Facial Profile Changes in Class III Malocclusion through Orthodontic Treatment

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Abstract

Background: Facial profiles are part of the appearance that gets considerable attention from the patient. Most of the patient’s desired orthodontic treatment is more based on aesthetic considerations in which the facial profile is included. In class III malocclusion, facial profile problems become more pronounced, because generally in this case, the patient has a concave profile that is less appealing. Orthognathic surgery is often the only option to obtain ideal facial profile, while not all patients with this concave profile are willing to undergo the surgical treatment, both on the basis of psychological readiness and economic considerations.

Objective: This case report seeks to present a concave facial profile change in patients with class III malocclusion through orthodontic treatment.

Methods: Orthodontic tooth movement is a way to overcome the problems that exist in class III malocclusions in this case by considering the results of study model and cephalometric analysis, and clinical findings in extra and intra-oral examinations performed.

Results: There was a change in the profile of the patient’s concave face through non-surgical orthodontic treatment, and non-extraction except for third molars.

Conclusion: Careful case analysis and appropriate case selection can produce satisfactory changes to the patient’s aesthetic demands.

Keywords: Orthodontic Treatment; Class III Malocclusion; Facial Profile; Concave Profile

Introduction

Modern society is concerned with physical attraction, especially the face and hence facial aesthetics are the main focus not only for patients but also orthodontists [1-6]. This is increasingly felt because the importance of considering the attractive appearance of the face will greatly affect the patient’s self-confidence, although the perception of the attractive face itself is subjective, where the racial and ethnic factors, gender, age and culture plays an important role [7].

Aesthetic factors are also still the main attraction underlying the reasons for patients to undergo orthodontic treatment [2,8]. Related to this, the key factor in orthodontic diagnosis and treatment plan is a soft tissue evaluation which of course should include the patient’s aesthetic expectations [9,10]. In soft tissue evaluation, one of the facial characteristics that is usually the benchmark is the facial profile. Several angles can be used to evaluate this facial esthetic profile, one of which is proposed by Legan and Burstona in 1980, i.e. the convex angle formed by soft tissue glabella, subnasale or upper lip and pogonion reference points [1,11].

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In terms of facial profile changes, the position of the upper and lower incisors plays an important role, because the position of the anterior teeth affects the position of the lips. Changes in the position or inclination of the upper and lower incisors may alter the position of the lips which in turn affects the facial profile [12-14]. Therefore, orthodontic tooth movement either retraction or protraction should consider its effect on facial profile changes, in addition to other factors such as lip muscle tone [15-17].

This case report will show facial profile changes through orthodontic treatment by comparing the results of facial profile silhouette of the patient. Analysis of facial profiles with photographic notes is widely used because photographs allow some measurements to be easier to perform, besides more cheaper as well [1,2,18,19]. It’s expected that the results shown in orthodontic treatment of this case might be an inspiration that a simple, non-surgical action can be attempted to provide satisfactory results to patients.

Case Report

A female patient, A.W. 20 years old came by wanting to undergo orthodontic treatment for upper front teeth correction in the hope of improving the profile of his face. Clinical examination results show that the patient has several problems such as: missing tooth (lower right first permanent molar), malposition of the upper right and left second premolars, and also the lower left second premolar, reverse overbite and overjet, characteristic of class III malocclusions (Figure 1). The lateral cephalogram and the patient panoramic image are shown in figure 2 and the cephalometric analysis results show the skeletal pattern of class III with -60 of ANB angle (Table 1).

Figure 1: The patient's initial photograph shows the extra oral and intra oral conditions. Reverse overjet that is apparent in intra oral photographs has a role in shaping the patient profile. Malposition in some second premolar teeth in both the upper and lower jaws is a problem that demands attention.

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Figure 2: (a) The lateral cephalogram and (b) panoramic photo of the patient prior to orthodontic treatment. The lateral cephalogram shows the characteristics of class III malocclusion, both skeletal and dental. Panoramic photo also shows the missing teeth of the lower right permanent first molar and impact teeth.

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Table 1: Cephalometric analysis before treatment.

Treatment plan

Based on the clinical condition of the teeth and the patient profile pattern as seen in the silhouette form (Figure 3), the patient wishes for improvement without surgery. Thus, treatments prepared to address patient problems are: Full-arch braces two jaws/conventional orthodontic treatment with preadjusted brackets .018 slot, Roth prescriptions on the upper and lower jaws with no extraction. The mal-
position of upper right and left second premolars will be returned to a good dental alignment, as well as the lower left second premolar. Meanwhile, the space caused by the loss of lower right first molars is attempted to close by moving the lower right second molars. Another thing to be achieved through orthodontic treatment is overbite and overjet correction to obtain normal incisor relation and because there is an anterior crossbite, a glass ionomer cement onlay (GIC onlay) is used to allow jumping the bite (Figure 4).

**Figure 3:** Silhouette patient profile before treatment. The change in upper lip position is one of the reasons underlying the patient’s desire to undergo orthodontic treatment.

**Figure 4:** (a) Initial bracket placement full arch with glass ionomer onlays on posterior teeth to allow jumping the bite. (b) At the first control visit, the patient’s overbite has shown improvement - a jumping the bite occurs, as expected even though it is not perfect.
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The orthodontic treatment performed in this case uses the following arch wire sequence: leveling and aligning is performed using the initial arch wire of .014 NiTi. Furthermore .018 stainless steel arch wire with open coil spring in the upper right and left second premolars and lower left second premolar to create the room and correct the malposition of the teeth (Figure 5, 6). At this stage, the correction is also aimed at cross bites in the anterior region (Figure 7). After the teeth are corrected and reaching a good position within the dental arch, orthodontic treatment is continued by using a .016 x .016 NiTi arch wire to obtain a better alignment of teeth in the upper and lower jaws. At the same time, the GIC onlays can be removed. Entering the final stages of orthodontic treatment, a .017 x .025 NiTi arch wire is used for both upper and lower jaw accompanied by up and down elastic to obtain good interdigitation.

*Figure 5:* (a) Malposition of the upper right and left second premolars is corrected by providing space first with open coil spring (b). Similarly for the lower left second premolar (c).

*Figure 6:* Power chain is used to restore the position of the lower left second premolar into a good alignment.

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Treatment results

A non extraction orthodontic treatment performed on the patient has resulted in the expected change. Some of these changes include: dental malposition correction of upper and lower left second premolars, closing the space due to tooth loss (the first lower right molar) and correction of overbite and overjet, which can be seen in figure 7, 8 and 9. The patient's lateral cephalogram along with the orthopantomogram (panoramic photo) can be seen in figure 10. Pre and post-treatment cephalometric analysis can be seen in table 2, where the ANB angle becomes -20. Another important change seen through this cephalometric analysis is the FMA (Frankfort mandibular angle) that originally was 280 degrees has changed to 320. To satisfy patients’ curiosity about their profile changes, a comparison of patient’s pre and post-treatment silhouette is shown so that it will allow the patient to understand the changes in treatment outcomes that have been achieved (Figure 11).

Figure 7: (a) Patient’s overjet and overbite are well corrected. (b) Malposition of the second upper premolar both right and left and (c) the lower left second premolar has been successfully repositioned into a good alignment.

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Figure 8: Photographs of patient after treatment that exhibit extra oral and intra-oral conditions. Extra orally shows a more satisfactory profile of the patient. Intra orally, several problems have been resolved, especially the malposition of the second premolar both in the upper and lower left jaw.

Figure 9: Photographs of patients before and after treatment show changes achieved through orthodontic treatment.

Figure 10: (a) The patient’s lateral cephalogram and (b) panoramic photo after treatment. The incisors relationship have shown improvement by achieving good overjet and overbite. Impacted teeth have also been removed and the space resulting from the loss of the first lower right permanent molar has been successfully closed.

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**Discussion**

Patients with skeletal class III malocclusions are generally well aware of their facial profile in addition to the condition of their teeth. Therefore, facial profile changes generally also become part of the aesthetic correction that patients expect after treatment. The orthodontic treatment that has the ability to move teeth in three spatial areas is expected to provide optimal results to achieve treatment outcomes as well as patient expectations. Of course some limitations must be taken into account especially on the very severe class III skeletal malocclusion. The inclination of the teeth of both upper and lower incisors is also an important consideration, especially when there is a need for an inclination change that may compromise the condition of the supporting tissue.

Generally, under class III malocclusion conditions, there is an extreme malposition of the teeth, such as ectopic canines or in this case a palatal positioned of the second premolars. Malposition of the teeth as in this case often leads to the thought of extraction as well as the condition of the lower left second premolar, which is then followed by retraction of lower teeth with the hope of achieving a correction of the incisors relationship which will correct the patient's aesthetic profile. However, in this case, it is not an option and instead, the teeth with extreme malposition are retained and returned into the dental arch to help achieve the expected profile correction.

**Figure 11**: Silhouette before and after treatment. Problems in the upper lip area have shown satisfactory changes. Right permanent molar has been successfully closed.

**Table 1**: Cephalometric analysis before and after treatment.

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Efforts to improve the profile of class III malocclusion in this case are done by changing the angle of the gonion in order to encourage the mandible rotation downward and backward which will lead to the movement of pogonion point backward to overcome the problem of sagittal relationship which in turn would give beneficial effects for the patient’s facial profile. This changes particularly can be seen at the angle of FMA (gonion) in table 2. Before treatment, patient’s gonion angle is 28° and after treatment, patient’s gonion angle becomes 32°. This is believed to have influenced the change of ANB angle from -6° to -2°. Overall, this change is evident in the comparison of pre and post-treatment facial profiles which are quite satisfactory for the patient. Through facial profile analysis using three anatomical reference points: glabella, upper lip and soft tissue pogonion, the following measurements were obtained: pre-treatment profile angle is 177.50° and post-treatment profile angle becomes 167° (Figure 11).

However, despite all the changes that have been achieved, there is a lack of perceived unsatisfactory by the dentist’s point of view, i.e. the naso-labial angle, where the pre-treatment angle is 73° and post-treatment becomes 47°. This naso-labial angle is closely related to the position of the upper lip, in which the smaller angle is interpreted as protrusive upper lip and vice versa, the large naso-labial angle is interpreted as the retractive upper lips. The fact that the patient is not concerned with the small post-treatment naso-labial angle shows that aesthetic values are perceived differently by each individual or subjective, depending on other factors such as culture, ethnicity, gender and personal characteristics of the patient. Moving from these considerations, it is believed that a facial esthetic evaluation should be based on consideration of these factors by taking into account the parameters adhered to by the patient itself as well as the culture of the society in which he is situated rather than based on the values theoretically considered to be more ideal.

Conclusion

Facial profile changes in skeletal class III malocclusions through orthodontic treatment are highly possible by conducting careful analysis of factors that may affect it. In this case, careful analysis of these factors has proven to be helpful in drawing up the best treatment plan to get the expected results.

Acknowledgement

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Conflict of Interest

None.

Bibliography


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