

Interproximal Papilla Volumization Using Vestibular Incision Subperiosteal Tunneling Access Technique in Esthetic Rehabilitation

Abstract

An accurate diagnostic and interdisciplinary approach is essential for obtaining suitable, conservative, and predictable results in areas with high esthetic demand. Patients reporting with an improper prosthesis that has a black triangle pose a challenge for soft-tissue esthetic rehabilitation. Re-restoration of such cases with conventional fixed prosthesis would be undesirable due to imbalance in pink and white esthetics. This case report describes an interdisciplinary approach to maintain the existing midline diastema and correction of black triangle in the interproximal area between abutment and pontic in the esthetic zone. Minimally invasive vestibular incision subperiosteal tunneling access technique with connective tissue graft was planned for reconstructing the interdental papilla, followed by prosthetic rehabilitation of edentulous site with fixed partial denture using loop connector design to maintain the midline diastema. Postoperative result showed a comprehensive, pink and white rehabilitation to meet the patient's esthetic demand.

Keywords: Black triangle, connective tissue graft, loop connector, midline diastema, vestibular incision subperiosteal tunneling access

Introduction

An esthetic smile is composed of balanced visibility of pink and white (i.e., gingiva and tooth structure, respectively) components, and a harmonious blend between them is of utmost importance in modern esthetic dentistry.^[1] Loss of dentition over a period of time results in both hard- and soft-tissue loss. Usually, prosthodontists are well acquainted in reconstructing the white component of a smile, but restoring the pink and white balance in the esthetic zone requires a more comprehensive and interdisciplinary approach.

Management of edentulous space with midline diastema and soft-tissue defect only with a conventional fixed partial denture (FPD) may result in wider teeth and black triangle in the interproximal area, thus compromising esthetics. Usually, to overcome these problems, FPD with pink porcelain is fabricated in an attempt to simulate the anatomic contour of the edentulous alveolar ridge.^[2] Although this treatment option was conceptually acceptable, in patients with a high smile line, it is esthetically undesirable.

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An effective diagnostic and interdisciplinary approach is, therefore, necessary to obtain optimized, conservative, and reliable outcomes in areas that are esthetically compromised.

This case report describes a technique to augment interproximal area in prosthesis using vestibular incision subperiosteal tunneling access (VISTA) approach with subepithelial connective tissue graft (CTG), followed by prosthetic rehabilitation with new FPD using loop connector to maintain diastema as per patient's demand.

Case Report

A 36-year-old male patient reported to the department of prosthodontics, with the chief complaint of unesthetic prosthesis concerning teeth numbers 11, 21, and 22. The patient was unhappy with the prosthesis and had a poor self-esteem. Prosthetic evaluation revealed midline diastema, black triangle between the pontic and the abutment, and also recession with tooth number 22, suggesting the need for periodontal intervention during prosthetic rehabilitation. Hence, an interdisciplinary approach of management was undertaken.

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Periodontal examination revealed a black triangle of about 5 mm in the interproximal area between pontic and 22, Miller's Class I recession with respect to 22 [Figure 1]. After phase I therapy, a VISTA technique with CTG was planned to enhance interproximal papillary fill. The patient was outlined the surgical and restorative options, and the informed consent was obtained.

Surgical procedure

Following administration of local anesthesia, vertical access incision was made in the midline of the labial frenum. The incision was made through the periosteum, and the subperiosteal tunnel was created using a microsurgical periosteal elevator. The tunnel was extended one or two teeth beyond the area of interest, crossing the alveolar crest of the edentulous area toward the palatal surface and also beyond the mucogingival margin to permit low tension while the gingiva was repositioned coronally. The CTG was harvested from the palate using a single-incision technique and was then inserted into the prepared subperiosteal tunnel at the recipient site. Once the graft was properly positioned, it was secured in the buccal and palatal aspect with 4-0 Vicryl sutures. Then, the prosthesis was placed, and single horizontal sutures with loose knots were placed 6–7 mm apical to the contact point at the interproximal area between pontic and 22. The knot was then advanced coronally with minimal tension to the most coronal level and was secured using glass ionomer cement (GIC) stops. The midline access incision was then sutured. Periodontal dressing was placed to cover the surgical site. The patient was prescribed analgesics and was put on oral hygiene maintenance. The sutures were removed after 10 days, and the area showed complete interproximal papillary fill and recession coverage with respect to 22 [Figure 2].

Prosthetic phase

After 2 months of healing, abutment teeth were refined to receive porcelain fused to metal prosthesis. Master impression for final FPD was made using a single-stage putty light body impression technique, disinfected and poured with Type IV dental stone. Die-cast was prepared and mounted on an articulator, followed by wax pattern fabrication using crown wax for ceramic facing, and a loop connector was made from sprue wax. The pattern was invested and cast with Ni-Cr alloy.

Metal try-in was done followed by porcelain firing. After evaluating for esthetics and phonetics, cementation of the prosthesis was done using Type I GIC. The patient was recalled after 15 days for follow-up, which showed improved soft-tissue contour with a desirable esthetic emergence profile. On 4-month follow-up, there was a substantial improvement in the interdental papilla, and there was no relapse in the augmented area [Figure 3].



Figure 1: (a) Frontal view – Midline diastema, (b) black triangle and recession with respect to 22, (c) black triangle measuring 5 mm

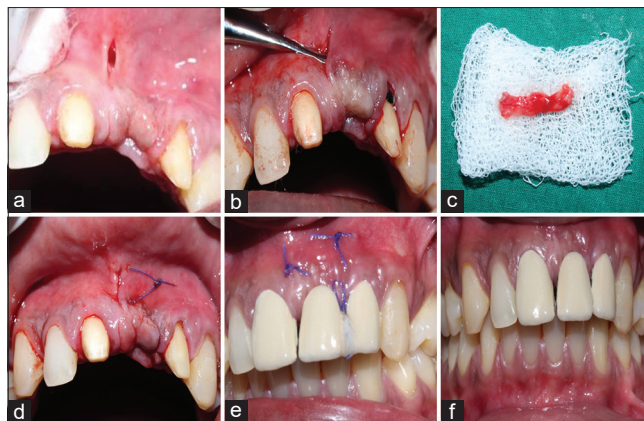


Figure 2: (a) Vertical access incision made at the labial frenum, (b) the subperiosteal tunnel was created using a microsurgical periosteal elevator, (c) connective tissue graft was harvested from the palate, (d) securing connective tissue graft in the buccal and palatal aspects using 4-0 Vicryl sutures, (e) the flap advanced coronally with minimal tension and secured using glass ionomer cement, (f) 15-day postsurgical view showing recession coverage and papillary fill

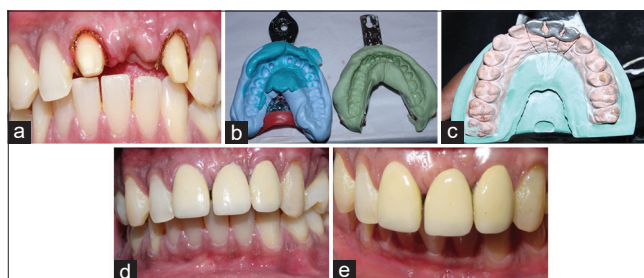


Figure 3: (a) Refined teeth preparation for porcelain fused to metal prosthesis, (b) master impression using single-stage putty light body impression technique, (c) die-cast and fixed partial denture with loop connectors, (d) 15-day postprosthetic rehabilitation showing improved soft-tissue contour, (e) 4-month follow-up after prosthetic rehabilitation

Discussion

The gingival architecture represents the framework of the teeth. Attaining this framework is of prime concern to periodontists and restorative dentists in giving an esthetically pleasing restoration to the patient. In this case report, as the patient had reported with unesthetic prosthesis with a black triangle, recession, and midline diastema in the esthetic region, we decided to correct the black triangle first using VISTA technique with CTG, followed by FPD with modified loop connector design to maintain the midline diastema and the surgically created papilla.

Surgical reconstruction of the interdental papilla is a crucial and technique-sensitive treatment, as it requires

well-designed and accurately performed incisions to fortify the minimal disturbance to blood supply. So far, various surgical techniques to reconstruct the papilla between natural teeth have been developed. Han and Takei proposed a semilunar incision to augment the papillary area.^[3] However, this procedure may jeopardize the blood supply to the area. Later in 2009, to minimize tissue trauma, Nordland *et al.* described a tunneling technique to position CTG under a deficient interdental papilla without a releasing incision.^[4] Although this technique had good clinical outcome, the main drawback was lack of accessibility. In 2011, Zadeh introduced VISTA technique for recession coverage; access incision is made in a remote area, to prevent unesthetic appearance.^[5] The other advantages of this technique over conventional procedures include increased accessibility, reduced disruption in blood supply, minimal trauma to the tissues, less scarring of tissues, and preservation of anatomical integrity of the interdental papillae. Therefore, we employed VISTA over other available techniques to reconstruct interproximal papilla.

In addition to subperiosteal tunnel preparation, incorporation of CTG attributes to its success with its good tissue-blending and dual blood supply characteristics.^[6] Studies have shown that the use of CTG appears to be more efficient than guided tissue regeneration membranes and enamel matrix derivatives.^[7,8]

In order to prevent the apical displacement of the gingival margin and to stabilize the donor tissue at the augmented site during healing, we used Nordland's suspensory suture technique against the pontic.^[4] This minimally invasive VISTA technique with CTG, usually employed for recession coverage, showed a higher esthetic outcome even in interproximal papilla reconstruction.

Managing edentulous space using conventional FPD with midline diastema would compromise the golden proportion of teeth. For this purpose, FPD with loop connector design was designed to preserve the midline diastema. Loop connectors are nonrigid connectors that consist of a loop between the retainers and pontics on the palatal aspect of the prosthesis. It can be fabricated from sprue wax and platinum–gold–palladium (Pt-Au-Pd) metal alloy.^[9] Care should be taken not to fabricate thick connectors so as to avoid tongue annoyance and plaque accumulation. The drawbacks of loop connectors include additional laboratory techniques, difficulty in maintaining oral hygiene, interruption to tongue movements, and phonetics, especially linguopalatal sounds. Hence, holding the connectors round and close to the tissues will not impact the phonetics. The modified FPD with loop connectors improved the esthetics by maintaining the existing midline diastema and also by creating required emergence profile.^[10]

Conclusion

Rebuilding the pink and white esthetics is an important aspect in modern clinical dentistry. Black triangles and midline diastema often pose esthetic and functional problems. The present clinical report discussed a minimally invasive tunnel technique to reconstruct the interproximal papilla and a modified FPD design with loop connectors to maintain midline diastema. Therefore, teamwork and an interdisciplinary treatment plan are of prime importance for the immediate and long-term success of pink and white esthetic balance.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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