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Research Article

SKELETAL CLASS II CORRECTION USING TWIN BLOCK & RICK-A-NATOR APPLIANCE: A CASE SERIES

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A B S T R A C T

Early screening and diagnosis help in preventing and intercepting the severity of the malocclusion which helps in addressing the esthetic and functional concerns. Growth modulation such as mandibular advancement has been an effective procedure in orthodontics

The treatment of skeletal Class II growing patient is to move the mandible into the Class I molar positon via facilitating mandibular growth. The functional appliances are to be designed to exert three major functions such as palatal expansion, forward growth of mandible and increase of the posterior vertical dimension. The twin block appliance along with rickanator increased the likelihood of patient cooperation and corrected the underlying skeletal malocclusion and reduced the treatment duration of fixed orthodontic appliance. The present paper presents two case reports of Class II malocclusion describing the clinical effectiveness of combination of Twin block & Rick-a-nator appliance with fixed mechanotherapy.

INTRODUCTION

Skeletal malocclusion is a frequently encountered problem in orthodontics that occurs due to the distortion of the maxillary and/or mandibular development and has a huge impact on the positioning, alignment and health of the primary and permanent teeth. Among these, Class II malocclusion is the most common anomaly often associated with mandibular retrognathism in most of the cases.[1]Proffit and Ackerman[2] described three primary treatment approaches for correcting a Class II malocclusion associated with mandibular deficiency, according to characteristics associated with the problem such as anteroposterior discrepancy, age and patient compliance. These include growth modification to eliminate the jaw discrepancies, dental compensation, and surgical correction. Growth modification by functional appliances also known as Functional Jaw Orthopedics is a commonly used treatment protocol for growing Class II patients.[3]

Amongst the Functional Jaw Orthopedics, the twin block appliance received the widespread popularity due to its increased compliance, efficacy and the advantages it offers over other appliances in correcting such defects.[4]

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A significant supplementary elongation of mandible can be achieved only when functional jaw orthopedics is performed at pubertal or immediately post pubertal periods of skeletal development. However, in patients with moderate to severe skeletal discrepancy, who report for treatment at the peak of or close to the end of pubertal growth spurt, when long term compliance is a major concern for any growth modification procedure, a fixed functional appliance can be used in conjunction to support the action of twin block appliance.

Rick-a-nator is a fixed functional appliance which is claimed to be effective in treating mandibular and vertical deficiencies. It is a compact, less bulky and virtually invisible appliance that improves patient comfort, speech and acceptance.[5]It consists of two molar bands on the upper fist permanent molars and an anterior acrylic bite plate which is fabricated from self-cure acrylic resin. This anterior bite plane is converted into an anterior repositioning appliance by the addition of acrylic incisal ramp which engages the lingual of the anterior teeth.

The anterior acrylic is connected to the molar bands by 0.045 stainless steel connector wires.

This appliance is effective without depending on patient's compliance and multi-bracket therapy can be used simultaneously; hence the treatment time is shorter.[6]The

present paper presents two case reports of Class II malocclusion describing the clinical effectiveness of combination of Twin block & Rick-a-nator appliance with fixed mechanotherapy.

Case Report

Case 1

A 12-year-old female child reported with a chief complaint of forwardly placed upper front teeth. Clinical examination showed a convex facial profile with mandibular retrusion, mesoprosopic facial pattern, hypotonic upper lip, everted lower lip and a deep mentolabialsulcus. The intraoral examination revealed 8mm of overjet, a deep overbite and Class II molar and canine relationship on both the sides with slight crowding in lower anterior segment.(Figure 1)

Figure 1 Pre treatment intraoral and extraoral photographs and radiographs

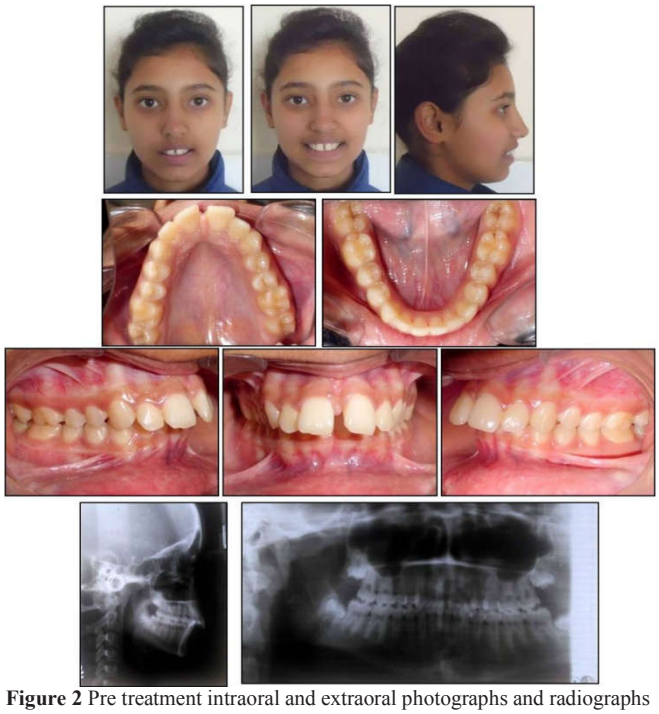

Figure 2 Pre treatment intraoral and extraoral photographs and radiographs

The cephalometric analysis confirmed a skeletal Class II relationship with mandibular retrusion (ANB-6^0, WITS-4mm, Facial angle-85^o), average growth pattern (Mandibular plane angle-25^0, Y AXIS-60^0), proclined upper incisors (U1-NA-6mm/30^0), normal axial inclination of lower incisors(LI-NB-5mm/25^0) and an acute nasolabial angle. The CVMI suggested the transition phase of the curve of pubertal growth spurt and with a positive visual treatment objective (VTO). A two phase treatment plan was decided for the patient with twin block appliance in first phase followed by Rick-a-nator and fixed mechanotherapy.(Figure 3)

Figure 3 a-h. Twin block appliance: intraoral right lateral image (a); intraoral frontal image(b); intraoral left lateral image (c); Rickanator appliance: intraoral upper occlusal image (d); intraoral lower occlusal image (e);Post functional appliance: intraoral right lateral image (f); intraoral frontal image(g); intraoral left lateral image (h)

Figure 4 a-h. Twin block appliance: intraoral right lateral image (a); intraoral frontal image(b); intraoral left lateral image (c); Rickanator appliance: intraoral upper occlusal image (d); intraoral lower occlusal image (e);Post functional appliance: intraoral right lateral image (f); intraoral frontal image(g); intraoral left lateral image (h)

Phase I treatment involved the construction of twin-block appliance to advance mandible to achieve Class I skeletal relationship. The active twin block appliance phase lasted for 6 months. After the active phase of the appliance, TB was replaced with the Rick-a-nator appliance for the maintenance phase with simultaneous bonding of upper and lower arches with preadjusted 0.022″ MBT appliance. An initial 0.014HANT wire was placed followed by progressive wire uptill 0.019×0.025 SS wire stage for levelling and alignment and closure of spaces. Rick-a-nator was removed and final

occlusal settling was done to obtain a good Class I intercuspation.Complete posttreatment records were taken which showed a marked improvement of the patient profile, lip competency with radiographs showing a decrease in the ANB angle and increase in the effective length of the mandible.(Figure 5)

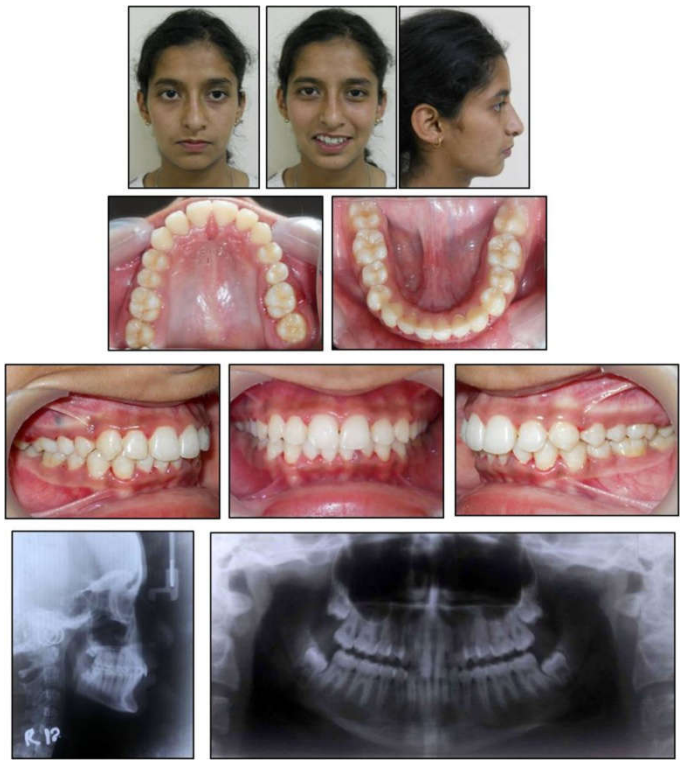

Figure 5 Post treatment intraoral and extraoral photographs and radiographs

Case 2

A girl aged 13 years and 2 months, with chief complaint of proclined upper front teeth. Extraoral examination showed retrognathic mandible, posterior divergence and convex profile with potentially incompetent lips. Intraoraly patient had an increased overjet and overbite, Class II molar and canine relation, a high arched palate and v-shaped maxillary arch with spacing in upper anterior teeth.(Figure 2) Lateral cephalogram showed CVMI stage 4 with ANB of 6^0 and Wits appraisal of 7 mm, indicative of a Class II skeletal pattern. The SNB angle was 78° and Facial angle 83^0showed that the mandible was retrognathic. Maxillary incisors were proclined with U1-NA-8 mm/30° and mandibular incisors were upright over the basal bone with L1-NB- 5 mm/24°.

Two-phase therapy was planned with twin-block appliance to advance the retrognathic mandible to correct skeletal Class II relation in phase I followed by Rick-a-nator& fixed appliance for arch coordination to correct minor displacement and detailing the occlusion in phase II.(Figure 4)

Twin block appliance was given for an active period of 7 months followed by Rick-a-nator appliance for maintenance. Upper and lower aches were simultaneously bonded with MBT 0.022appliance. Alignment and levelling of arches was done with sequential wires starting from 0.014 NiTi uptill 0.019×0.025 SS wire stage followed by finishing and detailing. Rick-a-nator was removed and final settling of occlusion was done with Class II elastics.

At the end of treatment Class I occlusion was achieved with marked improvement in patients profile, lip competence and axial inclination of teeth.(Figure 6)

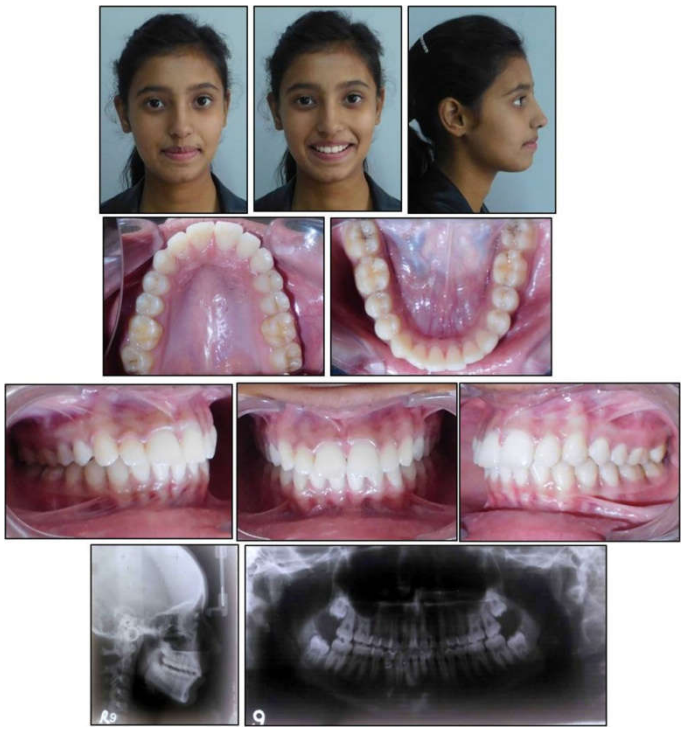

Figure 6 Post treatment intraoral and extraoral photographs and radiographs

DISCUSSION

Dentofacial deformities exist in the maxilla and/or mandible in all three dimensions of space but frequently occur in the anteroposterior plane manifesting as Class II or Class IIImalocclusion,[4] among which, Class II malocclusion is more common with a prevalence rate of 8.37% in Indian population.[7] Although variable combinations of dental and skeletal factors contribute to this malocclusion, McNamara[8] has claimed that the most frequent skeletal problem in Class II malocclusion in preadolescents is mandibular retrognathia which suggest that an appliance with the demonstrated ability to stimulate significant mandibular growth would be an important part of clinician's armamentarium.

The goal in the development of the twin block approach for treatment was to produce a technique that could maximize the growth response to functional mandibular protrusion by using an appliance system that is simple, comfortable and esthetically acceptable to patient.[8]Various researches in human beings have also reaffirmed the importance of full time wear for functional appliances to exert their maximum therapeutic effects by way of neuromuscular adaptation.

Although twin block appliance is less bulkier and acceptable by patients, still its long term wear depends on compliance of the patient. On the other hand, fixed appliances, like Rick-a-nator, is easier to construct, highyesthetic and cost effective and does not depend on compliance of patient. So in the present case report twin block was replaced with rick-a-nator after active phase to maintain the mandibular advancement and simultaneously further bringing about condyle fossa remodelling.

With Rick-A-Nator appliance, the patient had to move the mandible forward to engage the appliance. This induced adaptive reaction to the new pattern of mandibular closure and resulted in an increase of the forward growth of the mandible as a result of remodeling processes in the articular fossa or due to a functional adaptation in mandibular position.

The treatment with the Rick-a-nator appliance also resulted in a significant increase in the lower anterior facial height that can be attributed to the increase of the mandibular ramus height and extrusion of lower fist permanent molars because the appliance design allowed the opening of the bite posteriorly leading to passive extrusion of lower fist permanent molars in approximately 3 months. There was significant reduction in the overjet and overbite. This reduction was mainly due to increase in the mandibular ramus height, extrusion of lower fist permanent molars and the proclination of mandibular incisors.

CONCLUSIONS

The twin block appliance along with rickanator increased the likelihood of patient cooperation and corrected the underlying skeletal malocclusion and reduced the treatment duration of fixed orthodontic appliance. The lack of palatal coverage by acrylic made the appliance more comfortable and lack of wire elements in the anterior region made it more esthetic for the patient. It can be concluded that twin block appliance brought about skeletal and dental changes which helped in correction of Class II malocclusion. Rickanator helped achieve intercuspation in posterior segment which decreased the chances of relapse and significantly reduced the duration of treatment. Final detailing of occlusion was achieved with fixed appliances.

Better esthetics, ability to modify growth, fewer extractions, reduction in duration and difficulty of subsequent therapy were amongst the few benefits of two phase therapy.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form, the patients have given their consent for 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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Conflcts of interest

There are no conflicts of interest.

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