peri-implant tissue using a frenum access incision and a supraperiosteal tunneling approach (modified vestibular Incision supraperiosteal tunnel access [VISTA] technique). This novel technique resulted in an increase in tissue height and width, which suggests its potential use around implant-supported restorations.

Key Words: soft tissue augmentation, recession, dental implant, soft tissue deficiency

INTRODUCTION

Treating a soft tissue defect around an implant-supported restoration in the esthetic zone is still a challenging problem for today's clinicians. So far, there is no predictable way of correcting a soft tissue defect around an implant-supported crown. Currently, only one prospective cohort study1 and a couple of case reports2,3 describe successful treatment of soft tissue defects around implant-supported restorations. Burkhardt et al1 treated 10 patients with mucosal defects around implant-supported restorations in the maxillary anterior with coronally advanced flaps in combination with connective tissue grafts. Over the course of 6 months, soft tissue thickness and initial recession coverage decreased from 75% to 66%. In contrast, performing the same procedure on natural teeth can achieve 78% to 89% root coverage.4,5 These numbers demonstrate that a connective tissue graft in combination with a coronally advanced flap around implant-supported restorations in the maxillary anterior with coronally advanced flaps in combination with connective tissue grafts.

Several factors might negatively influence the healing of implant-supported restorations after soft tissue grafting. For example, there are structural differences between soft tissue around dental implants and natural teeth. In comparison to healthy tissue around teeth, soft tissue around dental implants has decreased vascularity6 and a reduced collagen to fibroblast ratio.7 The appearance of soft tissue around implant-supported restorations has been compared with that of scar tissue that forms after a surgical intervention,1 and its structural support and vascularization come solely from underlying bone. Soft tissue around natural teeth is characterized by supracrestal fibers that insert into the cementum, high vascularity, periodontal ligament space, and alveolar bone where periodontal fibers are inserting. In addition, cementum is more biocompatible than metal abutments or porcelain crowns and, therefore, soft tissue can form connective attachment8 to a tooth instead of only a long junctional epithelium.9 All this might explain the challenge associated with successful soft tissue grafting around dental implants because structural support and vascularization are prerequisites for achieving a sufficient amount of augmentation.

Zadeh10 described a surgical flap technique for root coverage around maxillary teeth called VISTA (vestibular incision subperiostal tunnel approach). A midline frenum access incision is used to access the buccal tissue and prepare a tunnel. This tunnel preparation toward the gingival margin of the maxillary anterior teeth releases flap tension, preserves vascularization, and, therefore, might positively affect clinical outcome.11 A graft can be placed through the frenum incision line underneath the flap and moved coronally to cover the recession. Because a conventional tunneling approach uses only a small intrasulcular incision, through which the soft tissue graft can be placed, the access through a frenum incision is broader and might, therefore, result in less trauma to the soft tissue collar due to tearing of the sulcular tissue.

Taking into account the nature of soft tissue around implant-supported restorations, we altered this minimally invasive technique and used it to address a soft tissue defect...
around an implant-supported restoration. Furthermore, we modified VISTA to a supraperiosteal flap design instead of the original full-thickness approach and combined it with a connective tissue grafting procedure to augment deficient soft tissue around an implant-supported restoration. In the current case report, we describe the surgical and restorative steps associated with the treatment.

**CASE REPORT AND MATERIAL AND METHODS**

**Initial surgical and restorative phase**

A 25-year-old woman presented for evaluation of tooth #9 in June 2010. The patient was systemically healthy, was a nonsmoker, and had a high smile line (Figure 1a). Tooth #9 had been endodontically treated after sustaining a trauma in 2007. A fistula on the buccal of #9 developed during the following months, and the root canal was subsequently retreated. However, the fistula remained, and examination using gutta percha markings and a periapical radiograph revealed a horizontal fracture (Figure 1a and c). Because of the apical location of the fracture line, the tooth was deemed nonrestorable, and it was decided to replace it with an implant-supported restoration. An atraumatic flapless extraction was performed to preserve tooth-supporting bone. Nevertheless, a large buccal fenestration (around 4 mm × 6 mm) was detected in the area of the previous fistula. The extraction socket was grafted with an allograft (FDBA, AlloGraft cancellous, Straumann, Andover, MA). The lesion within the socket and the socket orifice were covered with a collagen membrane (Dynamatrix Extracellular membrane, Keystone Dental, Burlington, Mass). To achieve primary flap closure without releasing a facial mucogingival flap, the socket was sealed with a free gingival graft as previously described by Landsberg et al. This technique facilitates closure after tooth extraction without changing the original location of the mucogingival junction. The #9 space was temporally restored using the natural crown of #9, which was connected to teeth #8 and #10 using Ribbond lingual mesh (Ribbond, Seattle, Wash) and flowable composite (shade A2, Filtek Supreme Ultra Flowable Restorative Refill, 3M ESPE). To avoid interferences during wound healing, the cervical part of the previous crown was reduced to leave a vertical space of 1–2 mm.

The patient was seen 1 week after the procedure to reinforce the composite bonding. During subsequent visits, additional composite was added underneath the pontic and the vertical gap between the edentulous ridge, and the bonded tooth crown was filled in. Seven months after socket preservation, a dental implant was placed (Osseotite Tapered Certain 4 × 10 mm, Biomet 3i, Palm Beach Gardens, Fla). At this time, the interdental papilla had receded 1 mm, and a reduction of the horizontal tissue dimension (1–2 mm) was detected on the facial aspect. To compensate for the horizontal tissue loss, the facial area was augmented with a xenograft (Endobon, Biomet 3i), and the graft particles were covered with a collagen membrane (Dynamatrix Extracellular membrane, Keystone Dental). Because the grafted area did not extend toward the coronal part of the ridge and the implant had been placed with a torque >40 Ncm, an immediate temporary restoration was placed.

For this purpose, a hexed open-tray impression coping (Certain EP Pick-Up Coping [Non-Hexed] 4.1 mm (D) × 4.1 mm (P), Biomet 3i) was screwed into the implant and an impression was taken using interocclusal record material (Blue-mousse Impression Material, Parkell, Edgewood, NY). A screw-retained...
was harvested from the palate using a 2-incision technique.\(^1\) Overbuilding soft tissue. Afterward, we used a periodontal dissection tunnel was extended toward the gingival sulcus, and subsequent change in ridge dimensions than elevating a flap. This extraction technique might cause less soft tissue recession and subsequent change in ridge dimensions than elevating a flap.\(^1\) It has been shown in previous studies that flap elevation can cause bone resorption\(^2\) and concomitant soft tissue recession.\(^3\) Nevertheless, in the patient in the present case, the mesial papilla of #9 receded 1 mm and the soft tissue on the buccal aspect of #9 lost 2 mm in the horizontal dimension after tooth extraction and simultaneous socket grafting. The compromised horizontal tissue dimension was especially visible when the patient smiled as it affected tissue coloration.

While placing a dental implant, guided bone regeneration was performed to augment the horizontal dimension and address the loss of ridge width. A temporary crown was delivered to support the coronal soft tissue. The crown was adjusted during healing to improve soft tissue contour. Adjusting the critical contour (area close to gingival margin)
and subcritical contour (area apical to the critical contour) during the healing phase can improve soft tissue appearance, whereas inappropriate contours of a temporary crown may cause further soft tissue recession.

However, despite contouring the temporary restoration and augmenting the facial area, the horizontal tissue dimension remained compromised, and the gingival margin remained 1 mm apical to the margin of #8. Both deficiencies were severe enough to be noticeable when the patient smiled. Therefore, a soft tissue augmentation procedure was planned to correct those defects before a permanent implant-supported restoration was fabricated.

We selected the VISTA technique, which had been originally used for the treatment of root recession, and customized it to address the specific soft tissue defects in our patient. The technique has several advantages over a conventional tunneling approach. Entering the surgical site through the vestibule by dissecting the frenum is less technique sensitive than preparing a tunnel flap from the sulcus because of the thick fibrous tissue of the frenum and accessibility of the area. In contrast to the original VISTA flap technique, we prepared a split thickness tunnel flap instead of a full thickness subperiosteum tunnel flap. The split thickness flap did not interfere with the previously placed graft and might have prevented further bone loss by leaving the periosteum intact and, therefore, preserving vascularity.

We used the patient’s own connective tissue for this grafting procedure. Connective tissue is an established treatment option for general root coverage. Criticism usually involves patient discomfort and tissue morbidity due to tissue harvest from a second surgical site. Therefore, Mareque-Bueno used acellular dermal matrix and a coronally advanced flap to graft a recession around an implant-supported restoration. Six
months after the procedure, 67% of the recession was covered. Nevertheless, in the current patient we used a connective tissue graft as previous studies showed that acellular dermal matrix can shrink significantly over time, resulting in a recurring recession during long term follow-up.21

Immediately after surgery, we detected an increase in the soft tissue horizontal dimension by 1–2 mm (within 5 mm from the gingival margin). During the healing phase, contour and contact points of the temporary crown were continuously adjusted, and an additional increase in papilla height (around 0.5 mm) was measured. It has to be taken into account, that one of the most determining factors in papilla presence and height is the amount of interproximal bone. This dictates, and might therefore limit, the amount of papilla regeneration.22,23

Several publications used placement of connective tissue grafts at different stages of implant therapy to increase and
preserve horizontal tissue dimensions. Grunder24 showed that buccal placement of connective tissue at the time of immediate implant placement can increase horizontal soft tissue dimension by 1 mm in comparison with a control group. Burkhardt et al1 evaluated recession coverage around implant-supported restorations 6 months after a conventional coronally advanced flap in combination with a connective tissue graft. They detected that an average of 2/3 of the original recession was covered. In line with these studies, Schneider et al25 and Lee et al26 used soft tissue grafting at dental implant sites immediately at the time of placement or at the second-stage procedure when a healing abutment was attached to improve soft tissue architecture. Stability of the gingival level27–29 and the changes in soft tissue dimensions30 after crown delivery are similar to that of other reports. There is still a slight deficiency of the mesial papilla height. However, the overall soft tissue architecture was very close to the pre-extraction situation, and the patient was very satisfied with the clinical outcome.

**CONCLUSION**

Modification of the VISTA technique seems to be a promising method for enhancing soft tissue dimensions around implant-supported restoration in the anterior maxilla.

**ABBREVIATIONS**

CEJ: cement enamel junction
VISTA: vestibular incision supraperiosteal tunnel access

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**REFERENCES**


