



Reconstruction of Interdental Papillae using Composite Resin Restoration and Modified Coronally Advanced Flap Technique with Sub-Epithelial Connective Tissue Graft- A Case Report with 1- Year Follow-Up

Liberia Libertina Dsouza¹, Sandeep Anant Lawande^{2*}, Kathleen Manuela Dsouza³ and James Samuel⁴

¹Former Postgraduate Student, Department of Periodontics, Goa Dental College and Hospital, Bambolim, Goa, India

²Professor, Department of Periodontics, Goa Dental College and Hospital, Bambolim, Goa, India

³Lecturer, Department of Prosthodontics, Goa Dental College and Hospital, Bambolim, Goa, India

⁴Professor and Head, Department of Periodontics, Goa Dental College and Hospital, Bambolim, Goa, India

***Corresponding Author:** Sandeep Anant Lawande, Department of Periodontics, Goa Dental College and Hospital, Bambolim, Goa, India

Received: February 27, 2023

Published: March 18, 2023

© All rights are reserved by **Sandeep Anant Lawande., et al.**

Abstract

Interdental papillae form part of the gingiva that occupy the cervical embrasures of the interdental papillary house. Absence or loss of interdental papillae gives rise to cosmetic defects known as “gingival black triangles” that complicate phonetics, lead to plaque accumulation, lateral food impaction, dental hypersensitivity and root caries. Although numerous non-surgical and surgical techniques have been attempted, reconstruction of interdental papilla remains daunting task in aesthetic procedures.

In this case report, class I defect was corrected by composite resin restoration. Whereas, the class II defect, treated using composite resin restoration and periodontal plastic surgical technique demonstrated an adequate gain in the papillary height and volume, increased keratinisation and complete recession coverage of the affected teeth at 1 year follow-up. However, increased contact point to the bone crest distance and large surface area to be reconstructed resulted in near complete fill of class II defect. Hence, this interdisciplinary approach satisfied the patient's aesthetic requirement.

Keywords: Gingival Black Triangles; Sub-Epithelial Connective Tissue Graft; Papilla Reconstruction; Interdental Papilla; Periodontal Plastic Surgery; Composite Resin

Introduction

Interdental papillae involve part of the gingiva, filling the interdental spaces between adjacent teeth. The architecture of this apparatus acts as a biologic barrier in protecting the periodontal structures and plays a critical role in esthetics and phonetics [1].

The loss or absence of interdental papillae often leads to open gingival embrasures called ‘gingival black triangles’, that create problems in esthetics, phonetics, plaque accumulation, lateral food impaction, dental hypersensitivity and root caries [2,3]. They are more prevalent in adults and rank third among the uneesthetic defects after carious lesions and dark crown margins [3,4]. It's multifactorial aetiology includes, periodontal disease, traumatic oral hygiene procedures, loss of teeth, inter-proximal spacing, increased

contact point to bone crest distance (>5mm), thin gingival biotype, ageing, pathological migration, diverging roots, abnormal crown shape; iatrogenically, consequent to improper contours and margins of restorations, post orthodontic treatment, post periodontal and orthognathic surgeries [3].

Various techniques reported in the literature have been found to be technique-sensitive, unpredictable and limited to case reports and prospective studies with lack of long-term follow-up [3,5]. The present case report is the first to describe an interdisciplinary approach using composite resin restorations and modified coronally advanced flap technique with connective tissue graft in the treatment of plaque-induced class I and class II papillary defects with a 1 year follow-up.

Case Report

A systemically healthy female aged 35 years, visited the Department of Periodontics with a chief complaint of black spaces in her upper left front teeth. On clinical examination [Figure 1a] the patient presented with a high smile line; root recession, plaque accumulation and bleeding on probing in the left maxillary central (21) and lateral (22) incisors. In addition, 22 had a bulbous, irregular, over contoured, discoloured composite restoration which was done 10 years back. Based on Norland and Tarnow's [4] classification, class I papillary loss [Table 1] was observed between the maxillary central incisors (11 and 21) and spacing with loss of interdental papilla between 21 and 22. Intraoral radiograph [Figure 1b] revealed horizontal bone loss up to the middle third of the roots between 21 and 22.

The patient was subjected to meticulous scaling and root planning. Following removal of the old restoration, a diastema of 3mm was noted between 21 and 22. The patient was not keen on undergoing orthodontic treatment due to the prolonged duration of treatment. She was also given the option of porcelain veneers for 21, 22 and 23. However, the patient insisted on a more conservative approach and finally consented to undergo treatment with composite resin restorations. The direct composite restorative technique using a combination of A1 and A2 shade composite resins (Tetric N Ceram, Ivoclar Vivadent, India) were used to build contact point between 21 and 22 and shift the contact point gingivally between 11 and 21 [Figure 1c-d]. Class II papilla defect was evident between 21 and 22 immediately following the restoration, which demanded an additional surgical approach.

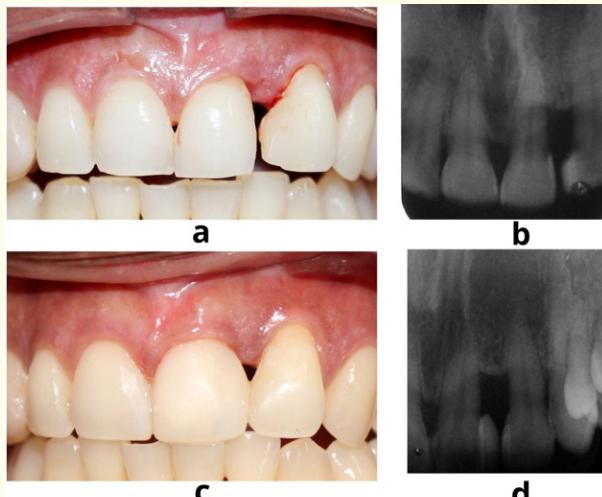


Figure 1: Preoperative view.

- Frontal view at baseline
- Intraoral radiograph at baseline
- Frontal view after composite restorations
- Intraoperative radiograph after composite restorations

Surgical approach

The surgical area was anesthetized using 2% lignocaine with 1:80,000 adrenaline. The flap design was based on the technique advocated by Zucchelli and de Sanctis [6]. Submarginal oblique interdental incisions together with the intrasulcular incisions were given at the mesial/distal margins of the recession defects, to form the surgical papillae of the envelope flap. The flap was then raised with a split-full-split approach in the corono-apical direction [Figure 2a-b].

Following this, the sub-epithelial connective tissue graft (1.5 mm thickness) harvested from the palate using a single incision technique [7], was shaped to fit the interproximal area and extended laterally to cover the recession defects of the adjacent teeth at the recipient site. The flap was then coronally advanced and stabilized using interrupted, vertical mattress and suspensory suturing techniques with 5-0 monocryl resorbable sutures [Figure 2c-d]. The surgical area was covered with a periodontal dressing (Coe-pak, GC, USA) and acrylic resin palatal stent.



Figure 2: Intra-operative view.

- Intrasulcular and oblique sub-marginal interdental incisions mesial and distal of 21
- Split thickness flap elevation
- Harvested sub-epithelial connective tissue graft
- Recipient flap coronally advanced and sutured

Post operative care

Post-operative instructions were given and antibiotic (Amoxicillin 500 mg 8 hourly for 5 days) along with analgesic (Ibuprofen 400 mg 8 hourly for three days) and 0.2% chlorhexidine gluconate twice daily for 2 weeks were prescribed. The postoperative healing was uneventful. The patient was called for a periodic follow-up and effective plaque control measures were reinforced at every follow up visit.

Results

Class I defect was corrected by composite resin restoration. At 6 months, an increase in the height and volume of the papilla with decrease in the size of the black triangle was observed between 21 and 22 [Table 1]. The reconstructed papilla had a triangular shape with a blunt tip, followed the proximal contours of the adjacent teeth and showed no signs of inflammation [Figure 3b]. These findings were stable at 1 year. The patient was overwhelmed with her smile [Figure 3c-d].



Figure 3: Postoperative view.

- a. 15 days
- b. 6 months
- c. 12 months
- d. Patient satisfied with her smile.

Discussion

Gingival black triangles have a multifactorial aetiology with plaque-associated periodontal disease being the most common. Hence, the treatment varies based on the aetiological factor, but is favourably managed by an interdisciplinary team work. Several non-surgical approaches such as orthodontics, prosthetic procedures, repeated curettage of the interdental papilla, photobiomodulation using lasers, tissue volumizing with hyaluronic acid, platelet-rich fibrin and tissue engineering methods are known to modify the interproximal space and soft tissues. Surgical techniques using pedicle grafts, free gingival grafts, connective tissue grafts and bone grafts, aim to preserve, recontour and reconstruct the soft tissue

between the teeth and the implants, with varied success. Microsurgery has also revolutionized the surgeon's ability to handle delicate papillary tissue, facilitating better visualization, lesser tissue trauma and enhanced aesthetics [1,3,5]. However, the limited vascular supply and small dimension of the interdental area for manipulation and grafting make these techniques challenging, technique sensitive, and less predictable. Despite an array of these techniques, there is no gold standard set due to lack of large number of clinical trials with long term follow-ups [5,8].

In the present case the restorative approach using composite resin not only corrected the class I papilla defect but also determined the height and shape of the interdental papillae, and stabilized the recipient flap with connective tissue graft via suspensory sutures looped around the contact area, which prevented the apical migration of the gingivo-papillary unit.

The advantage of the modified coronally advanced surgical technique used in the present case is related to its split-full-split approach which ensures good blood supply and anchorage in the inter-proximal areas, facilitates the coronal displacement, enhances complete root coverage, reduces flap shrinkage during healing and prevents unaesthetic visible white scars (keloids) [5].

The connective tissue graft employed as a biological matrix ensured adequate blood supply by in-growth of capillaries, counteracted the dead space, reduced flap shrinkage, improved the gingival biotype, increased width of the existing gingiva and enhanced root coverage of the affected teeth. It also increased the bulk and thickness of interdental gingiva that may have induced "creeping" papillary formation [3,4]. Concurrent to the present case, Nemcovsky reported an increased papilla reconstruction with connective tissue graft, achieving success in 8 out of 10 procedures [8].

Despite gain in volume and height of the papilla between 21 and 22, complete reconstruction was not achieved in the present case. This was mainly attributed to increased contact point to bone crest distance (9mm). Tarnow, *et al.* stated that complete papilla fill occurs when the distance from the contact point to the interproximal bone crest is 5mm or less [2]. Muthukumar S., *et al.* demonstrated that augmentation of interdental papilla with autogenous bone graft and subepithelial connective tissue graft in class III papilla defect resulted in predictable aesthetic results [9].

Another reason for incomplete papilla fill was the wide interproximal area and large volume of papilla to be filled. Carnio., *et al.* achieved complete reconstruction of large interproximal areas after multiple surgical procedures with connective tissue graft [10]. In addition, pressure exerted at the surgical site by the lips and wound tension during healing; and tissue memory can also create a tendency to pull the papillary tissue back to its original position [9].

In the present case, the interdisciplinary approach improved the papilla fill from Tarnow's class II to class I between 21 and 22. Despite not achieving complete papillary fill, the patient was overwhelmed and satisfied with her smile and did not opt for additional surgical interventions. Hence, the patient's aesthetic satisfaction was a defining factor in establishing the success of this treatment approach.

Thus, knowledge and thorough understanding of factors affecting the integrity of the interdental papilla is required for diagnosis and sequential treatment planning for papilla reconstruction. Future long-term clinical studies with larger sample size and minimally invasive incision designs need to be carried out to confirm the predictability and stability of the treatment approaches.

Conclusion

The interdisciplinary (restorative -periodontic) approach using composite resin and modified coronally advanced flap technique with sub-epithelial connective graft can be effectively used in the reconstruction of interdental papilla. However, the contact point to bone crest distance should be considered as a significant factor in deciding the treatment plan.

Conflict of Interest

None.

Bibliography

1. Gonzalez MK., *et al.* "Interdental papillary house: a new concept and guide for clinicians". *International Journal of Periodontics and Restorative Dentistry* 31 (2011): 87-93.
2. Tarnow DP., *et al.* "The effect of the distance from the contact point to the crest of bone on the presence or absence of the interproximal dental papilla". *Journal of Periodontology* 63 (1992): 995-996.
3. Prato GP., *et al.* "Interdental papilla management: a review and classification of the therapeutic approaches". *International Journal of Periodontics and Restorative Dentistry* 24 (2004): 246-255.
4. Nordland WP., *et al.* "A classification system for loss of papillary height". *Journal of Periodontology* 69 (1998): 1124-1126.
5. Cunliffe J., *et al.* "A literature review of the treatment of black triangles". *Journal of Dental and Maxillofacial Research* 2 (2019): 1-5.
6. Zucchelli G., *et al.* "Treatment of multiple recession-type defects in patients with esthetic demands". *Journal of Periodontology* 71 (2000): 1506-1514.
7. Liu CL., *et al.* "Connective tissue graft: a classification for incision design from the palatal site and clinical case reports". *International Journal of Periodontics and Restorative Dentistry* 22 (2002): 373-379.
8. Nemcovsky CE. "Interproximal papilla augmentation procedure: A novel surgical approach and clinical evaluation of 10 consecutive procedures". *International Journal of Periodontics and Restorative Dentistry* 21 (2001): 553-559.
9. Muthukumar S., *et al.* "Reconstruction of interdental papilla using autogenous bone and connective tissue grafts". *Journal of Indian Society of Periodontology* 20 (2016): 464-467.
10. Carnio J., *et al.* "Papilla reconstruction: interdisciplinary consideration for clinical success". *Journal of Esthetic and Restorative Dentistry* (2018): 1-8.