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Surgical reconstruction of lost interdental papilla: a case report



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Several reasons contribute to the loss of interdental papillae and establishment of 'black triangles' between teeth. 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. This case report demonstrates complete reconstruction of the papilla following a semilunar coronally repositioned papilla technique with 6 months follow-up.

■ Introduction

The absence or loss of interdental papillae (IDP) (resulting in so-called 'black triangles') is one of the most important aspects of the decision-making process of clinicians. This condition may create aesthetic impairments, phonetic problems and food impaction^{1,2}.

The IDP is the gingival area that occupies the space between two adjacent teeth. It not only acts as a biological barrier protecting the underlying periodontal structures, but also plays a critical role in aesthetics. It is formed by a dense connective tissue covered by oral epithelium. The shape of the IDP is determined by the contact relationships between the teeth, the width of

the approximal tooth surfaces, and the course of the cemento-enamel junction (CEJ).

Several conditions modify the interproximal space; as a consequence, the morphology of the IDP may be impaired. The common causes of the loss of interdental gingiva are listed below³.

Absolute causes:

- periodontal disease;
- osseous surgery;
- traumatic tooth extraction.

Relative causes:

- gingival biotype (thick vs thin);
- increase in gingival embrasure because of root divergence.

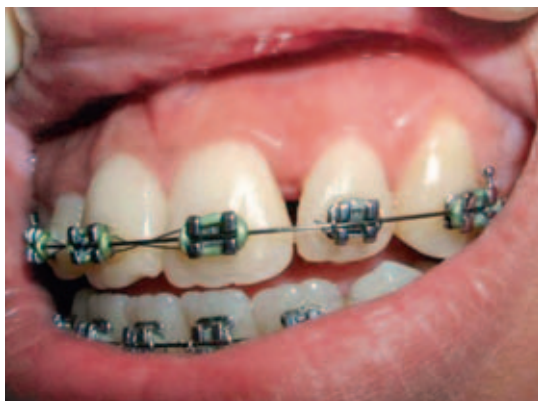


Fig 1 Pre-operative view.



Fig 2 Semilunar incision placed apical to the mucogingival junction.

Several classification systems have been proposed to assess the presence or absence of IDP. A classification system to assess the papillary height was first proposed by Norland and Tarnow⁴, based on three anatomical landmarks:

- interdental contact point;
- apical extent of the facial CEJ;
- coronal extent of the proximal CEJ.

According to this system, the position of IDP was classified as follows:

- Normal: the IDP occupies the entire embrasure space apical to the interdental contact point/area.
- Class I: the tip of the IDP is located between the interdental contact point and the level of the CEJ at the proximal surface of the tooth.
- Class II: the tip of the IDP is located at or apical to the level of the CEJ on the proximal surface of the tooth but coronal to the level of the CEJ mid-buccally.
- Class III: the tip of the IDP is located at or apical to the level of the CEJ mid-buccally.

Several surgical and non-surgical techniques have been used to treat and restore the missing IDP. If the loss of papilla is related to soft tissue damage only, reconstructive techniques are able to restore it completely. If the loss of the IDP is due to severe periodontal disease, with interproximal bone resorption, complete reconstruction is generally not achieved⁵. Non-surgical approaches used are:

- correction of traumatic oral hygiene procedures;

- restorative/prosthetic corrections;
- orthodontic approach;
- repeated curettage of the papilla.

Surgical approaches include:

- papilla recontouring;
- papilla preservation;
- papilla reconstruction.

The surgical techniques used for papilla reconstruction include several approaches. Beagle⁶ described a pedicle graft procedure utilising the soft tissues palatal to the interdental area to reconstruct new papilla. Han and Takei⁷ proposed an approach for papilla reconstruction ('semilunar coronally repositioned papilla') based on the use of a free connective tissue graft. Azzi et al⁸ described a technique in which an envelope-type flap was prepared for coverage of a connective tissue graft.

The present article describes a case with a surgical approach to papilla reconstruction based on the technique described by Han and Takei⁷.

Case report

A 24-year-old male patient was referred from the Department of Orthodontics to the Department of Periodontics, Meenakshi Ammal Dental College and Hospital, for the reconstruction of lost IDP between the maxillary left central and lateral incisors. He was undergoing orthodontic treatment for the correction



Fig 3 Coronal displacement of the gingival-papillary unit with an Orbans knife.



Fig 4 Harvested connective tissue graft.

of a deep overbite. Clinical examination revealed class I papillary loss (the tip of the IDP is located between the interdental contact point and the level of CEJ at the proximal surface of the tooth) between the abovementioned teeth. The distance from the contact point to the bone crest as assessed by transgingival probing was found to be 5 mm. The distance between the contact point of the adjacent teeth and the existing papilla was found to be 4 mm (Fig 1). The contact point between the central and lateral incisors was maintained at the incisal third

An intraoral periapical radiograph revealed no bone loss. Since it was only soft tissue loss, complete reconstruction of the papilla was expected. The surgical procedure was explained to the patient and informed consent was obtained.

■ Surgical procedure

Preparation of the patient included scaling and root planing of the entire dentition and oral hygiene instructions. Immediately prior to the surgical procedure, the patient was instructed to rinse with 0.2% chlorhexidine digluconate solution for 30 seconds. After administration of local anaesthesia, a split thickness semilunar incision was performed 3 mm apically from the mucogingival junction facial to the interdental area, and a pouch-like preparation was performed into the interdental area (Fig 2). Intraculcular incisions were made around the necks of the adjacent teeth extending from the buccal to the

palatal surface, to free the connective tissue attachment from the root surface and to allow coronal displacement of the gingival-papillary unit. The release was initiated with an Orbans knife (Fig 3).

Following this, the donor connective tissue graft was harvested from the palate and the donor site was sutured. The harvested graft was trimmed according to the requirements of the recipient site (Fig 4). It was then tucked in (Fig 5) and pushed coronally to support and provide bulk to the coronally positioned interdental tissue (Fig 6). Then the flap was stabilised using 5-0 black silk sutures (Fig 7).

The patient was placed on analgesics and 0.2% chlorhexidine digluconate mouthwash twice daily for 2 weeks with no mechanical cleaning of the surgically treated interproximal area.



Fig 5 Graft being tucked inside the pouch.



Fig 6 The graft provided bulk to the coronally positioned gingival-papillary unit.



Fig 7 The sutured flap.

Healing

The sutures were removed 2 weeks after the procedure. The surgical site was examined for uneventful healing. Healing was found to be satisfactory (Fig 8). The patient was reviewed 2 months (Fig 9), 4 months (Fig 10) and 6 months post-operatively. Normal anatomy and shape with complete reconstruction of the IDP was achieved after 6 months (Fig 11).

Discussion

The desire for cosmetic dentistry and improved aesthetics has recently increased. Cosmetic procedures have become an integral part of periodontal treatment. Recession and loss of IDP are the two main concerns in periodontal aesthetics. Presently, there

are numerous predictable procedures available for correcting the denuded root surface but none for the reconstruction of the lost papilla. The literature is limited to only a few case reports on papillary reconstruction⁶⁻¹¹.

Various factors influence the presence or absence of the IDP. These include crestal alveolar bone height, dimensions of the interproximal space, soft tissue appearance, buccal plate thickness and contact area. Hence, before attempts are made to reconstruct an IDP 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 area^{12,13}. 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. In the present case, since both these parameters were within these limits, we decided to perform surgical reconstruction in order to solve the problem of an interdental 'black triangle'.

In cases where the distance between the bone crest to the contact point is > 5 mm because of loss of periodontal support, non-surgical treatment with restorations would be appropriate. However, Azzi et al¹¹ have demonstrated the use of autogenous bone grafts in conjunction with connective tissue grafts to reconstruct lost papillae in periodontally involved teeth. To enhance the final results, porcelain veneers were used. Thus the lost papilla was reconstructed by the combination of periodontal plastic surgery and mucogingival therapy.



Fig 8 Two weeks post-operatively.



Fig 9 Two months post-operatively.

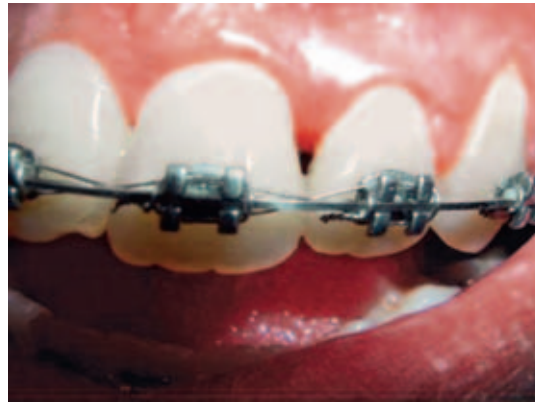


Fig 10 Four months post-operatively.

When using any technique related to gingival tissue reconstruction, adequacy of the blood supply to the surgical site should be considered. Because of the limited area that the IDP occupies, any form of grafting presents a blood supply problem in the reconstruction of the papilla. The advantages of the technique used in the present case report are that it provides a better blood supply from the flap to the graft, maintains papillary integrity and avoids flap necrosis.

Zetu and Wang³ developed and proposed an aesthetic triangle as a reference guide for the treatment planning of aesthetic problems. This triangle addresses the foundations that are essential for maintaining/creating papillae. From base to apex, this triangle should adhere to the following guidelines to achieve optimal aesthetics: space management for preserving soft/hard tissues, hard tissue assessment, soft tissue assessment and restorative work. For IDP management, adequate bone volume, proper soft tissue thickness and aesthetic restorations are required. This aesthetic triangle has been considered during the assessment and surgical phase of the present reconstruction technique.

In the present case report, the pre-operative photograph shows that the adjacent incisors were in contact, and in the post-operative photograph it is evident that the contact was maintained with no recontouring of the approximal crowns (see Figs 1 and 11). Also, no special extrusive mechanics were used and the full arch wire was placed only to maintain the orthodontic correction. This rules out the possibility of

any beneficial orthodontic movement in reconstructing the lost IDP.

Since the problem was a class I defect, the complete surgical reconstruction of the IDP was possible. However, the success of employing this technique for severe defects and the long-term stability needs to be proved by further clinical studies.

Although more sophisticated approaches showing good clinical results have been proposed to restore the lost IDP, the predictability of various procedures has not been completely documented and no data on the long-term stability are available in the literature. 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.



Fig 11 Six months post-operatively.



■ **References**

1. Tarnow DP, Magner AW, Fletcher P. The effect of the distance from the contact point to the crest of bone on the presence or absence of the interproximal dental papilla. *J Periodontol* 1992;63:995-996.
2. Kokich VG. Esthetics: the orthodontic-periodontic restorative connection. *Semin Orthod* 1996;2:21-30.
3. Zetu L, Wang HL. Management of interdental/interimplant papilla. *J Clin Periodontol* 2005;32:831-839.
4. Nordland NP, Tarnow DP. A classification system for loss of papillary height. *J Periodontol* 1998;69:1124-1126.
5. Pini Prato GP, Rotundo R, Cortellini P, Tinti C, Azzi R. Interdental papilla management: a review and classification of the therapeutic approaches. *Int J Periodontics Restorative Dent* 2004;24:246-255.
6. Beagle JR. Surgical reconstruction of the interdental papilla: case report. *Int J Periodontics Restorative Dent* 1992;12:144-151.
7. Han JJ, Takei HH. Progress in gingival papilla reconstruction. *Periodontol* 2000 1996;2:65-68.
8. Azzi R, Carranza F, Etienne D. Surgical reconstruction of the interdental papilla. *Int J Periodontics Restorative Dent* 1998;18:467-473.
9. Azzi R, Etienne D, Sauvan JC, Miller PD. Root coverage and papilla reconstruction in class IV recession: a case report. *Int J Periodontics Restorative Dent* 1999;19:449-455.
10. Shapiro A. Regeneration of interdental papilla using periodic curettage. *Int J Periodontics Restorative Dent* 1985;5:27-33.
11. Azzi R, Takei HH, Etienne D, Carranza FA. Root coverage and papilla reconstruction using autogenous osseous and connective tissue grafts. *Int J Periodontics Restorative Dent* 2001;21:141-147.
12. Gargiulo A W. Dimensions and relations of the dentogingival junction in humans. *J Periodontol* 1961;32:261-267.
13. Van der Velden U. Regeneration of the interdental soft tissues following denudation procedures. *J Clin Periodontol* 1982;9:455-459.