

Case Report

Treatment of Class II division 2 malocclusion with impacted lower canine

ABSTRACT

A 15-year-old female presented unilateral Class II molar relation with 90% overbite, retroclined upper central incisors, and impacted lower right canine. Nonextraction treatment was planned to correct deep bite, retroclination of upper central incisors, and unilateral Class II molar relation. Intrusion arch was used to intrude and procline the upper central incisors. Correcting the axial inclination of retroclined incisors caused unlocking of the mandible. This, in turn, leads to simultaneous correction of class II molar relation. The vertical loop was used to disimpact canine. Posttreatment incisors inclination was corrected, bilateral Class I molar relation was achieved, and canine had erupted in its position. The smile arc was improved along with mentolabial sulcus and nasolabial angle.

Key words: Class II division 2; deep bite; impacted canine; intrusion arch.

Introduction

Class II malocclusion is a frequently observed clinical problem, occurring in about 10% of Indian population.^[1-3] Many investigators have pointed out that a Class II molar relation occurs in a variety of skeletal and dental configurations.^[4-7] Class II division 2 malocclusion is characterized by a Class II molar relation coupled with retroclination of central incisors and overlapping by the lateral incisors.^[8] High lower lip line may be the cause of retroclination of upper central incisors in Class II division 2 malocclusion. Moorrees *et al.*,^[9] Buschang *et al.*,^[10] and Walkow and Peck^[11] all concluded that Class II division 2 malocclusion shows reduced intercanine width in the lower arch. This may cause impaction of the canine in many cases due to inadequate space. This malocclusion shows a high genetic tendency^[12,13] and is often associated with small-sized teeth.^[14] Basdra concluded that Class II division 2 malocclusions are closely associated with peg-shaped lateral incisors, impacted canines, hypodontia, and transpositions.^[15] These cases are usually characterized by severe, traumatic deep overbite with lingually inclined maxillary incisors. The first step of treatment in such cases is usually to start correcting the deep bite by intrusion and proclination of

the incisors, extrusion of the molars, or both.^[16] Class II malocclusions can be managed with diverse treatment methods such as functional appliances, extraoral traction, fixed appliances, extraction procedures, and surgery.^[17] This case report describes nonextraction treatment approach of a Class II division 2 subdivision malocclusion with impacted lower canine.


Case Report

A 15-year-old female reported with the chief complaint that her upper front teeth are irregularly placed. She was also concerned about her missing lower right canine. During

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the questionnaire, the patient revealed that her parents presented with a similar malocclusion. No relevant medical history was reported. The clinical examination showed mild convex facial profile, horizontal growth pattern, and competent lips [Figure 1]. Intraoral examination showed retroclined upper central incisors and malformed lateral incisors. The lower right canine was missing. The patient presented an Angle's Class I molar relation on the left side, end-on molar relation on the right side, and 90% deep bite. The lower incisors were elongated, and the curve of Spee was steepened by 4 mm [Figure 2]. Panoramic radiograph showed the presence of 32 teeth without bone loss. It indicated that the lower right canine was vertically impacted. A lateral cephalometric analysis [Table 1] revealed retrognathic maxilla with SNA - 78°, retrognathic mandible with SNB - 77°, a skeletal Class I jaw base relationship with ANB - 1°, and Wits appraisal 0.5 mm. The effective mandibular length (Co-Me) was 106 mm and GO GN-SN 19° indicative of a horizontal growth pattern. Upper incisors were lingually inclined with U1 - SN 99°. Lower incisors were inclined ideally over the basal bone with L1 - MP 93° [Figure 3].

Diagnosis and treatment objectives

The case was diagnosed as an Angle's Class II division 2 subdivision malocclusion on Class I skeletal jaw bases with a severe deep overbite. The treatment objectives included improvement of the deep overbite by means of leveling the upper and lower arches, disimpaction of the lower right canine, correction of end-on molar relation on the right side, and attainment of an esthetically pleasing profile and functionally stable occlusion.

Treatment plan

The treatment plan was nonextraction with MBT appliance to align and level the arches. Class II division 2 malocclusions requires correction of interincisal angle, to achieve class I incisor relationship and stable overbite relation. Intrusion arch was planned in the upper arch to correct extruded and retroclined upper central incisors. The vertical loop would be

used for forced orthodontic extrusion of lower right canine after creating space. Bondable lingual retainer was decided for posttreatment stability.

Treatment progress

MBT appliance 0.022 × 0.028" slots (Ormco, Glandora, CA, USA) were used. Anchorage was enhanced by transpalatal arch placed on banded maxillary first molars. Alignment and leveling in the maxilla were accomplished with the following sequence of arch wires: (a) 0.016 heat-activated nickel-titanium (NiTi) archwires, (b) 0.018 stainless steel archwires, and (c) 0.017 × 0.025 stainless steel archwires. After 3 months of alignment, 0.018 stainless steel intrusion

Table 1: Cephalometric findings

Variable	Standard	Pretreatment	Posttreatment
Skeletal			
SNA (°)	82±2	78	78
SNB (°)	80±2	77	77
ANB (°)	2	1	1
GO GN - SN (°)	32	19	20
Wits appraisal (mm)	0	0.5	0.5
Dental			
U1 - SN (°)	102±2	99	104
U1 - NA (mm/°)	4/22	3.5/22	4.5/26
L1 - NB (mm/°)	4/25	3/19	4/25
IMPA (°)	92±5	93	98
Interincisal angle (°)	131	137	129
Soft tissue			
Nasolabial angle (°)	90-110	99	96
U lip - S line (mm)	0	0	1
L lip - S line (mm)	0	0	1



Figure 1: Pretreatment extraoral photographs



Figure 2: Pretreatment intraoral photographs

arch was placed in the upper arch to level the maxillary central incisors and correct deep bite [Figure 4]. Fifty grams of force was used to intrude central incisors. After deep overbite correction, MBT brackets were bonded on the mandibular dentition. After initial alignment and leveling, space was opened for the lower right canine using NiTi open coil springs on 0.017 × 0.025 stainless steel archwires. The impacted canine was exposed by surgical means, and a bondable button was placed. Orthodontic traction was applied after 2 weeks of exposure, and a vertical loop made of 0.018 stainless steel was used to apply extrusive forces on the canine [Figure 5]. Both the arches were coordinated on 0.019 × 0.025 stainless steel archwires. Palatal root torque of 11 and 21 was incorporated in 0.021 × 0.025" titanium molybdenum alloy archwires to correct torque of upper incisors. Finishing was accomplished on 0.021 × 0.025" braided stainless steel archwires. Gingivotomy was performed before bracket removal to improve the gingival contour of 11 and 21. Composite restorations of incisor crowns were done to achieve ideal height-width ratio. At the debond visit, bonded lingual retainers were placed. The patient is being followed every 6 months for follow-up.

Treatment results

The total active treatment period was 20 months. The treatment objectives set in the pretreatment planning were achieved. The retroclined incisors, overbite, and steep

curve of Spee were corrected. The lower right canine was disimpacted and brought into the occlusion. The end on molar relation was corrected into a Class I molar relation on the right side. The mandibular plane angle and lower anterior facial height showed minimal changes [Figure 6]. The posttreatment models, X-ray, photographs showed axial inclination of upper and lower incisors corrected [Figures 7, 8 and 9]. The posttreatment orthopantomogram showed parallelism of roots. The gingival-tooth relationship was improved for the upper central incisors. Overall micro esthetics were achieved after gingivotomy and composite restoration of 12, 21, and 22. At the end of treatment, the patient had a harmonious profile and functionally stable occlusion, along with a pleasing smile and improved smile arc.

Discussion

Class II division 2 malocclusion is characterized by permanent mandibular incisors occluding posterior to the cingulum of retroclined permanent maxillary incisors.^[18] It frequently presents with reduced overjet and increased overbite. Classically, the permanent maxillary central incisors are retroclined and the maxillary lateral incisors are proclined and mesiolabially rotated. The position and shape of the lower lip to the maxillary incisors have been implicated as the principal etiological factor in the development and relapse of Class II division 2 malocclusion.^[19-24] Combination of hyperactivity of the labial musculature and a higher resting lip line is thought to cause maxillary incisor retroclination.^[24,25] A reduced crown-root angle (collum angle) has been reported for the

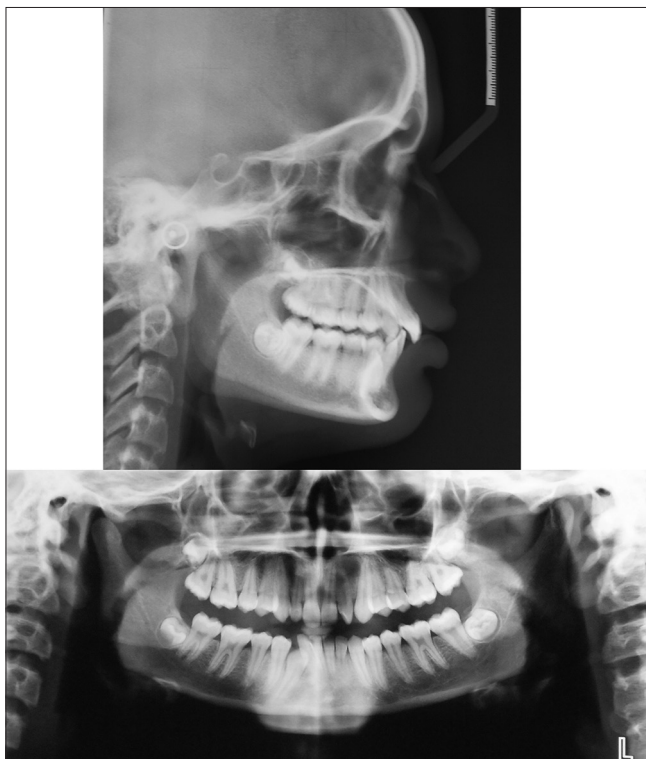


Figure 3: Pretreatment orthopantomogram and lateral cephalogram



Figure 4: Incisor intrusion arch in maxillary arch



Figure 5: Lower canine traction by vertical loop



Figure 7: Posttreatment intraoral photographs

upper incisors in class II division 2 malocclusions, which can contribute to their characteristic inclination.^[26,27] Class II division 2 may show polygenic inheritance and associated with various anomalies such as peg-shaped lateral incisors, transposition, and malformed teeth.^[12,28] Most of the class II division 2 malocclusions manifest with a severe deep bite. Various treatment options and appliance designs have been advocated for the correction of excessive overbite.^[29,30] According to Nanda, the correction of deep overbite can be



Figure 6: Posttreatment extraoral photographs

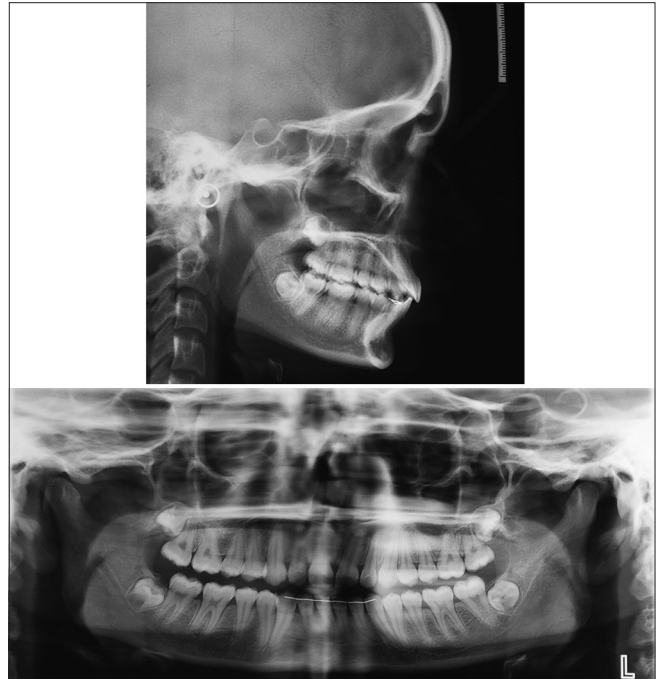


Figure 8: Posttreatment orthopantomogram and lateral cephalogram

achieved by four types of tooth movement, i.e., intrusion of incisors, proclination of anterior teeth, extrusion of posterior teeth, and surgical methods.^[31] Extrusion of posterior teeth results in increasing the lower anterior facial height, clockwise rotation of the mandible, which may worsen class II molar relationship and retrognathic profile.^[32] Deep bite was corrected by intrusion and proclination of upper central incisor in this case.

In cases presenting during the growth period, the forward growth of the mandible can be used to improve the anteroposterior discrepancy with the maintenance of an adequate vertical skeletal relationship. However, adult patients no longer experience catch-up growth and often need a surgical approach for sagittal correction.^[33,34] In many cases, the mandible gets locked in its backward position due to severe deep bite. Correcting the axial inclination of retroclined incisors causes unlocking of the mandible. This,

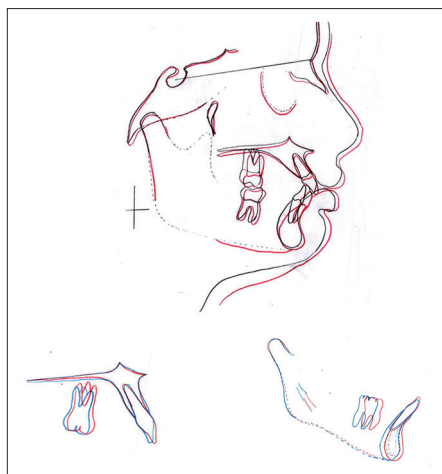


Figure 9: Superimposition

in turn, leads to simultaneous correction of class II molar relation. The increased overbite predisposes to a reduced lower intercanine width, which may be the cause of canine impaction in this case.

In our case, we corrected axial inclination of retroclined upper central incisors which allowed mandible to unlock the mandible and moved it in the forward direction. This got Class II molar relation into Class I relation. To promote stability, the interincisal angle requires correction by placing the incisal edge of the mandibular incisors anterior to the midpoint or centroid of the upper incisor roots;^[35] this was achieved in this case.

Conclusion

The shape and position of the lips in Class II division 2 malocclusion not only affect incisor inclinations but can also complicate orthodontic mechanotherapy and posttreatment stability. Deep bite correction helps in unlocking of mandible which corrects Class II molar relation. The interincisal angle must be normalized which gives long-term treatment stability.

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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Conflicts of interest

There are no conflicts of interest.

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