Interdental Papilla Management “Reality or A Myth” - A Review

Satish Kaliappan1, Abhinav Jha2, Abhijeet Alok3, Namrata Kumari4
1Professor and Head, Department of Periodontics and Implantology, Sarjug Dental College and Hospital, Darbhanga, Bihar, India. 2Senior Lecturer, Department of Oral Pathology and Microbiology, Sarjug Dental College and Hospital, Darbhanga, Bihar, India. 3Senior Lecturer, Department of Oral Medicine and Radiology, Sarjug Dental College and Hospital, Darbhanga, Bihar, India. 4Dental Officer, Department of Dentistry, Ex-Serviceman Contributory Health Schemes, Sitamarhi, Bihar, India

Interdental papillary recession has been esthetical as well as an oral hygiene maintenance problem for the patients. Abnormal tooth shape, improper contours of prosthetic restorations, and traumatic oral hygiene procedures may also negatively influence the outline of the interdental soft tissue. There are very fewer surgical techniques to create interdental papilla, which has been very technique sensitive and less predictive in treatment outcome; in this article, a review is attempted to illustrate various causes, classification, and management of interdental papilla.

**Keywords:** Gingival recession, Interdental papilla, Muco-gingival surgery, Periodontal plastic surgery

**INTRODUCTION**

The term periodontal plastic surgery was introduced in the late 1980s and consists of a broad range of procedures aiming at correcting or eliminating anatomic, developmental, or traumatic deformities of the gingiva or alveolar mucosa.1,2 One of the major esthetic challenges in periodontal plastic surgery is related to the ability of rebuilding lost papillae in the maxillary anterior segment.3,4 The presence of such interproximal space results in esthetic and phonetic problems.

Interdental papillae can be lost as a result of several distinct clinical situations.5 The first in the presence of a naturally occurring midline diastema. This situation can be remedied with orthodontic treatment, positioning the teeth closer together.6 Diverging roots are another situation that can result in the presence of an interproximal space when the contact point between the two clinical crowns is situated too incisally. Orthodontics may also correct such a clinical situation by aligning the roots and “squeezing” the interproximal soft tissue, thereby creating a new papilla. A clinical crown that tends to be triangular in shape can also result in a partial interproximal space? This happens because of an accentuated discrepancy in the mesiodistal width at the incisal edge and gingival line. Reshaping the clinical crown is helpful in reducing the interproximal opening.7

**DEFINITION**

The interdental papilla is defined as the gingival tissue extending from the incisal tip of the papilla to a line tangential to the gingival margins of the two adjacent teeth.

**MORPHOLOGY OF INTERDENTAL PAPILLA**

It depends on (i) the contact relationship between the adjacent teeth, (ii) the distance from the contact point to the crest of the bone, (iii) when the vertical distance from the contact point to the crest of the bone is 5 mm or less, the papilla is present almost 100% of the time (iv) when the distance is 6 mm or more, the papilla is usually missing.

**ETIOLOGY**

- Plaque-associated lesion
- Abnormal tooth shape
- Improper contours of the prosthetic restorations
- Traumatic oral hygiene habits
- Postperiodontal flap surgery

There may be several factors contributing to the loss of papilla height and the establishment of “black triangles”
between teeth. The most common reason in the adult individual is a loss of periodontal support due to plaque associated lesions. However, abnormal tooth shape, improper contours of prosthetic restorations, and traumatic oral hygiene procedures may also negatively influence the outline of the interdental soft tissue.

A true loss of a previously existing interdental papilla can occur as a result of periodontal disease processes or as a result of periodontal surgery procedures. Tarnow et al. suggest that partial loss of the soft tissue might occur with the surgical reflection of the interproximal tissue in areas in which the distance between the contact point and the crest of the interdental bone is >5 mm. Therefore, it is not unusual for the clinician to encounter situations; predictable surgical reconstruction of a lost papilla is not reality yet.

Surgical techniques aiming at correcting the “black hole problem” have been used mainly with free epithelialized gingival grafts, repeated interproximal curettage, or displacement of the interproximal palatal tissue in the buccal direction. While limited success has been achieved with these procedures, the major limited factor for the complete and predictable survival of the graft tissues is the lack of a minimal source of blood supply.

The healing principles on which the subepithelial connective tissue graft for root coverage and ridge augmentation is based (double blood supply) have been applied to the reconstruction of the interdental papilla, thus increasing both the success rate and predictability.

**CLASSIFICATION OF INTERDENTAL PAPILLA LOSS**

Nordland and Tarnow (1998) proposed a classification system regarding the papillary height adjacent to natural teeth, based on three anatomical landmarks: The interdental contact point, the apical extent of the facial cementoenamel junction (CEJ), and the coronal extent of the proximal CEJ (Figure 1).

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

In an observational study in humans, Tarnow et al. (1992) analyzed the correlation between the presence of interproximal papillae and the vertical distance between the contact point and the interproximal bone crest. When the vertical distance from the contact point to the crest of bone was 5 mm or less, the papilla was present almost 100% of the time; whereas if the distance was 6 mm or more, most commonly only partial papilla fill the embrasure between the teeth. Considering that a supracrestal connective tissue attachment zone of approximately 1 mm is normally found (Gargiulo, 1961), the observation indicates that the biological height of the interdental papilla may be limited to about 4 mm. This interpretation is supported by the observation that in interdental areas denuded following an apically repositioned flap procedure, an up growth of around 4 mm of soft tissue had taken place 3 years after surgery (Van der Velden 1982). Hence, before attempts are made to surgically reconstruct an interdental papilla, it is important to carefully assess both (1) the vertical distance between the bone crest and the apical point of the contact area between the crown and (2) the soft tissue height in the interdental area. If the distance between the bone crest and contact point is 5 mm and the papilla height is <4 mm, surgical intervention for increasing the volume of the papilla could be justified to solve the problem of an interdental “black triangle.” However, if the contact point is located >5 mm from the bone crest, because of loss of periodontal support and or an inappropriate interdental contact relationship between the crowns; means to apically lengthen the contact area between the teeth should be selected rather than a surgical attempt to improve the topography of the papilla. If loss of papilla height is caused by soft tissue damage only from oral hygiene devices, the interdental proximal hygiene procedures must be initially discontinued to allow soft tissue recovery and then successfully modified to eliminate or minimize the traumatic injury to the papilla.

Papilla presence index (PPI) by Cardropoli et al. (2004)
- PPI score 1 - Papilla completely present
- PPI score 2 - Apical to contact point
- PPI score 3 - Apical and CEJ visible
- PPI score 4 - Apical to both CEJ.
TREATMENT

Treatment modalities depend on the following criteria, whether the loss is related to soft tissue damage only or loss caused by severe periodontal diseases with interproximal bone resorption.

**Basic Treatment Modalities**

1. Surgical method
2. Non-surgical method
   i. Correction of traumatic oral hygiene habits
   ii. Prosthetic/restorative approach
   iii. Orthodontic approach
   iv. Repeated curettage of the papilla.

**SURGICAL METHODS OF MANAGING INTERDENTAL PAPILLA**

**Papilla Recontouring**

In the presence of gingival enlargement, the excess tissue should be eliminated to remodel the soft tissue architecture in the case of drug-induced hyperplasia, idiopathic gingival hyperplasia, etc. A gingivectomy may be performed.

**Surgical Techniques**

Several case reports have been published regarding surgical technique for reconstruction of deficient papilla (Beagle 1992, Han and Takie 1996, Azzi et al. 1998). However, the predictability of the various procedures has not been documented, and no data are available in the literatures providing information on the long-term stability of surgically regained interdental papillae.

Beagle (1992) described a pedicle graft procedure utilizing the soft tissues palatal of the interdental papilla.

**Technique**

A split thickness flap is dissected on the palatal aspect of the interdental area. The flap is elevated labially, folded and sutured to create the new papilla at the facial part of the interdental area. A periodontal dressing is applied on the palatal aspect only, to support the papilla.

Han and Takie (1996) proposed an approach for papilla reconstruction (semilunar coronally repositioned papilla) based on the use of free connective tissue graft (Figure 2).

**Technique**

A semilunar incision is placed in the alveolar mucosa facial to the interdental papilla and a pouch like preparation is performed into the interdental area. An intrasulcular incision is made around the mesial and distal half of the two adjacent teeth to free the connective tissue from the root surface to allow a coronal displacement of the gingival papillary unit. A connective tissue graft, taken from the palate, is placed into the pouch to support the coronally positioned interdental tissue.

Azzi et al. (1998) described a technique, in which envelope type flap was prepared for coverage of connective tissue graft.

**Technique**

An intrasulcular incision made at the tooth surface facing the interdental papilla to be reconstructed. Subsequently, an incision placed across the facial aspect of the interdental papilla and an envelope type split thickness flap is elevated into the proximal site as well as apically to and beyond mucogingival line. A connective tissue graft is harvested from the tuberosity area, trimmed to adequate size and shape and placed under the flap in the interdental papillae area; the flaps are brought together and sutured with the connective tissue graft (Figure 3).

**CONCLUSION**

The above techniques showed that using an interposed subepithelial connective tissue graft can regenerate lost interdental papilla, and the reconstructed papilla remained stable and without any clinical signs of inflammation for 4 years after surgical procedure, but the long-term survivability and the technique sensitivity involved in the surgery to considered.

**REFERENCES**


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