

## Mandibular Skeletal Changes Following Orthodontic Treatment of an Adult Case with Class II Division 2 Malocclusion

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### Abstract

The presented treatment strategy represents a concept that allows for a spontaneous correction of Class II malocclusion in an adult patient after unlocking the restrained mandible. As in Class II division 2 malocclusion the mandible acquires a retruded position that is spontaneously corrected to a more forward position after deep bite correction. Not only improvements in the dental parameters, as over-jet reduction, had been met but also there was an actual enhancement of the skeletal components; where the SNB angle increased by 2 degrees. This clarified a more physiologic method by which the orthodontic clinician can approach the treatment of Class II division 2 cases through commencing his treatment by vertical correction mechanics.

**Keywords:** Class II Division 2; Deep Bite; Anterior Bite Plate

### Introduction

Class II division 2 malocclusion is one of the most challenging malocclusions from the decision-making perspective. Where, a change in mandibular position could occur after the leveling and alignment phase that leads to dramatic changes regarding the over-jet and mandibular position. This mainly occurs in growing patients and is caused by the deep overbite that is found in nearly 13% of adults [1-3]. Actually, deep bite is usually accompanied with sagittal discrepancies; as most of the cases with Class II division 1 have deep anterior overbites due to over-eruption of the lower incisors. On the other hand, all Class II division 2 malocclusions cases present with deep anterior overbites; this is attributed to either under-eruption of the buccal segments or due to severe retroclination of the upper and lower incisors [4]. In growing patients, especially in cases with Class II division 2 malocclusions, the resolution of deep bite is generally aiming at correcting the sagittal discrepancy by unlocking the restrained mandible and allowing its forward growth [5-8]. When the mandible is unlocked, the increased over-jet may get reduced spontaneously; due to forward positioning of the mandible this could lead to Class II malocclusion correction without the need to apply an advancing force to the mandible.

This concept had led some clinicians to apply the same concept on adult cases [9]. Hence, we present in this article an adult Class II division 2 case that was treated based on the anticipation of attaining a more forward mandibular position through unlocking the restrained mandible.

### Case Diagnosis

A 16 years old female presented with class II division 2 incisor relationship on a mild class II skeletal pattern with decreased vertical proportions. Both upper and lower incisors were severely retroclined. There was a decreased lower facial height with dimin-

ished upper incisors show on smile. The upper arch showed 2 mm of crowding while the lower arch showed 3 mm of crowding with a 3 mm deep curve of Spee. In occlusion, the over-bite was increased at 100% and complete to the palatal soft tissue. There was a buccal scissors bite related to the UR4. On the left side, both the molar and the canine were in  $\frac{3}{4}$  unit Class II relation. On the right side, the molar relation was Class I, with  $\frac{1}{4}$  Class II canine relation. All permanent teeth were erupted. Teeth quality was good, but the oral hygiene was poor (Figure 1, 2).

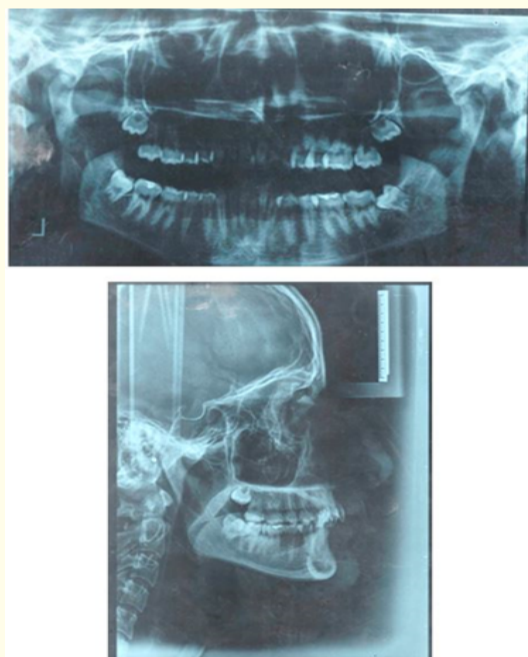


Figure 1: Pre-treatment extra-oral photos.



**Figure 2:** Pre-treatment intra-oral photos.

The cephalometric finding confirmed the clinical finding of a mild class II skeletal pattern ( $4^{\circ}$ ANB and  $78^{\circ}$ SNB). In addition to the presence of retroclined upper and lower incisors ( $96^{\circ}$  U1/Mxp and  $86^{\circ}$  L1/Mp). Moreover, the vertical skeletal relations were reduced (Figure 3).



**Figure 3:** Pre-treatment radiographs.

#### Problem list

1. The patient's chief complaint was having a bad smile and that her upper teeth are tipped inwards.
2. Scarce hard and soft deposits related to the lingual cervical margin of the lower incisors.

3. Decreased lower facial height with diminished upper incisors show on smile.
4. Class II division 2 incisor relationship.
5. 2 mm upper arch crowding with 3 mm lower arch crowding and a 3mm deep curve of Spee.
6. Severely retroclined upper and lower incisors.
7. Buccal scissors bite related to the UR4.
8. 3/4-unit Class II canine and molar on left side.
9. ¼ unit Class II canine relation on right side.
10. Mild class II skeletal pattern.
11. Complete overbite to the palate with a vertical skeletal deficiency.

#### Treatment plan

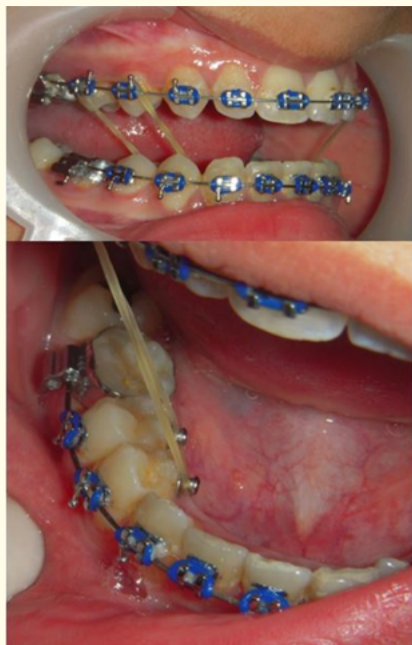
A Non-extraction treatment strategy was proposed using fixed pre-adjusted orthodontic edgewise appliance (0.022" x 0.028" slot) with Roth prescription. Fixed upper anterior flat bite plane would be added for bite opening at the start of treatment. Periodic periodontal follow up throughout the orthodontic treatment will be done.

#### Treatment sequence

Placement of fixed pre-adjusted orthodontic appliance with Roth prescription (0.022" X 0.028" slot) bonded to all upper teeth in conjunction with a fixed upper anterior flat bite plate (Figure 4). Stripping of the lower incisors to relief lower incisors crowding was done. Cross elastics were inserted between the hooks of the upper right premolars and buttons on the lingual surface of the lower right premolars in order to correct the buccal cross-bite (Figure 5). After deep bite and cross bite resolutions, there was a dramatic reduction of the over-jet, that was created after the leveling stage. This was attributed to the forward positioning of the restrained mandible. Reaching upper and lower 0.019" X 0.025" stainless steel, Class II inter-maxillary elastics were used for a period of 2 months (Figure 6); just for arches co-ordination and fine tuning of the buccal segments relation. This was followed by debonding and placement of upper and lower bonded retainers. Upper and lower impressions were then taken for the construction of an upper Hawley retainer with anterior flat bite plate.



**Figure 4:** Leveling and alignment and Placement of fixed upper anterior flat bite plate.



**Figure 5:** Placement of cross elastics between the hooks of the upper right premolars and buttons on the lingual surface of the lower right premolars.



**Figure 6:** Placement of Class II inter-maxillary elastics.

## Results

The presented case was successfully treated with upper and lower fixed appliances on a non-extraction basis over a period of 28 months. A satisfactory occlusal and aesthetic result was achieved. The original aims of treatment were achieved addressing the chief complaint of the patient concerning the smile esthetics.

## Skeletal results

The antero-posterior skeletal relation did slightly change with a 2° increase in SNB. This could be attributed to a forward drift of the mandibular position after unlocking of the bite together with the effect of proclining the severely retroclined lower incisors. However, this increase in SNB was minute, but yet, it changed the mild Class II skeletal relation into a Class I.

The maxillary-mandibular plane angle increased by 2° due to the extrusion of the lower posterior teeth by the flat anterior bite plane. The face height ratio was minimally affected where the vertical changes were minimal and made little overall contribution to the improvement of facial appearance which did not change significantly from pre- to post treatment. This was in favour of reducing the stretching of the muscles which could jeopardize the stability

of the corrected deep bite and cause relapse the extrusion of posterior teeth.

## Dental results:

- Overall a well-intercusated and well-aligned class I occlusion was achieved with Class I molar, canine and incisor relationships.
- Over-bite and overjet were reduced to normal.
- The upper incisors were proclined to within the normal value.
- The lower incisors were proclined to 98°.
- The inter-incisal was greatly improved and normalized 121° this aided in the post-treatment creation of occlusal stops which would aid in the stability of the corrected deep bite.
- The patient was fully informed before the start of the treatment about the need for long term retention of the corrected vertical discrepancy using an upper Hawley with flat anterior bite plane.
- Upper and lower bonded retainers were used due to the massive change in the inclination of incisors.

## Soft tissue

- Clinically, the patient's smile improved due to proclining the severely retroclined upper incisors. But still there is a reduced lower facial height.

## Iatrogenic

- The patient showed co-operation regarding oral hygiene measures and there were no noticeable decay or demineralization after treatment.
- The slight root approximation seen on the final stages radiograph between UR3 and UR4 was corrected with wire bending.

## Discussion

Class II division 2 malocclusion could result from a class II skeletal pattern with a high lip line relative to the upper incisors, resulting in retroclination of the upper incisors [10]. The decreased vertical dimension occurring with class II skeletal relation results in absence of occlusal stops for the lower incisors, which continue to erupt leading to a complete over-bite. Moreover, active muscular lips can cause bi-maxillary retrognathia with Class II division 2 incisor relation. The patient had diminished upper incisors show on smiling, moreover the lingual collapse of the upper anterior teeth on the right side had aggravated the poor smile esthetics; this represented the main concern of the patient.

From the vertical perspective, the patient had a complete deep bite with the incisal edges of the lower incisors contacting the palatal gingival. The mandibular plane angle was severely reduced disclosing a skeletal etiologic factor. Further analysis has shown under-eruption of the upper and lower buccal segments. This elucidated the need for posterior extrusive mechanics to increase the vertical proportions as the mechanics should be directed to resolve the causative factor of the deep overbite malocclusion [11].

Deep over-bite correction was achieved by extrusion of the lower posterior teeth by the help of the upper anterior flat bite plate. Proclination of the upper and lower incisor during the levelling stage of treatment aided in the bite opening process and

the improvement of smile aesthetics. No upper incisors intrusion was attempted due to the presence of diminished incisors show on smile (Figure 7, 8).



Figure 7: Post-treatment extra-oral photos.



Figure 8: Post-treatment intra-oral photos.

The main finding was the forward mandibular movement after the deep bite resolution at the end of the levelling stage. Where the SNB, ANB, and Wit's appraisal proved the forward mandibular relocation after its unlocking from the backward restrained position (Figure 9,10) (Table 1). This made the need for class II mechanics limited to settling and detailing of posterior occlusion. This was beneficial in avoiding the adverse effects of the long use of Class II elastics; in terms of excessive flaring of the lower incisors and uncontrolled extrusion of the buccal segments.

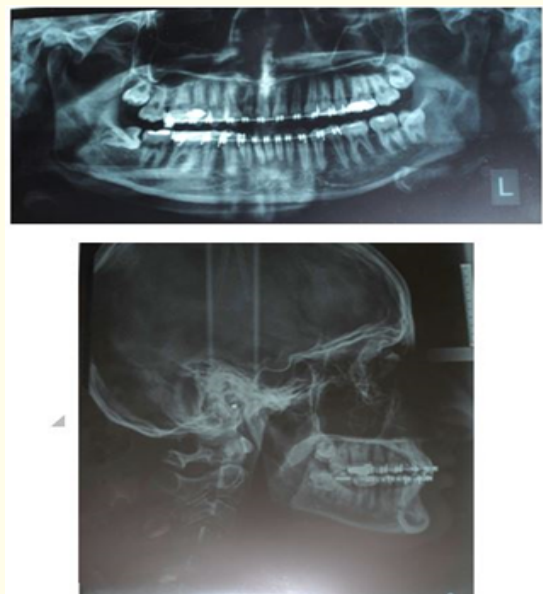


Figure 9: Post-treatment radiographs.

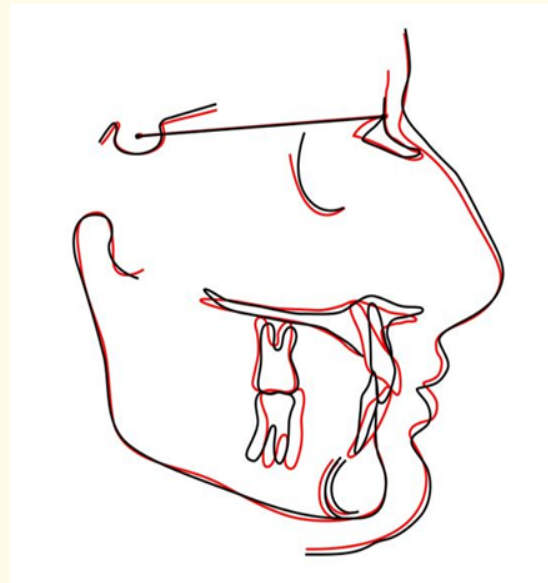


Figure 10: Super-imposition of the pre and post-treatment cephalometric tracings.

Variable	Pre-Treatment	Post- Treatment	Change
SNA	83°	83°	0°
SNB	78°	80°	+2°
ANB	5°	3°	-2°
SN to maxillary plane	5°	5°	0°
Wits appraisal	2 mm	0.5 mm	-1.5 mm
Upper incisor to maxillary plane angle	96°	116°	+20°
Lower incisor to mandibular plane angle	86°	98°	+12°
Interincisal angle	164°	121°	-43°
AXD	12°	11°	-1°

MM angle	17°	19°	+2°
Upper anterior face height	51 mm	51 mm	0°
Lower anterior face height	60 mm	60 mm	0 mm
Face height ratio	54%	54%	0%
Lower incisor to APo line	-4 mm	3 mm	+7 mm
Lower lip to Ricketts E Plane	-5 mm	-4 mm	+1 mm
Nasolabial angle	115°	100°	-15°

**Table 1:** The Cephalometric changes that occurred after the end of treatment.

### Conclusion

1. The retraced skeletal mandibular position in Class II division 2 cases is usually a direct result of an anterior deep overbite that hinders the mandible from attaining its actual position.
2. The resolution of deep bite in the early stages of treatment of Class II division 2 cases helps the mandible to attain a more forward position that aids in the correction of the Class II malocclusion.
3. The presented treatment protocol avoids the exaggeration of the adverse effects that result from the excessive use of Class II mechanics.

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