

## Non-surgical periodontal treatment for black triangle

Dita Saraswati Suwardi <sup>1</sup>, Theodora <sup>2</sup>, and Agung Krismariono <sup>3,\*</sup>

<sup>1</sup> *Periodontology Specialist Program Student, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, East Java, Indonesia*

<sup>2</sup> *Faculty of Medicine, Wijaya Kusuma University, Surabaya, East Java, Indonesia.*

<sup>3</sup> *Department of Periodontology, Faculty of Dental Medicine, Universitas Airlangga, Surabaya, East Java, Indonesia.*

World Journal of Advanced Research and Reviews, 2023, 19(02), 128–132

Publication history: Received on 17 June 2023; revised on 27 July 2023; accepted on 29 July 2023

Article DOI: <https://doi.org/10.30574/wjarr.2023.19.2.1527>

### Abstract

**Objective:** This case report aims to introduce the black triangle therapy in Miller's Class IV gingival recession.

**Methods:** The patient complained of spacing between the upper and lower teeth causing food accumulation, "long teeth", and receding gums which were unaesthetic during speaking. Clinical examination of the maxillary and mandibular anterior revealed Miller Class IV gingival recession, large black triangles, no tooth mobility nor pocket probing, and no gingival inflammation signs. Based on clinical and radiograph examination, nonsurgical therapy using gingival mask was the best option. Nonsurgical therapy using gingival mask was made using indirect technique with an elastomeric impression. An extra-soft soft liner was chosen for gingival mask materials.

**Results:** The black triangle was covered. The "long teeth" appearance and hypersensitivity were reduced.

**Conclusion:** Gingival masks is a good and predictable nonsurgical treatment option for treating black triangle in Miller Class IV gingival recession.

**Keywords:** Black triangle; Gingival mask; Gingival recession; Nonsurgical

### 1. Introduction

The interdental papilla is crucial to anterior aesthetics. The interdental papilla is one of the gingival elements that is situated in the cervical embrasure space on the proximal surface and expands to fill the lingual, buccal, and occlusal pyramidal regions of the interdental space. The interdental papillae appear triangular when viewed in two dimensions. Its shape, position and presence depend on the underlying alveolar bone[1]. In the case of periodontal disease, when there is alveolar bone loss, there will be an adjustment by the connective tissue and epithelial attachment so that the papillae decrease [2]. The loss of the interdental papilla causes a condition known as a black triangle, which is associated with bone loss, interproximal contact between teeth, gingival biotype, and crown form [3]. The etiology of the black triangle is multifactorial, including physiological, anatomical, and pathological factors [4, 5]. The absence of the periodontal ligament, the location of the interproximal contact, the length of the embrasure region, angulated roots, and triangular crowns are some of the factors that contribute to the black triangle [6]. Other causes of the appearance of a black triangle include trauma when brushing teeth, iatrogenic damage from unfavorable restorations, and repeated scaling and root planning [7]. Anatomical reasons include bone dehiscence, tooth misalignment, orthodontic movement, muscular stress, trauma due to malocclusion, and physiological (ageing) or pathological (smoking-related) factors can also result in gingival recession and the formation of a black triangle [8]. The black triangle can cause patients to complain of aesthetic, phonetic problems, food impaction, and difficulty maintaining oral hygiene [9, 10].

\* Corresponding author: Agung Krismariono

The interdental papilla serves as an aesthetic key in addition to serving as a barrier to the underlying periodontal tissue [11]. Dense connective tissue that extends as far as the proximal tooth surface and the cementum enamel junction (CEJ) forms up the interdental papilla, which is constrained in width by the contact between the teeth [6].

Therapy to overcome gingival damage can be done with surgical or non-surgical measures. Surgical therapy includes papilla recontouring, papilla preservation, and papilla reconstruction. Meanwhile, non-surgical treatment options include orthodontic, periodontal, restorative, and prosthetic approaches [12]. In many cases, the surgical treatment approach can achieve satisfactory results, but not a few state that surgical therapy related to papilla reconstruction is a difficult task [13]. Successful surgical therapy can mimic the original gingival contour. It is possible to correct the contour of the gingival tissue with surgical therapy if the damage is small, but surgical therapy will be unpredictable if the tissue damage that occurs is large [14].

The success of black triangle management therapy is determined by the diagnosis, therefore it is important to classify the severity of gingival recession. In this case, the classification used is the Miller classification. The Miller classification looks at the mucogingival junction (MGJ), the presence or absence of keratinized tissue (KT), and the state of interdental soft tissue/bone loss [15]. Based on the amount of marginal tissue, residual bone, and soft tissue support, Miller's categorization can be divided into four classes: class I, class II, class III, and class IV. According to Miller's categorization of class I gingival recession, there is no interproximal tissue loss and the recession does not extend to the MGJ. The MGJ looks to represent the limit of Class II Miller gingival recession, yet there is little interproximal tissue injury either. The marginal gingival recession extends or surpasses the MGJ in class III and IV, and there is interproximal periodontal tissue destruction, which results in varying degrees of root closure [8, 16].

In situations where conventional techniques, such surgery, are impractical, gingival prosthesis have been frequently utilized to restore tissue loss. An artificial gingiva, often referred to as a gingival mask, is a prosthesis worn on the labial side of the tooth arch that tries to restore the mucogingival shape and aesthetics in regions with weak periodontal tissue. The materials utilized to make gingival masks can range from silicone-based soft materials to porcelains, soft liners, composite resins, and thermoplastic acrylics [17].

Gingival mask is a conservative therapy, simple, and requires only basic skills. In addition, it is easy to do maintenance by the patient. However, it should be considered the drawbacks of this therapy such as patient co-operation, food impaction, and bacterial growth, discoloration that may occur in prostheses [6]. Gingival mask indications are in cases of loss of gingival contour in the concave labial arc, black triangle, exposed root surface, and/or crown margin problems, complaints of interdental food slipping, difficulty controlling saliva, speech disturbances, and root-dentin sensitivity. A gingival mask should not be used on patients who have poor oral hygiene, difficulties practicing dental hygiene, high caries activity or risk, inadequate periodontal treatment, or allergies to the fabrication materials. [14].

This case report will discuss the black triangle case with nonsurgical gingival mask therapy in patients with chronic periodontitis, which is non-invasive, stable, and clinically acceptable.

## 2. Case

A 48-year-old male patient came to the Periodontology Department of RSKGM-P Universitas Airlangga, Surabaya, wanting to continue treatment because his upper and lower anterior teeth looked long. Based on clinical examination in tooth region 12, 11, 21, 22, 23 shows the gums were up, there seemed to be spaces between his teeth so that it became food retention. In addition, the patient also complained of hypersensitive teeth when eating or drinking. The patient brushes his teeth twice a day, in the morning and at night. The patient denied having a history of high blood pressure, diabetes, asthma, heart disease, and had no history of drug or food allergies. The patient was also not taking any regular medication. The patient does not have a smoking habit. The patient has a history of chronic periodontitis and has been on phase 1 therapy.

In phase IV therapy for maintenance, clinical examination found Miller class IV gingival recession in the maxillary and mandibular anterior teeth area without pockets, inflammation, bleeding on probing, unsteadiness, or calculus. Labioversion maxillary anterior teeth were found. The patient had a thin and scallop gingival biotype. Examination of the gap between the bone's crest with the contact point exceeds 5 mm.



**Figure 1** Before using a gingival mask

### 3. Case Management

Phase I therapies such as supragingival and subgingival scaling have been performed using an ultrasonic scaler followed by polishing and oral hygiene instructions. Patients were prescribed 0.12% chlorhexidine mouthwash 2x1 a day, morning and evening. The patient was also splinted on teeth 33, 32, 31, 41, 42, and 41 to overcome the problem of degree 1 mobility in tooth 32, and degree 2 in tooth 31. Extraction of the remaining roots of tooth 13 was carried out. After one week of phase I therapy, the patient was evaluated for the maintenance phase, there was no bleeding on probing which indicated that the periodontal tissue was in a stable condition. Thus, it was decided to make a maxillary gingival restoration to address the patient's complaint. The gingival mask was made using an indirect technique using extra soft-soft liner material.



**Figure 2** After Using a gingival mask

After insertion, the patient was instructed to always clean the gingival mask after every meal and to remove it at night to rest the gingiva. The patient feels that his smile is improved, the complaints of toothache and food impaction are reduced.

### 4. Discussion

The interdental papilla can be lost due to trauma, periodontal disease, structural changes, and dental operations, as indicated by the black triangle. Additionally, it results in the development of open gingival embrasures, which can lead to issues with appearance, functionality, and health. Food slipping between teeth is a common functional issue, and medical issues including dentin hypersensitivity due to exposed root surfaces and constriction of associated gingiva can also result in aesthetic concerns since the teeth look longer. This pain arises due to roots that are not covered by alveolar bone and gingiva causing the teeth feel more sensitive to stimuli [4]. In this case, the treatment's primary objective is to alleviate the symptoms brought on by gingival recession and interdental papilla loss. The goal of the therapy is to reduce dentin hypersensitivity and enhance aesthetics.

Gingival recession generally occurs as a manifestation of inflammation due to the accumulation of plaque and calculus on the tooth surface. Interaction between bacteria and the host immune response can lead to tissue damage resulting in gingival recession. In these conditions, the proper care is scaling and root planing before further treatment [18]. Surgery or non-surgical therapy are both options for gingival recession therapy. When a patient has a thick gingival biotype and no periodontal ligament loss, surgical treatment is thought to be useful in addressing issues brought on by

gingival recession. Thick gingival biotype is important to consider because it is related to vascularity that affects the healing process. In addition, surgery may be performed if the papilla height is less than 4 mm and the distance between the bony crest and the contact point is 5 mm. In the case of a black triangle that already involves papilla loss, surgery may not be successful to achieve long-term stability and is unpredictable due to reduced blood supply in the interdental papilla which will affect the success of papilla regeneration. In order to maintain papilla integrity and prevent flap necrosis, the surgical approach needs a sufficient blood flow from the flap.

In this case report, non-surgical therapy using a gingival mask was chosen instead of surgical therapy because the patient does not have sufficient keratinized gingiva and interdental papillae for surgery [18]. The patient's age, thin and scalloped gingiva, the >5mm gap between the alveolar crest and the contact point, the length of the proximal contact point, the angulation of the anterior teeth, and the fact that the patient had already lost a significant amount of hard and soft tissue made surgical treatment unpredictable.

Gingival masks should only be used in Miller classes III and IV or when there is a gap of at least 5 mm between the contact point and the alveolar crest [6], while classes I and II can be treated with surgical techniques. This is related to the attachment of the gingival mask. The gingival mask is mechanically linked to the prosthesis via the prosthesis elongating between the proximal root gaps, saliva adhesion, and lip pressure. [17]. Miller's class I and class II recessions have no proximal fissures.

Gingival mask requires an acrylic base denture removable liner. This material is easy to shape and adapts to the patient's dental condition. Soft liner material has many advantages including being flexible and making it easy to fit and remove from the proximal gap without causing pain. The undercut of the gingival mask serves well as a retention prosthesis. Aesthetically, the soft liner material is also advantageous due to its transparent colour, so that when applied to areas with black triangles and recessions, the colour of the gingival mask will be almost the same as the original colour of the gingiva.

Nonsurgical therapy was chosen with the consideration of being more predictable in restoring the appearance and contour of the gingiva in Miller class IV cases to achieve the aesthetic goals of the patient's smile. In addition, the gingival mask which is a removable prosthesis is easy to clean and maintain oral hygiene. Surgical therapy is not a treatment option because it is unpredictable in restoring lost soft tissue.

After the installation of the gingival mask, the patient admitted that the dentin hypersensitive complaint was reduced. The reduced dentin hypersensitivity is due to the gingival mask covering almost the entire root surface exposed due to recession [19]. As the root surface on the palatal/lingual side is not completely covered by the gingival mask during the treatment, it is still feasible for an external stimulus to impact the tooth's nerve. The gingival mask covered practically the whole root surface, therefore this impact was minor. Additionally, it should be highlighted that a lack of material might result in faults in the surface and porosity, which could serve as an ideal environment for bacterial plaque colonization, leave a taste after usage, and absorb odors. So, it requires periodic maintenance and occasional revision [17]. The patient was instructed to clean after each meal and to remove the prosthesis at night to rest the gingival tissue.

---

## 5. Conclusion

The gingival mask is a non-surgical treatment option to overcome the black triangle in Miller class IV gingival recession because it is predictable, it only requires basic skills and does not require a lot of materials, it can also achieve patient's satisfaction and increase their confidence.

---

### Compliance with ethical standards

#### *Acknowledgements*

Authors wish to thank Dr. Mercia Sharon Kandou for providing the images and information related to this case.

#### *Disclosure of Conflict of interest*

No conflict of interest.

#### *Statement of informed consent*

Informed consent was obtained from all individual participant included in the study.

## References

- [1] Shenoy B S, Punj A, Ramesh A, et al. Salvaging the Lost Pink Triangle: A Case Series of Papilla Reconstruction. *Case Rep Dent*; 2020. Epub ahead of print 2020. DOI: 10.1155/2020/9735074.
- [2] Pugliese F, Hess R, Palomo L. Reprint of black triangles: Preventing their occurrence, managing them when prevention is not practical. *Semin Orthod* 2021; 27: 2-14.
- [3] Sudhakar DU, Arunachalam DLT, D BM, et al. Interdental papilla and various preservation techniques: A review. *Int J Appl Dent Sci* 2020; 6: 161-166.
- [4] Krismariono A. Gingiva tiruan sebagai perawatan alternatif untuk resesi gingiva ( Artificial gingiva as alternative treatment for gingival recession ) Case Report Gingiva tiruan sebagai perawatan alternatif untuk resesi gingiva ( Artificial gingiva as alternative treatm. *Periodontic J* 2012; 1: 10-14.
- [5] Krismariono A. Less invasive vestibule access tunneling with platelet-rich fibrin membrane for the treatment of gingival recession. *J Contemp Dent Pract* 2019; 20: 1024-1028.
- [6] Masraini Lubis P, Octavia Nasution R, Zulkarnain D. Black Triangle, Etiology and Treatment Approaches: Literature Review. 2018; 8: 241-244.
- [7] Mahajan A, Asi S, Rayast D, et al. Decision-making in classifying gingival recession defects - A systematic review. *Natl J Maxillofac Surg* 2019; 206-211.
- [8] Monika K, Sunkala L, Sandeep N, et al. Evaluation of root coverage with pedicled buccal fat pad in class III and class IV gingival recession defects. *Journal of Family Medicine and Primary Care* 2020; 9: 1656.
- [9] Zhang Y, Zhang Y, Wu H, et al. Application of Hyaluronic Acid as a Biopolymer Material in Reconstruction of Interdental Papilla in Rats. *Front Mater* 2021; 8: 1-12.
- [10] Sanchez-Perez A, Vela-García TR, Mateos-Moreno B, et al. Systematic review and meta-analysis of the use of hyaluronic acid injections to restore interproximal papillae. *Applied Sciences (Switzerland)*; 11. Epub ahead of print 2021. DOI: 10.3390/app112210572.
- [11] Turgut Çankaya Z, Tamam E. An examination of the 2-year results obtained from hyaluronic acid filler injection for interdental papilla losses. *Quintessence Int* 2020; 51: 274-284.
- [12] Nyush A, Chatterjee S, Mondol S, et al. Allied Sciences |Vol. 5|Issue 1|January-February PRITI DESAI International Journal of Research in Health and Allied Sciences |Vol. 5|Issue 1|January-February. *Int J Res Heal Allied Sci*, www.ijrhas.com (2019).
- [13] Abdelraouf SA, Dahab OA, Elbarbary A, et al. Assessment of Hyaluronic Acid Gel Injection in the Reconstruction of Interdental Papilla: A Randomized Clinical Trial the Creative Commons Attribution-NonCommercial 4.0 International License (CC BY-NC 4.0). *J Med Sci* 2019; 7: 1834-1840.
- [14] Ankli V, Limeira F, Yamauti M, et al. Gingival veneer used as prosthetic solution for esthetic-compromised malpositioned dental implant. *Contemporary Clinical Dentistry* 2018; 9: 123-127.
- [15] Imber JC, Kasaj A. Treatment of Gingival Recession: When and How? *International Dental Journal* 2021; 71: 178-187.
- [16] Agung Krismariono. Prinsip Dasar Perawatan Resesi Gingiva. *Dentika Dent J* 2014; 18: 96-100.
- [17] Chaudhary S, Agrawal H, Dhakal R, et al. View of Gingival mask for conservative management of gingival recession\_A case report.pdf. *Journal of Nepalese Prosthodontic Society* 2021; 4: 57-60.
- [18] Jamwal D, Kanade K, Singh Tanwar V, et al. Treatment of Interdental Papilla: A Review. *Galore Int J Heal Sci Res* 2019; 4: 1.
- [19] Oktawati SRI, Djais AI, Achmad H, et al. Gingival Mask as A Non-Surgical Treatment in Gingival Recession: A Literature Review. *Int J Pharm Res* 2020; 12: 4036-4039.