

Reconstruction of Pink and White Esthetic Balance Using Architectural Gingival Recontouring: A Case Report

Pradnya V. Bansode¹, Devika M. Kalaskar²

1. Professor and Head of the department, Department of Conservative dentistry and Endodontics, GDCH, Aurangabad, Maharashtra, India

2. MDS Student, Department of Conservative dentistry and Endodontics, GDCH, Aurangabad, Maharashtra, India.

Corresponding Author: Pradnya V. Bansode

Abstract: The composition of smile architecture includes pink gingiva and white tooth structure that complement each other in balance and harmony. "Black triangles" however may compromise the concord of a patient's smile. Black triangles are triangular spaces between the teeth caused due receded gingiva and/ or the absence of interdental papilla. Interdental papilla plays a significant role in establishing the harmony of smile. Its presence depends mainly on the distance between the crest of interdental alveolar bone and the base of the contact area.

To increase the emergence profile and to develop natural contours at the gingival-tooth interface the conventional technique using Mylar strip was modified. Mylar strip was pulled out of the sulcus by approximately 1 mm from the marginal gingiva and was stabilized using a small cotton pellet. This modified technique used to provide the emergence profile and to develop natural contours gives satisfactory results in a clinical situation.

Keywords: Black triangle; Contact point; Diastema closure; Emergence profile; Gingival contouring; Interdental bone

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I. Introduction

The harmony of a patient's smile is compromised in cases of midline diastema. Among the varied options for diastema closure such as orthodontics, restorative dentistry, and prosthodontics, restorative approach is commonly chosen as it is the simplest, fastest and the most predictable one.¹ But, sometimes it is difficult to satisfactorily close the diastema as it may result in unwanted development of black triangles.² Careful considerations in the gingival reconstruction that relies on the concepts of cervical contouring and location of the future contact point prevent the formation of a black triangle.

A number of studies were carried out to explore the factors that determine the presence of interdental papilla.³⁻⁸ A significant determinant in the presence or absence of the interdental papilla is the distance from the contact point (CP) to the alveolar bone crest (BC). According to a study by Tarnow et al. it was found that interdental papilla was often present when the CP-BC distance was 5 mm.³⁻⁵ So, in cases of diastema closure to prevent the formation of black triangle, a non-invasive technique was used to determine the distance between the future contact point and alveolar bone crest. Contact point location was further developed within a distance of 5mm from the alveolar crest in order to achieve complete papilla fill. Also, the traditional technique using Mylar strip was modified to increase the emergence profile with natural contours at the gingival-tooth interface. This paper describes a case report in which the diastema closure was successfully accomplished using direct adhesive restorations and gingival tissue recontouring technique.

II. Case report

A 21-year-old male reported to the department of Conservative dentistry and Endodontics, Government Dental College and Hospital, Aurangabad with a chief complaint of spacing in the middle of front teeth. On intra-oral examination a space of 2 mm was revealed between maxillary central incisors with an overall favorable oral hygiene [Figure1a and b]. Patient opted for a conservative restorative approach for management of diastema. Treatment plan involved closing the diastema using nonsurgical gingival contouring of the interdental papilla with the help of composite resin restorations.

A small piece of a temporary radiopaque material (MD- Temp Plus, MetaBiomed, Korea) was located between the teeth. This provided a landmark for determining the proper position of the future contact point. It

was placed in such a way that it was co-incident clinically with the location of interproximal soft tissue. [Figure 1c].

An intra-oral periapical radiograph was taken by using a paralleling technique for calculating the length of the interdental papilla non-invasively [Figure 1d]. The radiograph was placed over radiographic grid.⁶ Two values were obtained by using the radiograph, i.e, value a and value b. Value a (3mm) is the length from the most coronal portion of the crestal bone to the apical border of radiopaque material and b (5.25mm) is the length from the apical border of the radiopaque material to incisal edge of the central incisors [Figure 1e and f].

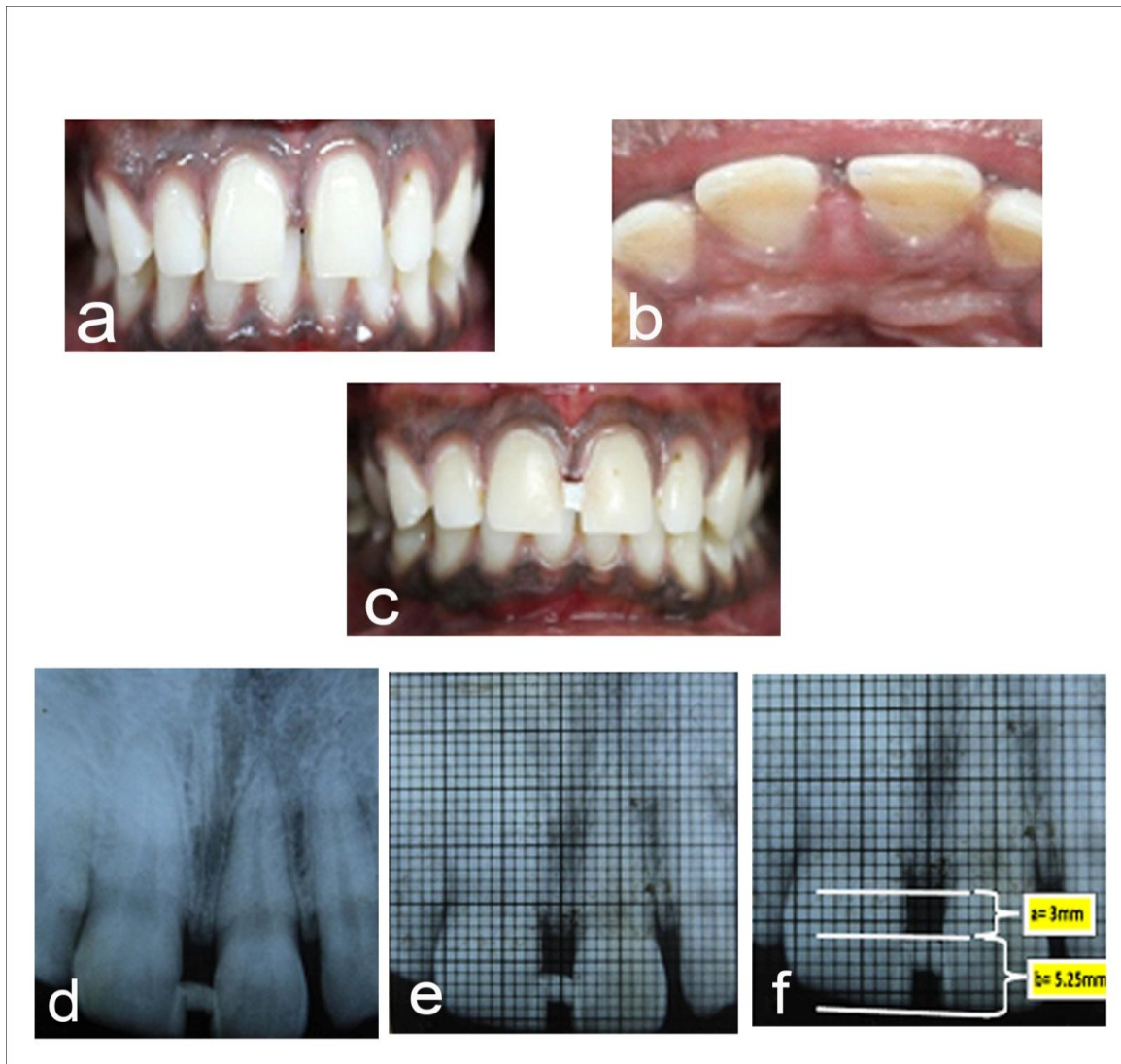


Figure 1: (a) Pre-operative intra-oral photograph, frontal view, revealing 2mm of midline diastema. (b) Pre-operative intra-oral photograph, intra-oral view, revealing 2mm of midline diastema and favorable oral hygiene. (c) Placement of temporary radiopaque restorative material between central incisors co-incident clinically with position of interproximal tissue. (d) An intra-oral periapical radiograph taken after placement of temporary radiopaque restorative material. (e), (f) An intra-oral periapical radiograph placed over radiographic grid to obtain values a and b; a=3mm and b=5.25mm.



Figure 2: (a) A study model fabricated and value, $y=5\text{mm}$, measured using this study model.
 (b) Value x , i.e., distance between crestal bone and coronal extent of the papilla to be calculated.
 (c) Using proportional expression actual length between crestal bone and the coronal extent of the papilla ($x=2.8\text{mm}$) calculated.
 (d) A wax mock up done on the study model that simulated a plan of esthetic closure.
 (e) Use of a narrowed Mylar strip and cotton pellet to increase emergence profile.
 (f) Water-balloon effect.
 (g) Post-operative intra-oral photograph after diastema closure using composite resin restorations demonstrating complete filling of interproximal area by tissue.

A study model was fabricated after taking an upper arch impression with irreversible hydrocolloid. Another value ($y=5\text{mm}$) was measured using this study model [Figure 2a]. Value y indicated length between top of the papilla and incisal edge of the central incisors.

Using a proportional expression, i.e., $a/b \propto x/y$ actual length between crestal bone and the coronal extent of the papilla ($x=2.8\text{mm}$) was calculated [Figure 2b and c]. Based on the findings of Tarnow's study, contact point was defined approximately 5.0 mm from the bone crest i.e at a distance of 2.2mm from tip of interdental papilla.

A wax mock up was done on the study model that offered a plan of esthetic treatment [Figure 2d]. Thereafter, the diastema closure using direct composite resin was completed.

In cases of large spacing between the teeth and thick gingival variety the creation of emergence profile is difficult. In order to overcome this difficulty, Willhite suggested the use of a narrowed Mylar strip and cotton pellet. This led to an increase in emergence profile and also provided gingival tissue recontouring.⁹ A Mylar strip was cut lengthwise and was seated into the gingival sulcus in such a way that it extended outside the sulcus by approximately 1 mm. Mylar strip was held in place with the help of cotton pellet [Figure 2e].

When pressure is applied to one area of a water balloon, the balloon swelled in another area. A very similar response was demonstrated by interdental papilla¹⁰ [Figure 2f]. This characteristic of fibrous and thick variety of interdental papilla proved to be very useful in development of emergence profile.

After 5 minutes, cotton pellet was removed and the empty space that was gained helped in achieving the gingival contouring. Narrowed Mylar strip was then set aside. After etching the tooth with 37% phosphoric acid and application of an adhesive, the tooth was built up with composite resin, shade A1 (Filtek Z-250 Universal Restorative, 3M ESPE, St. Paul, MN, USA). Each increment was adequately cured. The narrowed Mylar strip was used for developing gingival contour to the contact point and the remaining contour was sculpted using a full width Mylar strip. Finishing and polishing were accomplished with Sof-Lex disks and Sof-Lex strips (3M ESPE). Same procedures were carried out on the opposite tooth. Direct adhesive restorations and gingival re-contouring resulted in successful accomplishment of diastema closure in central incisors. It was seen that interdental space was completely filled with interdental papilla [Figure 2g].

III. Discussion

In order to obtain harmony between hard and soft tissues in cases of large midline diastemas with thick gingival biotype, it is necessary to choose procedures that induce the formation of interdental papilla between the teeth. It is necessary to develop the CP-BC distance of 5mm to achieve satisfactory results.³⁻⁸

Martegani et al. used a self-made resin device. This device bore a 5 mm radiographic metal piece.⁷ In this case, the actual length of study model was used to verify magnification.

De Araujo et al. used an invasive method by inserting a needle into the gingival tissue until reaching the bone crest.¹¹ A rubber stop indicated the penetration depth of the needle in the tissue. In this method, it was necessary to anesthetize the tissues.

Lee et al. registered a method of measuring the length of the interdental papilla non-invasively. They used radiopaque material and a periapical radiograph.¹² A 5 mm metal ball was attached to the teeth as a reference material.

The narrowed Mylar strip and cotton pellet improved access of resin instrument into the areas gingival to the contact point and improved visibility. Therefore, this modified approach is acceptable for the clinical situation.

IV. Conclusion

Among various other factors that determine the presence of interdental papilla, the most important parameter is the distance from the interdental crest to the apical portion of the contact point. Also, the narrowed Mylar strip and cotton pellet improved access of resin instrument into the areas gingival to the contact point and improved visibility. Therefore, this modified approach is acceptable for the clinical situation.

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Declaration of Patient Consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient has given his consent for his images and other clinical information to be reported in the journal. The patient understands that his name and initials will not be published and due efforts will be made to conceal his identity.

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