Management of Dento-Maxillary Disharmony in Angle Class I malocclusion with Normobite: A Case Report

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Received November 01, 2021; Revised December 03, 2021; Accepted December 12, 2021

Abstract Dento-maxillary disharmony is a disproportion between the size or mesiodistal diameter of teeth and the perimeter of the corresponding alveolar arches. This case report describes the orthodontic treatment of a 17-year-old female patient with a normo occlusal class I malocclusion with a persistent temporary tooth. The goals were to maintain skeletal profile and Class I, eliminate crowding and correct tooth axis to achieve a bilateral Class I canine and maintain a bilateral Class I molar relationship, as well as to achieve adequate overbite and overjet, correct the midline, and achieve good balance and occlusal function.

Keywords: class I malocclusion, normobite, dento maxillary disharmony, management

Cite This Article: Amal EL AOUAME, Lamia Bouchghel, Sanaa ALAMI, and Farid EL QUARS, “Management of Dento-Maxillary Disharmony in Angle Class I malocclusion with Normobite: A Case Report.” American Journal of Educational Research, vol. 9, no. 12 (2021): 725-729. doi: 10.12691/education-9-12-5.

1. Introduction

Class I malocclusion, as defined by Angle, incorporates a normal inter-arch relationship, and exists when there is a harmonious relationship of the underlying skeletal structures, the malocclusion component is restricted to dental misalignments only, [1], usually characterized by a normal molar relationship, but with some degree of overcrowding and misalignment of teeth. [2]

Individuals with Class I malocclusion have normal molar relationships, but their teeth are not correctly positioned in the line of occlusion due to malposed teeth, rotations, spacing, overbites, open bites, posterior cross bites, or even anterior cross bites. [3]

It constitute the most prevalent form of malocclusion, even more prevalent than normal occlusion. However, there is no clear consensus concerning its etiology. [3]

A Moroccan study that aimed to evaluate the prevalence of malocclusions and orthodontic treatment need among schoolchildren in Casablanca, Morocco have found Angle Class I malocclusions in 61%, and 50% with anterior crowding. In all, 84.2% of the subjects needed some orthodontic treatment.[4]

This case report aims at illustrating the treatment of an adolescent patient with class 1 malocclusion with normobite associated to a severe maxillary anterior crowding.

2. Case Report 1

A 17-year-old female came to the University Dental Hospital with chief complaint of crowding in the upper arch. She had never done orthodontic consultation before and wanted to be treated to improve the appearance of her teeth.

Extra oral examination (Figure 1) showed a concave face profile, deep bite face type, and competent lips. She also had normal speech function, and no bad habits.
Intra oral photographs (Figure 2) revealed normal oral mucosa, tongue and palate. Findings included no caries; maxillary midline deviation of 2 mm to the right, and mandibular midline deviation of 0.5 mm to the left; crowding in the anterior maxilla with persistent of the 63, a localized cross bite between the 13 and 43,44 and rotation of the second lower premolars.

Patient’s orthopantomogram (Figure 3) confirms the severe crowding at the maxillary arch and no pathologic image associated to the general structures.

2.1. Diagnosis

The patient was diagnosed to have Angle Class I malocclusion with anterior crowding, midline shifting, and normo bite.

2.2. Treatment Objectives

Treatment objectives were to correct the maxillary and mandibular crowding, the midline shifting on upper and lower arch, the localized cross bite between the 13 and 43/44, and to achieve a Class I relationship canine with ideal arch form, overjet, and overbite.

2.3. Treatment Plan

According to the information gathered from both clinical examination and diagnostic records, it was planned to relieve the maxillary and mandibular crowding and midline shifting with fixed appliance.

This was to be followed by alignment of the upper and lower teeth with orthodontic edgewise brackets appliances, and to be concluded by bonded orthodontic retainers on both arches.

2.4. Treatment Progress

After the extraction of the 63, both the upper and lower arches were bonded with 0.022” × 0.028” MBT fixed appliance. Initial alignment arch wires were 0.014”,0.016 and 0.16× 022 nickel titanium wires in both upper and lower arches. As the treatment progressed, the nickel titanium wires were replaced with 0.016 × 0.022” rectangular stainless-steel wire and the power chain have been placed between the 23 and the 24 in order to close the residual space and to correct the class 1 canine on the left side. (Figure 4)

A rigid wire of 0.017 × 0.025 stainless steel in the upper arch and stainless steel in the lower arch replaced the previous round wire (Figure 5). After space closing the orthopantomogram showed roots axes to correct, so we can proceed to re-bonding (Figure 6). According to clinical and radiographic data the 21, 14 and 22 have been re-bonded to correct the tip, and the 0.16 × 022 nickel titanium wire have been placed in the upper arch. In the lower arch power chains have been used to correct the rotation of the 45.35 and the 31. Rigid wires of 0.017 × 0.025 and 0.017 × 0.025 stainless steel in the upper and lower arches replaced the previous wires (Figure 7).
Vertical elastics was applied to help correct the interdigitation and midline shifting.

![Figure 5. Patient’s intraoral photographs during treatment (Phase 1 denture correction)](image)

**Figure 5.** Patient’s intraoral photographs during treatment (Phase 1 denture correction)

The orthopantomogram and cephalogram before of the end of treatment showed that the objectives of the treatment have been achieved (Figure 8). Then, we proceeded to remove the appliance and to place bonded orthodontic retainers on both arches (12 to 22 at the maxillary and 33 to 43 at the mandibula). All in all, the total treatment time was 18 months.

![Figure 7. Patient’s extraoral and intraoral photographs during treatment](image)

**Figure 7.** Patient’s extraoral and intraoral photographs during treatment

**2.5. Treatment Results**

There was an overt improvement in the facial aesthetic of the patient. We have reacted to her demand by aligning the upper teeth.

![Figure 9. Patient's cephalogram during treatment](image)

**Figure 9.** Patient’s cephalogram during treatment

![Figure 10. Patient’s extraoral and intraoral photographs (After treatment)](image)

**Figure 10.** Patient’s extraoral and intraoral photographs (After treatment)

After almost 18 months of treatment (Figure 10), the crowding on the upper and lower arches were corrected. By the end of orthodontic treatment, extraction of 18, 28, 38 and 48 that erupted was envisaged.

There was a significant change in the arch of smile and the parameters of the occlusion: midline symmetry, plate curve of Spee, Angle class 1, this constitutes a guarantee of treatment stability.

![Figure 8. Patient’s orthopantomogram before debonding](image)

**Figure 8.** Patient’s orthopantomogram before debonding

![Figure 11. Patient’s orthopantomogram after treatment](image)

**Figure 11.** Patient’s orthopantomogram after treatment
Table 1 and Table 2 shows the evolution of cephalometric parameters, the lower and upper incisor has been maintained in their initial position, and the vertical dimension has been conserved. The general and local superpositions confirm the same data. (Figure 13).

Figure 12. Patient's cephalogram after treatment

Figure 13. Patient’s general and local superpositions

3. Discussion

Oral health in adolescents has received an ascending attention recently as compromised oral health influences their daily life, as it is associated with oral pain, difficulty in chewing and avoidance of smiling. Therefore, oral health is a chief component in determining the quality of life.

For this reason, seeking treatment in adolescent to improve aesthetic appearance has become very common practice these days. Since majority of orthodontic abnormalities are asymptomatic, consultations are made in association with aesthetic problems rather than functional problems [5,6].

As it’s known, malocclusion is a manifestation of genetic and environmental interaction on the development of the orofacial region. Class I Malocclusion with crowding EDA (Ectodysplasin) gene associated with crowding EDA was shown to act in a morphogenetic role in teeth and other ectodermal organs, teeth, hair, and sweat glands. Mutations in the EDA gene: defects in ectodermal organs [7]. Mutations results in differential gene expression which causes large tooth phenotype. This ultimately results in crowding [8].

Dentoalveolar disharmony (DAD) with crowding represents a predispose factor for the onset of periodontal pathology, especially when septic inflammation is associated, because the disproportion between mesial-distal dimensions of permanent teeth and alveolar arches perimeter leads first of all to diverse dental malposition (ectopy, rotation, inclusion) localized at incisive-canine regions, and secondly to numerous retentive sites for food rests and bacterial plaque that are difficult to remove through self or artificial cleaning [9,10].

In the present case, the main treatment goals were fulfilled and the patient’s chief complaint has been addressed. The molars and canines were in Class I occlusion, and the mandibular anterior dental crowding, the patient’s main complaint has also been corrected. The decision to not extract premolars was based on the type of profile that was concave with harmonious labial relationship, the value of crowding and the absence of facial discrepancy.

A study that aimed to evaluate the relative influence of different criteria in the choice between extraction and non-extraction treatment in current orthodontics showed that the two most important factors in the decision-making were the soft tissue profile that has a higher impact than traditional criteria such as cephalometric measurements in the extraction decision and the amount of crowding. The least important factor was the presence of third molars [11].

In our case third premolars were extracted at the end of treatment, the indication was based on the presence of posterior dento-alveolar disharmony.

In term of aesthetics results, findings of others studies document that the presence or absence of four premolars is not the determining factor of facial appearance. Satisfactory facial result can be achieved consistently either by extracting premolars or not extracting them, as long as the diagnosis and treatment are correct. [12,13]

In term of stability, a systematic review that aimed to investigate factors related this parameter have reported that no large differences were observed for correction or stability in extraction versus non-extraction treatment [14,15].

Stability in the long term constitutes the main challenges for all the orthodontists. The concerned literature reports that the frequency of relapse varies by a follow-up time. In the long term, relapse values of 30% have been reported. Other researchers state that between 30% and 50% of cases maintain an acceptable alignment after 10 years, but barely 10% do so after 20 years [4,11].

Some authors [16] have indicated that long-term relapse is influenced not only by the result of the orthodontic treatment but also by physiological changes in the dentition and the tissues and forces that surround it.

In our case, the occlusion achieved at the end of treatment and the position of incisors that remains stable before and after treatment allowed us to finish with the muscles of mastication in equilibrium. This was a very important objective to avoid relapse.

One year post treatment control have showed that the occlusion of our patient was stable as well as the aesthetics results. (Figure 14)
4. Conclusion

Class I with crowding is certainly a frequent malocclusion. Success in the management of such a malocclusion is conditioned by a proper diagnosis and treatment planning. Adolescence with a severe crowding, orthodontic management allows the patient to improve her quality of life. Throughout the period of treatment, we come to the conclusion that conscientious clinicians are those who try to develop individualized treatment plans for their patients.

In our case, the patient and her legal guardians were pleased with the final result, which considerably improved her self-esteem. In contrast long term follow up demurs essential.

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