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Case Report **Orthodontics**

Class II Division 1 Malocclusion Treated with Two-Phase Orthodontic Approach

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Abstract

Improving facial aesthetics is a major reason why patients with class II division 1 malocclusion look for orthodontic therapy. Two-phase approach that includes functional jaw orthopaedics as well as fixed orthodontic treatment is one of various techniques available to treat Class II malocclusions. The following case report describes a young growing female patient with a Class II Division 1 malocclusion. In the first stage, the patient was treated using Andresen activator for growth modification and correction of her overjet, overbite and profile. Then, fixed orthodontic appliance was used in the second phase, to ensure well-aligned arches and improve aesthetic and function.

Keywords: Overjet Correction, Overbite Correction, Facial Aesthetics, Case Report, Growth Modification.

INTRODUCTION

Among the different types of malocclusions found in human population, class II division 1 is one of the most common, with a prevalence range of 13%-24% [1, 2]. It may be caused by mandibular retrusion, maxillary protrusion or a combination of both [3, 4]. According to Dr. McNamara [5], the retrusion of the mandible is the most common factor contributing to class II malocclusion.

Class II division 1 malocclusions are generally described as having either a dental, skeletal or functional characteristics. The Class II is described by a distal relationship of the mandibular molar relative to the maxillary molar of more than one-half the width of the cusp. Class II division 1 is characterized by labially inclined maxillary incisors, an increased overjet and a relatively narrow maxillary arch.

The treatment of class II division 1 is a function of the patient's age, growth potential, severity of malocclusion and adherence to treatment [5, 6]. In growing individuals, growth modification procedures can be used to correct Class II skeletal malocclusion in mixed or the early stages of permanent dentition. The Andresen activator functional appliance is a monoblock that during closing induces an anterior position of the mandible. The effects of activator therapy were an increase in condylar growth and a remodeling of the articular fossa.

This case report describes the two-phase Orthodontic treatment with the Andresen activator followed by orthodontic fixed appliances of a case with skeletal Class II malocclusion and mandibular retrusion.

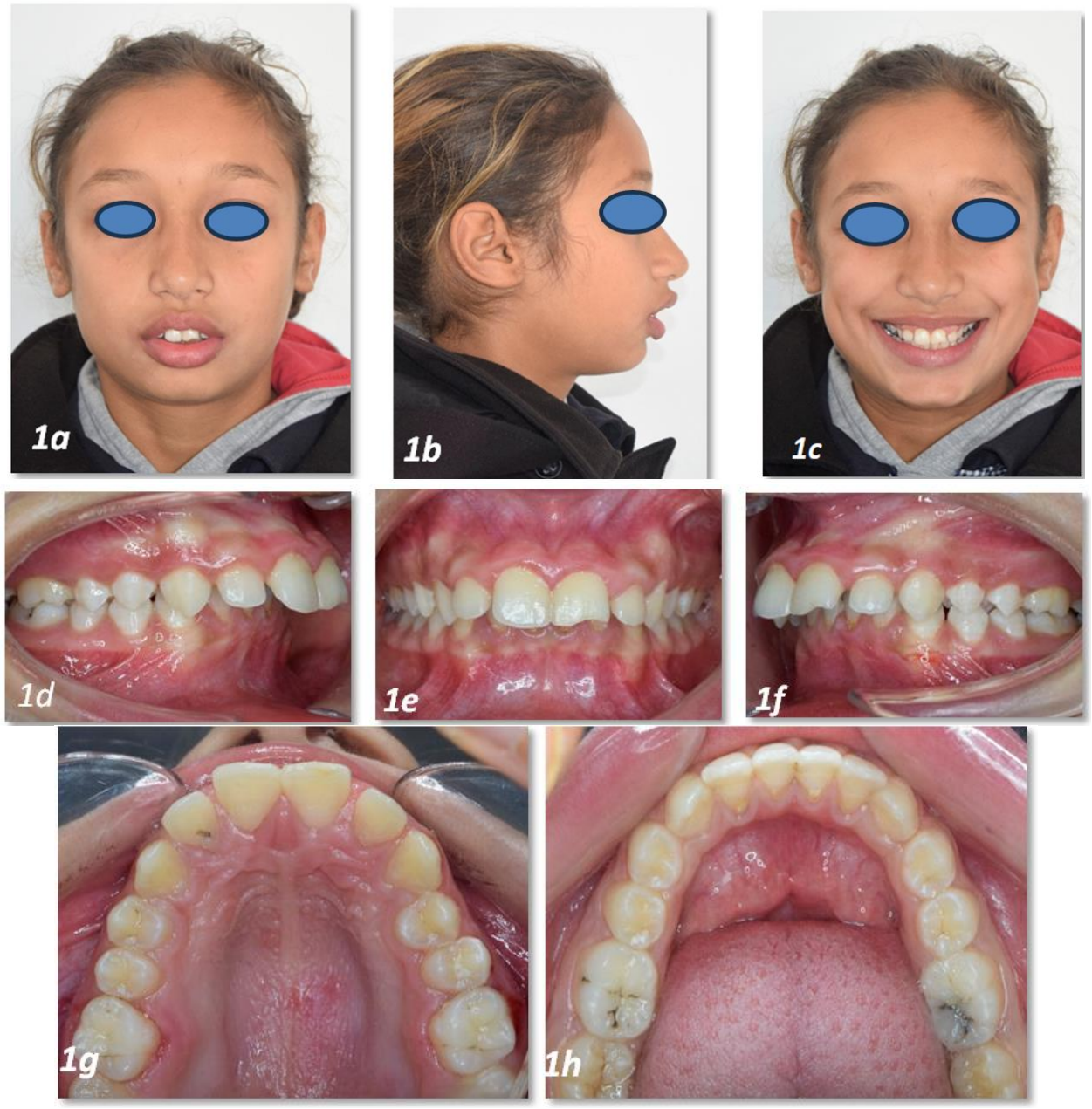

Figure 1(a-h): Pre-Treatment Photographs

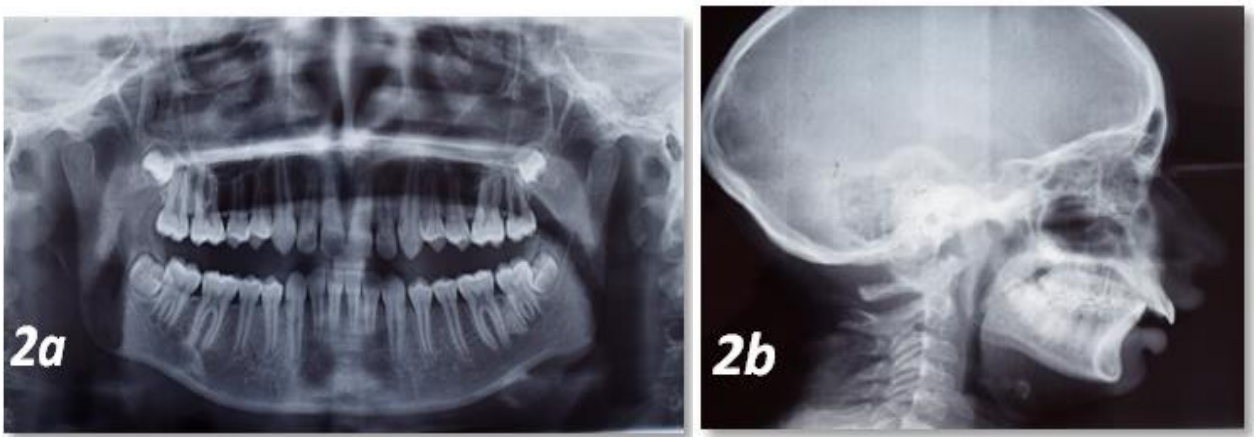

Figure 2(a-c): The pre-treatment radiographs

CASE REPORT

Diagnosis and Etiology:

A 11-year-old female patient, who was accompanied by her parents, was appertained to our orthodontic department. Her chief complaint was protrusion of upper front teeth and unpleasant looks. No histories of systemic conditions or allergies were reported.

Extraoral examination revealed convex profile, protrusion of the upper lip, everted lower lip and incompetent lip closure. Intraoral examination revealed permanent dentition.

In Occlusion, she had a Class II canine relationship by 6 mm on the right side, 5 mm on the left side, and a Class II molar relationship bilaterally by 5 mm. The patient presented with an increased overjet (10mm) and deep bite (6 mm).

The panoramic radiograph showed third molars in development and no significant abnormality. Lateral cephalometric analysis revealed a Class II skeletal pattern (ANB angle of 8°). The maxilla was normal relative to the cranial base with an SNA at 81°. The mandible was retrognathic with an SNB value of 73°.There was dental biprotrusion (I/F angle of 115° and IMPA angle of 96°).

Based on these findings, the patient was diagnosed with skeletal Class II division 1 malocclusion with retrognathic mandible and a normodivergent facial profile.

Treatment objectives:

Treatment objectives included the following:

*Correct the skeletal Class II to obtain a pleasing facial profile.
*Control of vertical dimension.
*Establish Class I molar and canine relationships.
*Achieving a normal overjet and overbite.
*Align the upper and lower teeth.

Treatment Alternatives

The first treatment option was functional appliance therapy to improve the amount of the mandible growth followed by fixed appliances. The advantages of this option were correcting the mandible retrognathism and improving the patient's profile. The fixed orthodontic treatment used to improve the occlusion of permanent teeth in order for them to settle into Class I relationship.

The second option was to extraction of the maxillary first premolars which would reduce the overjet and deep overbite and establish class I canine relationships. This option would not improve the patient's facial profile.

Treatment alternatives were explained to the patient's parents. They preferred the first treatment option because improvement of facial esthetics by forward mandibular growth.

Figure 3(a-d): Andresen activator

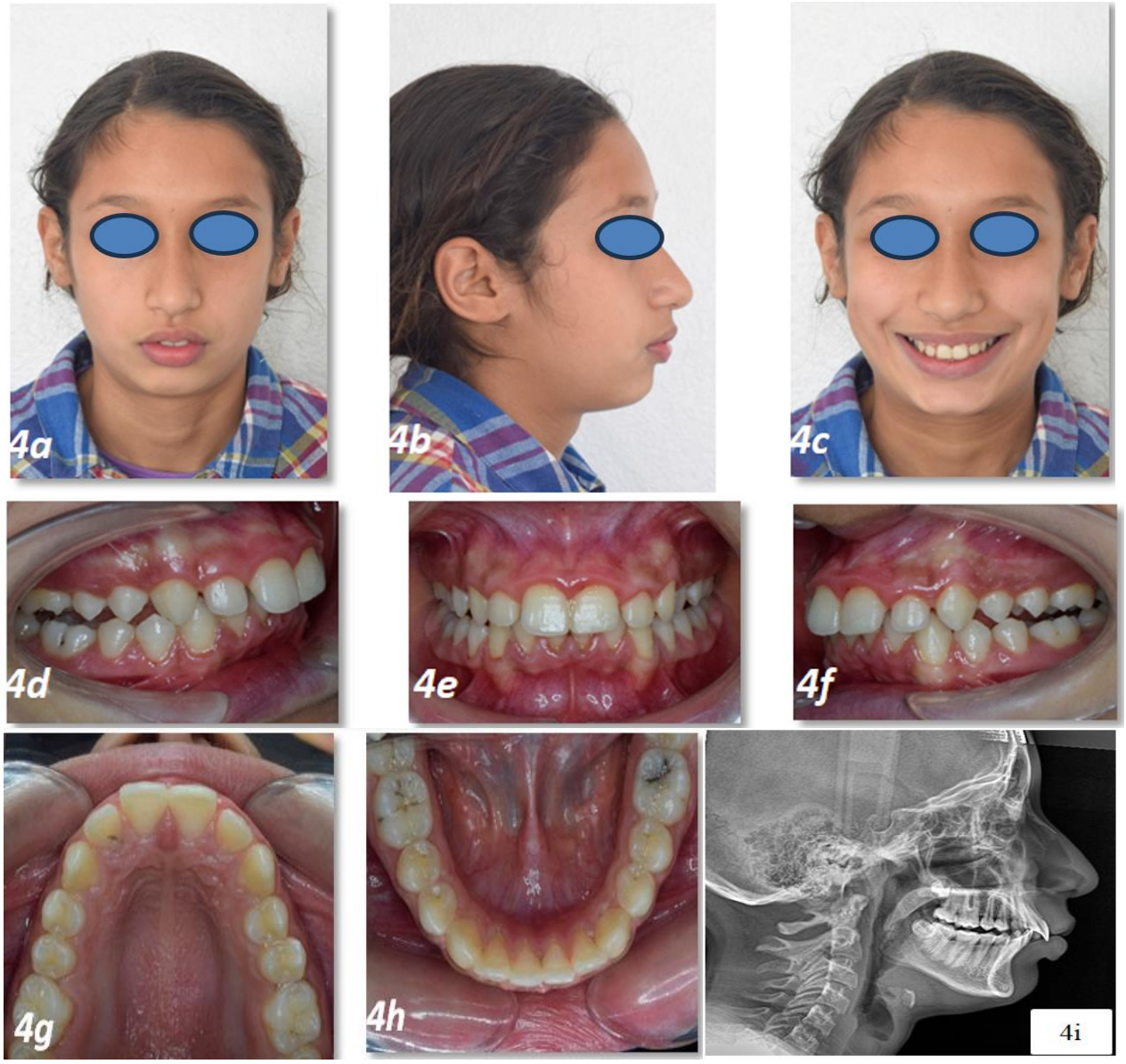

Figure 4(a-i): Phase I final and phase II pretreatment facial and intraoral photos and lateral cephalometric radiograph

Treatment progress:

Our treatment plan was using Andresen Activator to achieve anterior reposition of the mandible and to influence the growth of the mandible to reach its maximum. The first construction bite made was 8 mm sagittal to anterior, vertical 4 mm and transversally lower midline was adjusted to midline of the face.

Patient wore her appliance regularly, all night and during daytime as well. The Andresen activator was used for a period of 10 months from 10 to 12 hours per day during afternoons and nights. After using activator for 10 months, overjet was reduced to 2–3 mm and the profile changed significantly. Molar and canine relationships on both sides were class I.

After phase I was completed, phase II started immediately with 0.022 × 0.028 in. Edgewise complete fixed appliances for a period of 1 year. An initial 0.014 nickel-titanium archwire was placed for aligning and leveling. The patient was progressively shifted to heavier archwires. After the alignment and leveling, coordinated 0.019″ × 0.025″ stainless steel wires were placed.

Figure 5:

Treatment result:

The phase I treatment lasted 10 months and the goals to reduce the large overjet and deep overbite to normal parameters were achieved.

The patient's profile had significantly improved and there was a significant reduction in the soft tissue facial convexity with forward mandibular growth. Class I dental occlusion was achieved bilaterally.

Cephalometric measurements of the patient indicate that the changes were found at dentoalveolar skeletal components. Posttreatment cephalometric tracing revealed significant improvement in the skeletal discrepancy (ANB pretreatment: 8° and posttreatment: 5°; SNB pretreatment: 73° and posttreatment 76°), inclination of the maxillary and mandibular incisors (upper incisors to FH angle, pretreatment: 115° and posttreatment: 112°; IMPA pretreatment: 96° and posttreatment 100°).

At the end of the phase II (fixed appliances treatment), Regional superimpositions of the maxilla and the mandible demonstrated that the maxillary incisors were palatally uprighted, and the mandibular incisors were slightly labially proclined.

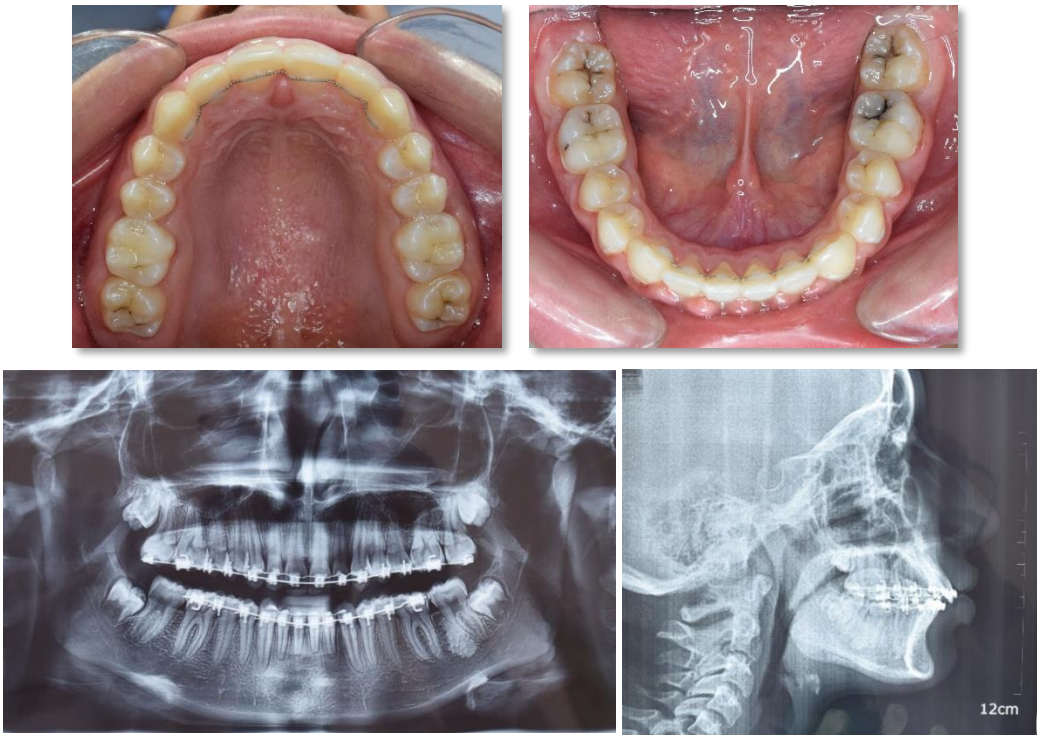

Figure 6: Posttreatment facial and intraoral photos and panoramic and lateral cephalometric radiographs

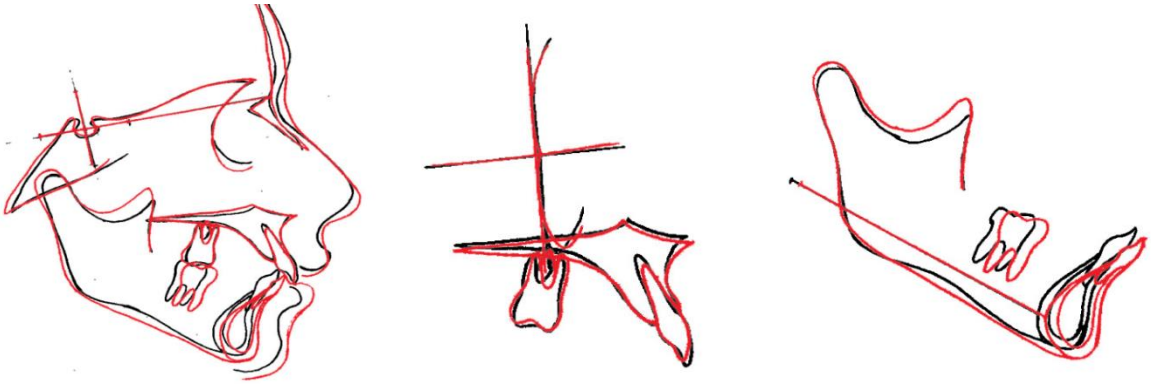

Figure 7: Superimposition of cephalometric tracings pretreatment (black), and posttreatment (red)

Table 1: Pretreatment, postmyofunctional, and posttreatment cephalometric data

Parameter	Average	Pretreatment	Postmyofunctional	Posttreatment
SNA (°)	82	81	81	81
SNB (°)	80	73	76	76
ANB (°)	2	8	5	5
FMA (°)	25	22	24	25
SN-GoGn (°)	32	36	37	37
U1-NA (angle)	22	23	22	21
U1-NA (linear)	4	5	5	4
U1-SN (°)	102	108	106	102
L1-NB (angle)	25	28	29	29
L1-NB (linear)	4	6	6	7
IMPA (°)	90	96	100	102
Nasolabial angle (°)	102	101	103	103
U1 exposure (mm)	3-5	8	8	7
NB-Pog	2±2	2	2	2

SNA: Sella Nasion Point A angle, SNB: Sella Nasion Point B angle, ANB: Point A Nasion Point B angle, FMA: Frankfort horizontal to Mandibular plane angle, IMPA: Lower

DISCUSSION

The purpose of Class II Division 1 therapy is to correct the molar and canine relationship to Class I, to reduce the overjet, improve the deep bite and ensure a correct functional result. Class II Division 1 therapy should also aim to resolve dentoskeletal disharmony in order to obtain a favorable facial appearance [7].

Using a two-phase approach to treatment can successfully treat growing patients and can significantly enhance both function and aesthetics [8]. The first stage requires patient compliance and is performed with a removable functional device. The second phase is carried out using a fixed appliances.

According to Pancherz *et al*., [9], functional therapy stimulates mandibular growth and slows down maxillary growth. Functional devices are effective in the treatment of Class II skeletal malocclusion, especially when retrognathic mandibular these appliances are the most clinically beneficial in active growth patients.

In this case, the muscular force generated by the mandibular propulsion positioning was transferred to teeth through the acrylic body and labial arch. These forces which were transmitted through the teeth to the bone were responsible in producing a limiting effect on the maxillary growth, while stimulating the mandibular growth and causing dentoalveolar adaptation [10, 11].

However, functional devices have limited ability for individual dental movement compared with fixed orthodontic devices. A treatment with removable functional device can therefore be followed by an orthodontic treatment with fixed appliances to produce individual dental movements and improve occlusion.

CONCLUSION

This case report elaborated on the use of Andresen activator therapy for the correction of a severe skeletal Class II. Functional appliances can be used successfully to treat skeletal class II malocclusions in, growing and cooperative patients. The ideal case for such treatment is: Class II division I malocclusion with retrognathic mandible with Upright or lingually tipped lower incisors. However, when determining the modality of the treatment, the etiology for skeletal anomalies, the optimum time to start treatment, the types of the functional device, and the patient's compliance should be considered cautiously to ensure successful treatment.

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