

“THE DREADED BLACK TRIANGLE” — ORTHODONTICS : THE CHOICE

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Abstract :

The secret to success for advanced esthetic dentistry is generally related to careful treatment planning, meticulous follow up and the professional dental team. This article describes a systematic approach to the treatment planning and aesthetic alteration of the “black triangle”.

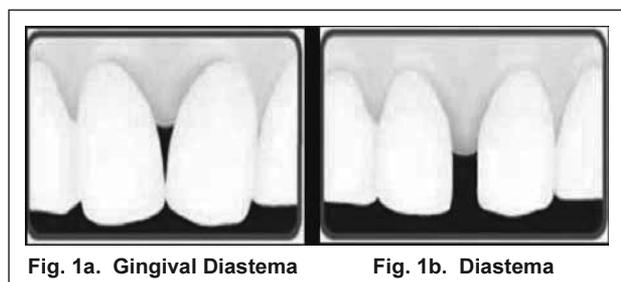
The black triangle that resulted due to orthodontic treatment in a 15 year old female patient had been alleviated by using both orthodontic and periodontic means. This report explains the various treatment modalities that can be adopted to avoid embarrassing post-treatment results. Several methods of managing patients with gingival diastemas exist, but the interdisciplinary aspects of treatment must be emphasized to achieve best results. The orthodontist can play a significant role in helping to manage these cases.

Introduction

Many a time in treatment of adult orthodontics cases, unravelling the incisors to correct the problem of crowding will often result in the unfortunate side effect - blunted papillae, though a dramatic improvement resulting in esthetics of tooth position is achieved¹.

The secret to success for advanced esthetic dentistry is generally related to careful treatment planning, meticulous follow up by the professional dental team involved.

The open gingival embrasure or gingival diastema (Fig.1) is a visible triangular space caused by the lack of interdental gingival papillae filling this area. Gingival diastemas may result from agenesis or malformation of central incisors; bone/dental discrepancy, habits or a relapse following orthodontic treatment.



The mean prevalence of black triangles in adolescent patients after correction of malposed incisors was reported to be 41.9% and 38% in adult patients post orthodontic treatment². Black spaces affect the esthetics of the smile and may cause loss of periodontal health due to chronic retention of food debris and subsequent gingival inflammation leading to abnormal gingival morphology.

This article describes a systematic approach to the treatment planning and aesthetic alteration of the “black triangle”.



Fig. 2a

Case report

This 15 year old female patient had crowded and overlapped maxillary central incisors (Fig.2a) and sought orthodontic consultation for “an improved smile”.

The correction was planned orthodontically. Bracket positioning modifications for force generation close to the center of resistance (CRes) of the two incisors was done by placing the brackets slightly more gingival to the calculated measurement. With all the procedures planned and executed systematically, an annoying black triangle resulted (Fig.2b) owing to the de-crowding of the triangular shaped incisors, which had to be corrected. Nevertheless, periodontal intervention with semilunar coronally repositioned flap (Fig.2e&f) with connective tissue graft from the palate (Fig.2c & 2d) was performed to achieve long term stability and success. A frenectomy too was performed to prevent any untoward forces on the incisive papilla (Fig.2g). In two months of post periodontal intervention, papillary recession due to cicatricial contraction of the graft tissue was observed leading to the 50% relapse of the black triangle. The situation was reassessed and the correction was re-planned orthodontically by altering the contour of the teeth involved. A proximal slenderization (Fig.2h) was performed at the incisal level contact area of the central incisors after calculating the bolton's ratio which showed maxillary anterior excess. The space closure was continued followed by placing bondable buttons more gingival to the brackets of both the incisors (Fig 2i & j). This design facilitated the maintenance of the tip during space closure owing to the retraction wire engaged in the slot and the teeth moved bodily towards each other when elastomeric chain was engaged on to the buttons. The disadvantage of this design would be that it could cause gingival irritation as the E-Chain would be engaged closer to the papilla.



Fig. 2b



Fig. 2c

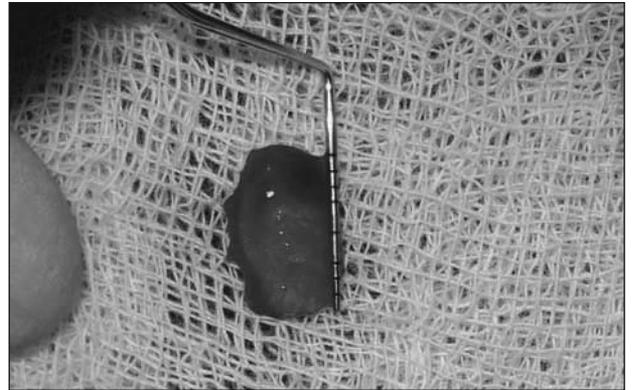


Fig. 2d



Fig. 2e



Fig. 2f



Fig. 2g

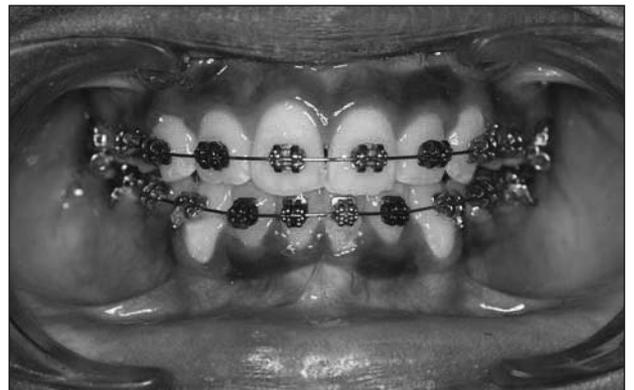


Fig. 2h



Fig. 2i



Fig. 2j



Fig. 2k

The incisors were brought to a good proximal contact maintaining good root parallelism (Fig 2k) as proposed by Kokich⁴.

Discussion

The mean prevalence of cervical diastema in post treatment adult orthodontic patients is about 38%. Burke et al³ reported a 41% prevalence of black triangles between maxillary central incisors previously overlapped among patients who had undergone orthodontic treatment. Prevalence of open gingival embrasures is greater in patients over 20 years and is attributed to the resorption of the alveolar crest.

Sarver⁵ explained that the approximal contact points are the exact place where the teeth “appear” to touch and these points progress apically as the teeth proceed more posterior. The connector height is greatest between the central incisors and diminishes from the central to the posterior teeth. The appropriate ratio for connector between the central incisors is 50% of tooth height. (Fig.3) The contact point between central incisors is closer to the incisal third rather than in the center of the clinical crown as in most teeth. This feature might explain their greater propensity for the occurrence of black triangles⁶.

For the orthodontist, the acceptable length of the open gingival embrasure was 2mm while the general dentist and lay people were unable to detect an open gingival embrasure unless it was at least 3mm. These variations in level aid the dental professional in making specific treatment recommendations.

Laser irradiation can be done to prevent or minimize the occurrence of post-orthodontic treatment black triangles as it reduces the levels of E2 prostaglandin (PGE2) and plasmin activator which are responsible for inflammation of the gingival tissue during orthodontic treatment⁷.

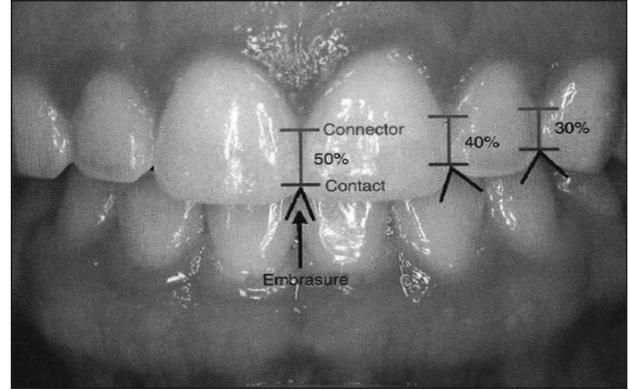


Fig. 3

Papillary reconstruction could be a solution to eliminate the black triangle. But the outcome is unpredictable and the risk of cicatricial contraction and necrosis of the conjunctive grafted tissue is unavoidable. However reconstruction of the maxillary midline papilla by orthodontic-periodontic intervention in adult patients is predictable in conditions with thin or wide gingiva⁸.

Turverson⁹ reported that triangular teeth exhibit contact points rather than contact areas which makes them more instable and more susceptible to crowding.

The morphology of the coronal portion of central incisors with divergent mesial surfaces can be corrected by reduction of enamel by stripping⁹. This selective reduction enhances the contact areas, with good oral hygiene, provides more stability to treatment. Composite build up can also be done but care should be taken that compression of papilla due to undue thickness of composite is avoided. This can also cause plaque retention and inflammation leading to subsequent problems which include discoloration especially near the margins which would compromise the esthetic outcome.

Conclusion

All etiological factors and treatment alternatives associated with an open gingival embrasure must be discussed with the patient before embarking on the procedure. A multidisciplinary approach must be considered mandatory if a successful clinical outcome is to be achieved. Through the interaction between different clinical disciplines and through the knowledge gained, the definition of a desirable smile has been refined and included in the finishing stage of anterior esthetics for our patients while individual variations are given a good consideration.

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