

# Reconstruction of Lost Interdental Papilla: A Review

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**G**ingival esthetics is one of the most important factors for success in a restorative treatment<sup>1</sup>. The advent of periodontal plastic surgery has made it possible to address the common esthetic concern of receded gums.<sup>2</sup> Several efforts have been undertaken to treat and restore the missing interproximal papilla. If the loss of papilla is related to soft tissue damage only, reconstructive techniques are able to restore it completely. If the loss of Interdental papilla is caused by severe periodontal disease with interproximal bone resorption, complete reconstruction is generally not achieved. Different surgical and non surgical approaches are proposed in the periodontal literature to provide satisfactory interdental papilla reconstruction.

## I. Non surgical approaches:

### 1. Correction of traumatic oral hygiene procedure:

Diffuse erythema and denudation of attached gingiva throughout the mouth may be striking sequelae of overzealous brushing. Improper use of dental floss may damage the interdental papilla. Traumatic interproximal hygiene procedures must be initially discontinued and successively modified. Reepithelialization of the traumatic lesion can restore the papilla completely.<sup>3</sup>

### 2. Restorative/Prosthetic restorations:

Abnormal tooth shape may contribute to a missing papilla, and an appropriate restorative technique is indicated to favour the creeping of the interdental tissues. In case of incisors with an incisal edge much wider than the cervical third, the contact point is located coronally. In this situation, the cervical pyramid of the Interdental space is increased and the papilla does not fill the space completely. By a restorative/prosthetic reshaping of the contours of the teeth, the contact point may be lengthened and located more apically; the embrasure is reduced, allowing coronal displacement of the Interdental gingiva (Figure 1 A and B).<sup>5,6</sup>



Figure 1:

- A: By restorative /prosthetic rehabilitation, contact point may be lengthened and located more apically, allowing coronal displacement of interdental gingival.
- B: Schematic movement of contact point C: Final result of prosthetic rehabilitation of the lateral incisors, with consequent coronal displacement of the interdental gingival.

### 3. Orthodontic approach:

In the presence of diastema, the contact point is lacking and therefore the classification criteria of Norland and Tarnow cannot be applied. In this condition, the Interdental papilla may be apparently absent, and it may create both esthetic and phonetic problems. In situations of periodontal health, the interproximal gingival tissues is firmly attached to the teeth and alveolar bone. An orthodontic approach is indicated in these situations. The aim is to restore the diastema and create a contact point between the adjacent teeth, without periodontal attempts to build up the missing papilla (fig 2 A and B). In fact, the proper closure of the diastema causes some degree of coronal

creeping of the interproximal gingival tissue.<sup>7</sup>



Figure 2 :

- 2A: Modification of interdental space by means of orthodontic treatment
- 2B: Closure of diastema causes coronal creeping of interproximal gingival tissues

Orthodontic closure of the Interdental space should be attained with a bodily movement of the two adjacent teeth. In fact, a mesiodistal divergence of the roots would lead to a coronal location of the contact point. As a consequence, the interproximal papilla will not fill the interdental space and the esthetic problem would not be solved. When a diastema is due to periodontal disease, the orthodontic closure of the diastema can be performed after the resolution of the inflammation. In these cases, the Interdental papilla reconstruction is not the main goal of the comprehensive treatment plan.<sup>3</sup>

### 4. Repeated curettage of the papilla:

A case report study, describes a non surgical approach to recreate papillae destroyed by necrotizing gingivitis. Repeated scaling /root planning and curettage of the papillary tissue were performed every 15 days to 3 months. This instrumentation may induce a proliferative hyperplastic inflammatory reaction of the papilla ( Figure 3 ). Some new regenerated papillae<sup>8</sup> were observed, while others did not respond.



Figure 3:

- 1. Loss of interdental papilla between maxillary lateral and central incisors. Repeated curettage of the interdental papilla was performed every 15 days.
- 2. Bottom right: same case after three months. Complete regeneration of the interdental tissue is achieved.

## II. Surgical approaches :

Surgical approaches included following three treatment modalities.

- 1. Papilla re-contouring.
- 2. Papilla preservation.
- 3. Papilla reconstruction.

### I. Papilla re-contouring:

In the presence of gingival enlargement, the excess tissue should be eliminated to remodel the soft tissue architecture. In cases of drug-induced and idiopathic gingival enlargement, a gingivectomy may be performed.

### II. Papilla preservation:

Specific surgical approaches have been reported to prevent or reduce an excessive apical displacement of the gingival margin in the treatment of periodontal defects. Restricting flap elevation can minimize the amount of bone resorption, thus helping in preservation of interdental papilla. Various soft-tissue surgical procedures have been introduced in an attempt to recreate and preserve the interdental papilla.

#### 1. Papilla preservation flap:

In this technique, Takei et al<sup>9</sup> the facial surface is prepared with sulcular incision around each tooth with no incision being made through the interdental papilla. The lingual or palatal flap design consists of a sulcular incision along the lingual or palatal aspect of each tooth with a semilunar incision made across the each interdental papilla. This can be elevated intact with the facial flap. In posterior areas with a narrow interdental space, trim-off the tip of the papilla in order to preserve the intact papilla through the embrasure space.



(Figure 4)

- Top left: Papilla preservation technique: interproximal defect in a young patient.
- Top right: Palatal incision at the base of the papilla allows for elevation of a flap that includes the papilla itself.
- Bottom left: Palatal papilla is maintained.
- Bottom right: Palatal papilla is sutured in its original position.

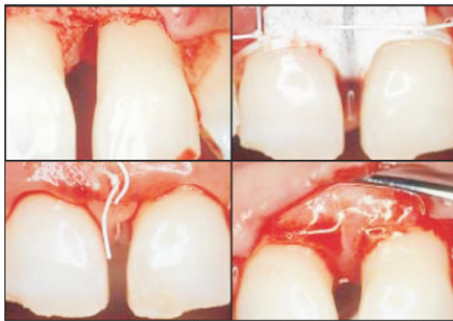
#### 2. Modified papilla preservation flap:

This Technique Cortellini et al<sup>10</sup>, was a variation of the papilla preservation technique. This was modified to achieve and maintain primary closure of the flap in the interdental space over the GTR membrane. A buccal and

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interproximal intrasulcular primary incision to the alveolar crest, involving the two teeth neighboring the defect, was performed. A horizontal incision with a slight internal bevel was given in the buccal gingiva at the base of the papilla, just coronal to the bone crest, and the papilla<sup>11</sup> was elevated towards the palatal aspect. A buccal full thickness flap is elevated with vertical releasing incisions and /or periosteal incisions when needed. A barrier membrane is positioned to cover the defect. The interdental tissue are repositioned and sutured to completely cover the membrane. A horizontal internal crossed mattress suture is placed beneath the mucoperiosteal flaps between the base of the palatal papilla and the buccal flap. This suture relieves all the tensions of the flaps.

A second suture (vertical internal mattress suture) is placed between the buccal aspect of the interproximal papilla and the most coronal portion of the buccal flap to ensure primary closure. (Figure 5).



**Figure 5:**

- Top left: Modified papilla preservation technique : initial incisions, flap elevation, and defect debridement.
- Top right: nonresorbable membrane is shaped and positioned onto defect.
- Bottom left: Palatal papilla is sutured.
- Bottom Right : Newly formed tissue at reentry procedure 6 weeks later.

This technique is applicable in wide interdental spaces (>2mm), especially in the anterior dentition. This technique allows for achieving primary closure of the tissue and preserving the papilla in 75% of cases. These results may be improved using a microsurgical approach.

**3. Simplified papilla preservation flap Cortellini et al(1999)**

This technique is indicated in narrow interdental space (less than 2 mm) in anterior and posterior region. This approach includes a first oblique incision across the associated papilla, starting from the gingival margin at the buccal-line angle of the involved tooth to reach the mid-interproximal portion of the papilla under the contact point of the adjacent tooth. This oblique interdental incision is continued intrasulcularly in the buccal aspect of the teeth neighboring the defect. A full thickness flap, including the papilla, and a split thickness buccal flap are then elevated. After application of a barrier membrane, the interdental tissues are positioned and sutured to obtain primary closure of the interdental space. A horizontal internal mattress suture (offset mattress suture) runs from the base of the keratinised tissue at the midbuccal aspect of the tooth not involved by the defect to a symmetric location at the base of the lingual/palatal flap. This suture allows the coronal positioning of the buccal flap. The interdental tissues above the membrane are then sutured to obtain primary closure.<sup>12</sup>

**4. Cortellini and Tonetti<sup>13</sup>:**

Further improved the results by using

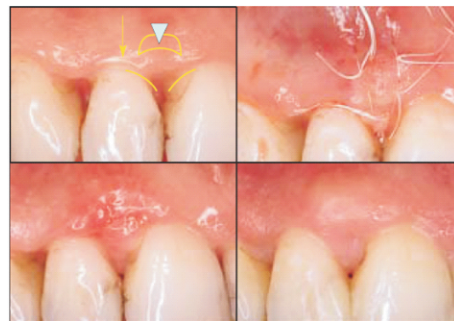
microsurgical approach. Surgeries were performed with the aid of an operating microscope at a magnification of ×4-16. Microsurgical instruments and blades were utilized for the procedure. The advantage includes improved illumination, access and magnification of the surgical field

**III. Papilla reconstruction**

After elimination of the inflammation, specific techniques have been proposed to reconstruct the interdental tissues.

**1. Pedicle flap:** This technique<sup>14</sup> basically combine the roll technique and papilla preservation technique.<sup>16</sup> In correspondence to the lost interproximal papilla, a palatal split-thickness flap is dissected and labially elevated. The flap is folded on itself and sutured to create the new papilla between the two incisors. A periodontal dressing is applied on the palatal aspect only to support the papilla.

**2. Semilunar coronally repositioned flap:** This approach<sup>7,17</sup> is mainly based on a flap design reported previously by Tarnow.<sup>18</sup> In their modification for papilla reconstruction, they recommended placing the semilunar incision in the interdental region (Figure 6). Intrasulcular incisions are also made around the mesial and distal half of the two adjacent teeth to free the connective tissue from the root surfaces to allow the coronal displacement of gingivo-papillary unit. To maintain position, the measured amount of the sub epithelial connective tissue obtained from the palate is stuffed further into the semilunar incision and in to the pouch like space coronal to the incision. The authors claim that the procedure may be repeated a second and third time after 2 to 3 months of healing to reach the goal of papilla reconstruction.



**Figure 6:**

- Top left: Technique to increase interproximal papilla: semilunar incision allows for positioning of connective tissue graft beneath the coronally positioned interdental tissue.
- Top right :interdental papilla at the removal of sutures after 2 weeks.
- Bottom left: Healing after 1 month .
- Bottom right: Healing after 3 months.

**3. Envelop type flap<sup>19</sup>:**

An intrasulcular and buccal incision is made across the interdental papilla to be reconstructed, at the level of CEJ. An envelope type split thickness flap is elevated buccally and palatally. The buccal portion of flap is dissected well beyond the mucogingival line, leaving the periostium and a thin layer of connective tissue on the bone. The palatal portion of flap, is also split thickness, includes the interdental papilla. A connective tissue graft of adequate size and shape was placed under the flaps in recipient site to provide more bulk in the papillary region and the buccal and palatal flaps are then sutured together with the connective tissue graft underneath.

**4. Microsurgery:**

The surgery is accomplished without the use

of releasing incisions, thereby increasing the likelihood of donor tissue survival and minimizing tissue trauma, excessive bleeding, scarring, and pain. Because, the vascular supply remains intact, donor tissue survival is optimized.

**Other techniques of consideration includes :**

5. Papilla reconstruction using platelet rich fibrin:
6. Micronised Acellular Dermal Graft for use in Interproximal Papillae Regeneration.
7. Root Coverage and Papilla Reconstruction Using Autogenous Osseous and Connective Tissue Grafts.
8. Interproximal papilla augmentation procedure .

**Conclusion**

Rebuilding the pink gingival esthetic is an important issue in modern esthetic dentistry. An increased cosmetic demand from the profession and patients has resulted in more emphasis on the gingival esthetic. Thorough treatment planning is essential for maintenance of the height of the interproximal papillae following tooth removal. Periodontal plastic procedures can be used to enhance the ultimate outcome.

**Reference**

1. Oliveira JD, Storrer CM et al. Papillary regeneration: anatomical aspects and treatment approaches. *RSBO*. 2012 Oct-Dec;9(4):448-56
2. Arunachalam LT et al. A novel surgical procedure for papilla reconstruction using platelet rich fibrin. *Contm clin Dent* 2012 Oct;3(4):467-70.
3. Prato GP, Rotundo R, Cotellini P, Tinti C, Azzi R. Interdental papilla management: a review and classification of the therapeutic approaches. *Int J Periodontics Restorative Dent*. 2004 Jun;24(3):246-55.
4. Ingber JS. Forced eruption. I. A method of treating isolated one and two wall infrabony osseous defects-rationale and case report. *J Periodontol* 1974;45:199-206.
5. Blatz MB, Hürzeler MB, Strub JR. Reconstruction of the lost interproximal papilla: Presentation of surgical and nonsurgical approaches. *Int J Periodontics Restorative Dent*. 1999;19:395-406.
6. Kokich VG. Esthetics: The orthodontic-periodontic restorative connection. *Semin Orthod*. 1996;2:21-30.
7. Han TJ, Takei HH. Progress in gingival papilla reconstruction. *Periodontol* 2000.1996;11:65-8.
8. Shapiro A. Regeneration of interdental papillae using periodic curettage. *Int J Periodontics Restorative Dent*. 1985;5:27-33.
9. Takei HH, Han TJ, Carranza FA, Jr, Kenney EB, Lekovic V. Flap technique for periodontal bone implants. Papilla preservation technique. *J Periodontol*. 1985;56:204-10.
10. Cortellini P, Prato GP, Tonetti MS. The modified papilla preservation technique. A new surgical approach for interproximal regenerative procedures. *J Periodontol*. 1995;66:261-6.
11. Singh VP, Uppoor AS, Nayak DG, Shah D. Black triangle dilemma and its management in esthetic dentistry. *Dent Res J (Isfahan)* 2013 May;10(3):296-301.
12. Cortellini P, Prato GP, Tonetti MS. The simplified papilla preservation flap. A novel surgical approach for the management of soft tissues in regenerative procedures. *Int J Periodontics Restorative Dent*. 1999;19:589-99.
13. Cortellini P, Tonetti MS. Microsurgical approach to periodontal regeneration. Initial evaluation in a case cohort. *J Periodontol*. 2001;72:559-69.
14. Beagle JR. Surgical reconstruction of the interdental papilla: Case report. *Int J Periodontics Restorative Dent*. 1992;12:145-51.
15. Abrams L. Augmentation of the deformed residual edentulous ridge for fixed prosthesis. *Compend Contin Educ Gen Dent*. 1980;1:205-14.
16. Evian CI, Corn H, Rosenberg ES. Retained interdental papilla procedure for maintaining anterior esthetics. *Compend Contin Educ Dent*. 1985;6:58-64.
17. Carnio J. Surgical reconstruction of interdental papilla using an interposed subepithelial connective tissue graft: A case report. *Int J Periodontics Restorative Dent*. 2004;24:31-37.
18. Tarnow DP. Semilunar coronally repositioned flap. *J Clin Periodontol*. 1986;13:182-85.
19. Azzi R, Etienne D, Carranza F. Surgical reconstruction of the interdental papilla. *Int J Periodontics Restorative Dent*. 1998;18:467-74.