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Case Report

Correction of a Class II malocclusion with lateral open bite

ABSTRACT

This case reports the treatment of a 13-year-old male with Class II malocclusion, mandibular retrusion, lateral open bite, and crowded anterior teeth. Nonextraction approach was used for this patient. Ideal overbite and overjet were achieved. Leveling and aligning with fixed appliance and elastic was applied to correct this case. Rectangular loop was used to achieve mesial tipping and extrusion of the maxillary premolar.

Keywords: Alignment and leveling, Class II, rectangular loop

INTRODUCTION

Class II malocclusion can be treated by several means according to the characteristics associated with the problem, such as anteroposterior discrepancy, age, and patient compliance. In adolescents, the correction of Class II malocclusion by growth modification is the treatment of choice. Dental crowding can be defined as a disharmony in the relationship between tooth size and jaw size which results in imbrications and rotation by the presence of third molars and mesial component of force.[1] In treating a Class II malocclusion by means of comprehensive orthodontics, there are two main therapeutic approaches: extraction and nonextraction.[2] Edward H. Angle was the pioneer to describe normal occlusion and classify malocclusion.[3] He emphasized that the preservation of all dental units was necessary to achieve facial balance, harmony, and esthetics.[4] The main goal of orthodontic treatment is to obtain a normal relationship of the teeth with facial structures, and it is generally accepted that orthodontic treatment will have some sort of an effect on facial proportions.[5] Currently, there is a decline in the number of cases treated by extraction. This may be explained by several factors, including facial esthetic concern, stability, temporomandibular joint (TMJ) dysfunction, and versatile in technique.[6,7] The present case report describes the nonextraction orthodontic treatment of a Class II malocclusion patient who had maxillary and mandibular arch crowding and lateral open bite.

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CASE REPORT

Etiology and Diagnosis

A 13-year-old male patient was referred by his general dentist regarding correction of his crowded anterior teeth. Medical and dental histories were noncontributory, and the findings of a TMJ examination were normal with adequate range of jaw movements. He had angle's Class I molar, Class II canine relationship bilaterally, 4.5 mm overjet, 3.5 mm overbite, and lateral open bite. Upper dental midline was coincidental with the facial midline, and lower dental midline was shifted to the left by 1.5 mm as compared with the facial midline; maxillary arch was V shaped and symmetric with crowding of 3 mm; mandibular arch was U shaped, with crowding of 4.5 mm and deep curve of spee. Oral hygiene was fair [Figure 1].

He presented with a convex skeletal and soft-tissue profile mainly due to a retrognathic mandible, normal mandibular

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plane angle, normal lower anterior facial height, and normally placed mandibular and maxillary incisors. Upper and lower lips are competent with slightly protrusive upper lip; the nasolabial angle was obtuse [Figure 2 and Table 1].

Treatment objectives

The treatment objectives were to correct the convex profile to an orthognathic profile, correct of Class II canine relationship, relieve the crowding in lower and upper anterior teeth, correct the lateral open bite, establish an ideal overjet and overbite, and correct the retrognathic appearance of the facial profile.

Treatment alternatives

Nonextraction approach was applied for correction of maxillary and mandibular crowding and to achieve slight improvement of the skeletal and soft-tissue profile by fixed appliances and elastic.

The extraction of two maxillary premolars could have been another option.

The third option could be the application of a removable appliance with centralized expansion.

The first option was opted by the patient parent after discussion about the treatment plan options.

Treatment progress

Band molars, and bond maxillary arch with 0.022 preadjusted edgewise appliance (MBT prescription), alignment with 0.012, 0.016, 0.018 and 0.016 × 022-inch NiTi arch wires [Figures 3 and 4]. Then bond mandibular arch, Level with 0.016, 0.018, and 0.016 × 0.022-inch NiTi arch wires with full time 3/16 inch medium Class II elastic [Figure 5a and b]. Continue

Table 1: Comparative cephalometric measurement

Measurement	Pretreatment	Posttreatment
SNA angle (°)	78	79
SNB angle (°)	73	76
ANB angle (°)	5	3
Wits appraisal (mm)	0	0
SN - Pg (°)	74	75
NL-NSL (°)	12	11
ML-NSL (°)	35	36
ML-NL (°)	23	25
Björk (°)	395	396
+1/NL (°)	67	61
+1/NA (°)	24	30
+1i/NA (mm)	1	1
−1/NB (°)	25	29
−1i/NB (mm)	1	2
−1/ML (°)	97	98
Interincisal angle (°)	127	117
Upper lip/E lin (mm)	−1	−1
Lower lipa/E lin (mm)	0	−1

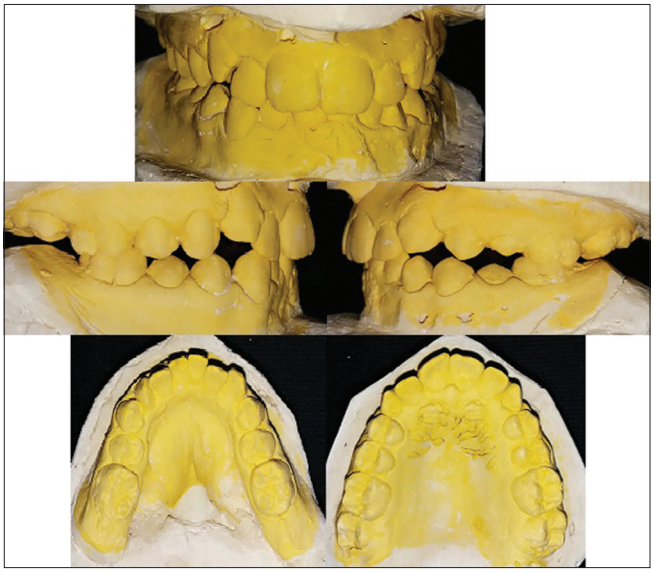

Figure 1: Pretreatment dental casts

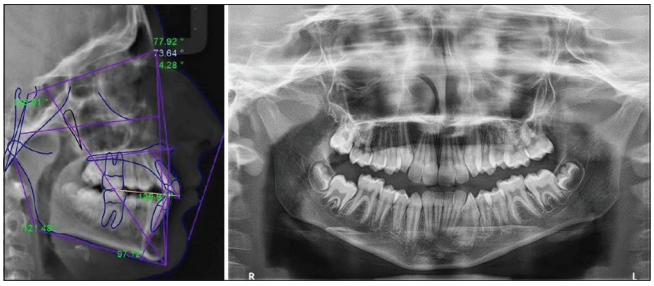

Figure 2: Pretreatment radiograph

Figure 3: Level and alignment with 0.012 NITI

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leveling maxillary and mandibular arch with 0.017 × 0.025 and 0.019 × 0.025-inch NiTi archwire, with full time 3/16 inch Subdivision Class II elastic on the left side and vertical elastic on the right side [Figures 6 and 7]. Rectangular loop 0.016 × 0.022-inch stainless steel archwires for producing mesial tipping and extrusion of the maxillary premolar [Figures 8 and 9].

Treatment results

Crowding was resolved while ideal overbite and overjet were achieved. A Class I molar and canine relationship was established, lower midline was coincidental with the facial midline and upper dental midline, and acceptable occlusion was achieved [Figures 10 and 11].

Cephalometric evaluation revealed that the maxilla and mandible did not exhibit any significant change in the vertical dimension. Slight mandibular advancement in the anteroposterior dimension was achieved. The maxillary incisors showed procline [Figures 12-14].

DISCUSSION

The treatment of a crowded dental arch on a nonextraction basis, without tooth size reduction, requires an increase in arch perimeter to allow resolution of crowding and achievement of optimum arch alignment and leveling. Without molar distalization, crowding resolution typically involves both transverse expansion and incisors' proclination.[8] Leveling and aligning with fixed appliances increases the transverse dentoalveolar width and the perimeter of the maxillary arch.[9] Therefore, the nonextraction option was chosen, and dentoalveolar expansion of the maxillary and mandibular arch during the initial phases of therapy was achieved with superelastic nickel-titanium archwires 0.012, 0.016, 0.018, and 0.016 × 0.022-inch NiTi to correct of Class II malocclusion.

The correction of the Class II malocclusion and lower dental midline shift was achieved using elastics between the jaws. If a Class II elastic is placed between the maxillary canine and the mandibular first molar [Figure 7c and d], the point of force application is at the canine and molar hooks, and the force acts along its line of action (green elastic). The maxillary arch moves downward and backward, and the mandibular arch moves upward and forward. Simultaneously, the large moments cause rotation of both arches around their CRs. Unilateral Class II elastic on the right side produces an open bite on the left side [Figure 6]. The mandibular arch rotates more because the point of force application in mandibular first molar > maxillary canine, and this side effect can be avoided when a unilateral Class II elastic is used by vertical elastic on the left side to close the open bite, vertical elastic placed off-center [Figure 7b].[10]

Figure 4: Level and alignment with 0.016 × 0.022 NITI

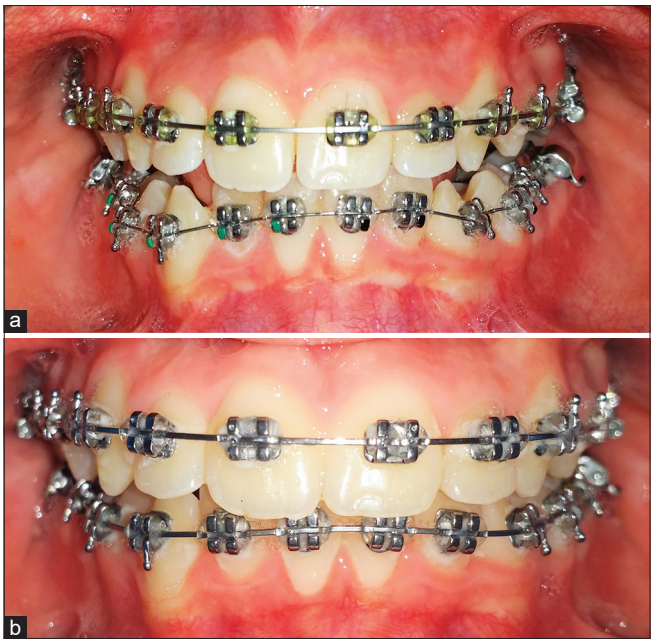

Figure 5: (a and b) Level and alignment lower arch

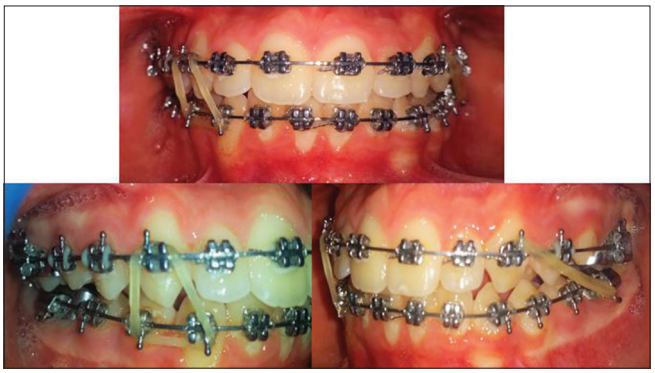

Figure 6: 3/16 inch subdivision Class II elastic on the left side and vertical elastic on the right side

The three-dimensional control of single teeth exhibiting severe positional anomalies is a common challenge for the

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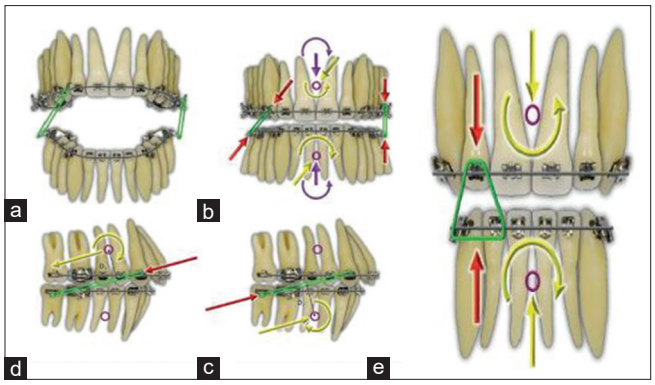

Figure 7: The Class II malocclusion and lower dental midline shift was achieved using elastics between the jaws (Figure 7a and b). If a Class II elastic is placed between the maxillary canine and the mandibular first molar[Figure 7c and d], the point of force application is at the canine and molar hooks, and the force acts along its line of action (green elastic). The maxillary arch moves downward and backward (Figure 7d), and the mandibular arch moves upward and forward (Figure 7c). Simultaneously, the large moments cause rotation of both arches around their CRs. Unilateral Class II elastic on the right side produces an open bite on the left side. The mandibular arch rotates more because the point of force application in mandibular first molar > maxillary canine, and this side effect can be avoided when a unilateral ClassII elastic is used by vertical elastic on the left side to close the open bite, vertical elastic placed off-center [Figure 7e]

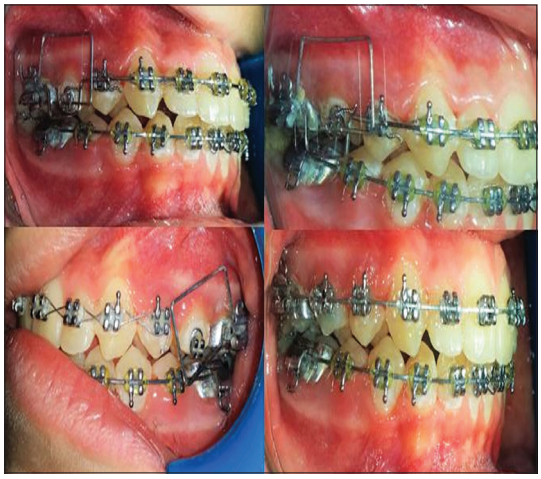

Figure 9: Rectangular loop 0.016 × 0.022-inch stainless steel arch wires for producing mesial tipping and extrusion of the maxillary premolar

Figure 11: Posttreatment intraoral photographs

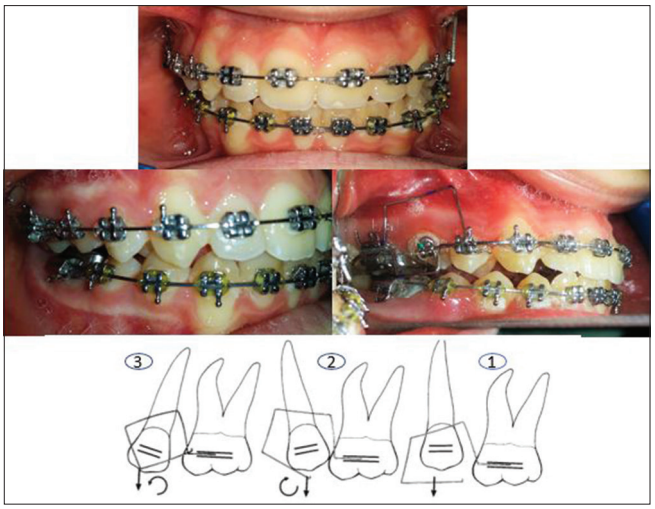

Figure 8: Rectangular loop

Figure 10: Place 0.019 × 0.025 inch stainless steel arch wire

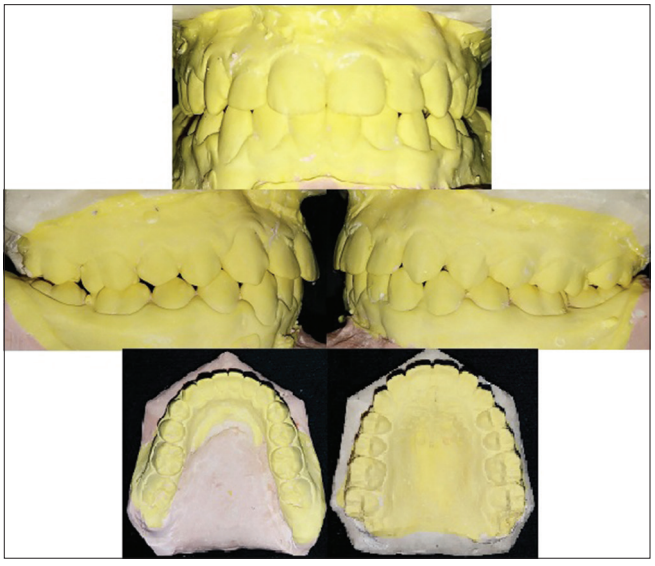

Figure 12: Posttreatment dental cast

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Figure 13: Posttreatment facial l photographs

orthodontist. The straight-wire appliance (SWA) concept was developed to obtain complete three dimensional (3D) control on all teeth. Unfortunately, not all the irregularities within individual segments of a dental arch can be corrected by a straight wire inserted into the brackets of malaligned teeth. The rectangular loop can be used for first, second, and third order corrections and delivers a force system that cannot be achieved by the SWA; the direction of moments generated at the loop depends on the point of force application in relation to the horizontal dimension of the "box."[10] Rectangular loops have been shown to be effective in the 3D control of single-tooth discrepancies. By looking at the preactivated form, the clinician can easily predict the combination of forces and moments in the three planes of space.[11]

CONCLUSION

Nonextraction can be an effective treatment choice for a Class II malocclusion. Leveling and aligning increases in the transverse dentoalveolar width and resolved crowding.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Nil.

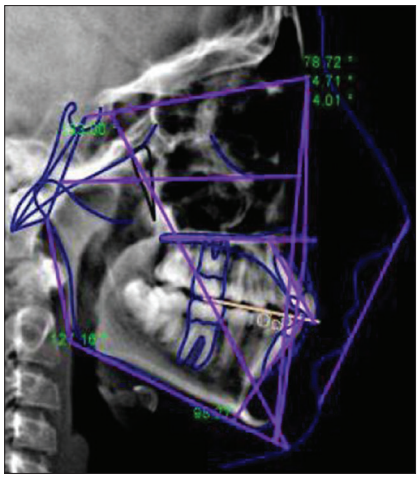

Figure 14: Posttreatment radiograph

Conflicts of interest

There are no conflicts of interest.

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