

OBLITERATION OF “BLACK TRIANGLE” USING A SUBEPITHELIAL CONNECTIVE TISSUE GRAFT AND FRENECTOMY: A CASE REPORT

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ABSTRACT

An attractive and pleasing smile is a balance of properly positioned healthy teeth along with surrounding soft tissue. Several reasons contribute to loss of gingival and inter dental soft and hard tissues, thereby resulting in long clinical crowns and black triangles between the teeth, eventually resulting in unpleasant smile. These reasons include loss of periodontal support, because of plaque associated lesions, frenal pull, abnormal shape and/ or positioning of teeth, improper contours of prosthetic restorations and traumatic oral hygiene procedures. Several non-surgical and surgical techniques have been proposed to treat soft tissue deformities and manage the interproximal space. Non-surgical approaches (orthodontic, prosthetic and restorative procedures) modify the interproximal space, thereby inducing modifications to the soft tissues. The surgical techniques aim to re-contour, preserve and reconstruct the soft tissue between the teeth. The objective of this report is to describe the surgical technique of a semilunar coronally repositioned papilla technique along with frenectomy to achieve complete reconstruction of interdental papilla.

KEY WORDS

Black Triangle, Frenectomy, Interdental Papilla, Subepithelial Connective Tissue Graft

INTRODUCTION

Esthetic awareness has come into the foray since the past few years, and dentistry has technologically advanced providing patients with esthetic solutions via various methods. The term “periodontal plastic surgery” was introduced by Miller in 1988¹ which consist of a broad range of techniques aiming at correcting or eliminating anatomic, developmental, or traumatic deformities of the gingiva or alveolar mucosa.² Several reconstructive periodontal plastic surgical procedures have been developed to attain better



FIG 1: Pre Operative View



FIG 2: Pre Operative Measurement Of Contact Point With Interdental Bone

esthetics. However, the reconstruction of the lost interdental papilla has been elusive.

Interdental papilla can be defined as the portion of gingiva that occupies the space between two adjacent teeth, ie, the interdental extension of the gingiva.² The interdental gingival morphology is influenced by factors such as size and shape of the contact point between two adjacent teeth, distance between the contact point and the interdental alveolar bone, tooth morphology (eg, shape of the crown), and volume of the interdental em-

brasure.³ The loss of interdental papillae as the result of frenal pull, midline diastema, diverging roots, tooth extractions, traumatic interproximal oral hygiene procedures, abnormal crown forms and inflammatory periodontal disease creates a significant challenge in the esthetic zone.⁴ Loss of interdental papilla could result in patient complaints such as phonetic problems, food impaction, functional problems and esthetic concern. It is clinically represented by open embrasures and is often referred to as the “black triangle”.

Several surgical and non-surgical techniques have been proposed to treat soft tissue deformities and to manage the interproximal space. The non-surgical approaches are orthodontic, prosthetic and restorative procedures. They modify the interproximal space, thereby inducing modifications of the soft tissues. The surgical techniques aim to augment soft tissue around dental implants and teeth.⁴ These include technique by Han and Takei (1996)^{20/5} which defined the use of a facial approach with a semilunar incision to gain access to the papillary area for augmentation of the papilla. Cortellini et al⁶ proposed a simplified papilla preservation flap

that requires a releasing incision in the papillary area and placement of a barrier membrane under the surgical site. Azzi et al⁷ have described techniques to gain access to augment the connective tissue and bone under the deficient papilla.

This case report highlights process of the papilla augmentation based on the use of a sub-epithelial connective tissue graft along with frenectomy to negate frenal pull for the treatment of the "Black triangle".

CASE REPORT

A healthy 42-year-old non-smoking man was referred for the reconstruction of the lost interdental papilla between the maxillary central incisors with the distance between the bone crest and the contact point as 6mm (Figs 1 & 2). The papillary loss was classified as Class I according to Nordland and Tarnow (1998)⁸ classification. The patient had a positive frenal pull for the maxillary labial frenum. Thus a treatment plan of a single stage frenectomy and papillary regeneration surgery was devised.

Following phase one therapy, the gingival tissue around the maxillary central incisors was clinically healthy on the day of surgery. After the administration of local anesthesia (2% lignocaine hydrochloride which contained 1:2,00,000 adrenaline) a split-thickness incision was performed 2 mm coronal to the mucogingival junction, extending

from the mesial aspect of the left lateral incisor to the mesial aspect of the right lateral incisor (Fig 3). Undermining of the split thickness incision was carried out to release the frenal pull by excising the fibres. To release the gingivopapillary unit from the bone, a split-thickness flap was initiated using an Orban's knife through the incision on the buccal face, extending toward the palate (Fig 4) creating a pouch like preparation towards the inter-dental area. Intra-sulcular incisions were made around the necks of the adjacent teeth to free the connective tissue attachment from the root surface, to allow the coronal displacement of the gingivo-papillary unit. The existing papilla was fully preserved. Immediately after this procedure, the donor tissue, consisting of 2-mm-thick palatal connective tissue (Fig 5), was harvested from the palate and the donor site was sutured with 3-0 silk sutures (Fig 6). The graft was then shaped to fit the interproximal area and was tucked in and pushed coronally within the prepared pouch to support and provide bulk to the coronally positioned interdental papilla (Fig 7). The gingiva-papillary unit was then sutured with 3-0 silk sutures (Fig 8). No periodontal dressing was used. The patient was prescribed analgesics (Ibuprofen 400mg bid for 3 days) The postoperative care consisted of 0.2% chlorhexidine rinses 3 times a day for 4 weeks, with no mechanical cleaning of the interproximal area. The sutures were

removed after 10 days. The surgical site was evaluated on follow up visits post-operatively at 1 month and 3 months (Figs 9 & 10).

DISCUSSION

The desire for cosmetic dentistry and improved aesthetics has increased recently. Cosmetic procedures have now become an integral part of periodontal treatment plan. Various factors influence the presence or absence of the interdental papilla. These include hard and soft tissue parameters like-crestal alveolar bone height, dimensions of the interproximal space, soft tissue appearance, buccal plate thickness and contact area.⁹

Thus, before any attempt is made to reconstruct an interdental papilla surgically, it is important to assess

- i) the vertical distance between the bone crest and the apical point of the contact area between the crowns, and
- ii) the soft tissue height of the interdental area¹⁰.

Tarnow et al³ demonstrated that the distance from the contact point to the alveolar interdental bone is the main determining factor for the presence or absence of the interdental papilla. They proved that when this distance was 5 mm or less, the papilla was almost always present (98%), while when the distance was 6 mm or more, nearly half or more of gingival tissue was missing (44%).³ Thus, if the distance between bone crest and the contact point is 5 mm and the papilla height is < 4 mm, surgical intervention for increasing the volume of the papilla could be justified and about 100% papillary fill is predicted if all other parameters are kept in control.³

In this case the distance between the bone crest to the contact point was about 6 mm because of loss of periodontal support and frenal pull non-surgical treatment with restorations would have been the appropriate line of treatment. However, Azzi et al⁷ have successfully demonstrated the use of autogenous bone grafts in conjunction with connective tissue grafts to reconstruct lost papillae in periodontally compromised teeth. Thus the lost papilla was reconstructed by the combination of periodontal plastic surgery and mucogingival therapy.

The success and the predictability of any surgical procedure for treating papilla loss is based on the amount of the papilla fill. Since the problem was a class I defect, the complete surgical reconstruction of the papilla was possible. Anatomically, the papilla is a soft tissue structure irrigated by limited terminal vascularization, When using any technique related to gingival tissue reconstruction, adequacy of the blood supply to the surgical site



FIG 3: Split-Thickness Incision 2 mm Coronal to the Mucogingival Junction to Release Frenal Pull



FIG 4: A Split-Thickness Flap To Create A Pouch Using An Orban Knife



FIG 5: Graft Harvested from the palate



FIG 6: Donor Site Sutured

CLINICAL SECTION



FIG 7: Graft being Positioned in the Pouch created



FIG 8: Graft Sutured



FIG 9: One Month Post-Operative View



FIG 10: Three Month Post-Operative View

should be considered.

The procedure employed a modification in accordance with that of Han TJ and Takie HH (1996).⁵ A modified semilunar coronally repositioned papilla was combined with a sub epithelial connective tissue graft and it was found to be an effective method of achieving predictable and stable results for treating papilla loss. A closed wound donor site provided less post-operative discomfort and an excellent colour match. The pull on the papilla due to frenal fibres was also negated by performing frenectomy simultaneously. The success of this grafting procedure was mainly attained due to the dual blood supply from the underlying connective tissue base and the overlying recipient flap to the graft, which maintained the papillary integrity and avoided flap necrosis. The use of a pouch like design avoided a horizontal or vertical releasing incision, evading compromise in blood supply and helped in maximizing the papillary and the lateral blood supply to the submerged connective tissue graft which received a flow of plasma and an ingrowth of capillaries from three sources-the periosteum, underlying connective tissue and the overlying flaps. The papilla augmentation and frenectomy procedures are relatively easy and based on the principles of plastic surgery techniques. The atraumatic handling of the tissues, continuous blood supply and avoidance of frenal tissue tension and pressure were critical for the viability of the tissues and the success for the procedure. The use of a

sub-epithelial connective tissue graft for interproximal papilla augmentation along with negation of frenal pull proposed a reliable solution to the aesthetic problem of "black triangles".

CONCLUSION

The present case was successful due to proper planning and evaluation of soft and hard tissues that are required for optimal outcomes in papilla reconstruction techniques.⁷ In this case, there was a complete fill of the papilla in the site due to the stability of the connective tissue graft and the maintenance of good oral hygiene. However, the success of employing this technique for severe defects and the long-term stability needs to be proved by further clinical trials and use of other sophisticated techniques like microsurgery.

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