Two-phase treatment of class II malocclusion in young growing patient

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Abstract
The use of functional jaw orthopedics, at the correct time during growth, can ultimately result in malocclusion patients achieving a broad beautiful smile, an excellent functional occlusion, a full face with a beautiful jaw line and lateral profile. Following is a case report of a young growing individual with mandibular retrognathia. Treatment was planned in two stages with the use of twin block during the first phase for correction of skeletal malocclusion and forward positioning of the mandible, followed by the second phase of fixed pre-adjusted edgewise orthodontic appliance for camouflaging the remaining skeletal discrepancy and achieving a stable harmonious occlusion.

Keywords: Class II corrector, functional appliance, twin block appliance, two-phase therapy

Introduction
In a two-stage treatment, the active phase involves the use of the removable twin block appliance to reposition the mandible forward until the overjet and overbite are corrected.[1] When that occurs, the first molars will be in contact and the maxillary and mandibular incisors will be nicely coupled.[2] To ensure the patient does not have a dual bite, the appliance is worn for a minimum of 7–9 months. Once the active phase of the treatment is completed, the support phase commences. An upper removable appliance with a steep anterior incline plane is used to retain the corrected incisor relationship until the posterior occlusion is fully integrated. This usually takes 4–6 months and is continued for an additional 3–6 months to allow for functional re-orientation of the muscular complex. After this functional appliance phase is completed, fixed orthodontic treatment is necessary for the settling of occlusion and maintenance of the skeletal correction achieved and correction of any remaining dental discrepancy.

Case Report
A 12-year-old female patient presented with a chief complaint of forwardly placed and spacing between the upper front teeth and gaps between teeth.

Extraoral
She was mesocephalic, mesoprosopic with convex facial profile and consciously competent lips. The incisal show at rest was 4–5 mm with everted lips [Figure 1a–c].

Intraoral
She had an Angle's class II molar relation on Left side and End on' molar relation on the Right Side. with overjet of 8 mm and overbite of 5 mm, with mild crowding and rotation in lower arch with the upper midline shifted toward the right by 1–2 mm [Figure 2a–d].

Radiographic findings
The radiographic findings are shown in Figure 3.
- SNA 80, SNB 74 (skeletal class II)
- Increased mandibular plane angle 30°
- AO ahead of BO by 5 mm
- UI to NA 12 mm, 41°
- LI to NB 12 mm, 40°
- Interincisal angle 93° (proclined incisors)
- IMPA 104°
- Base plane angle 29°
- Inclination angle 90°
- Upper lip strain 12 mm

Orthopantomogram (OPG) revealed radiolucency with respect to lower anteriors, suggestive of a cyst.

Diagnosis
- Median mandibular cyst
- Class II skeletal base with retrognathic mandible
- Class II molar and canine relation
- Bimaxillary dentoalveolar proclination with incompetent lips
- Convex facial profile
- Average growth pattern
Visual Treatment Objective was positive; so, a treatment plan involving mandibular advancement with a fixed twin block was considered.

**Treatment objectives**
- Correction of proclination of upper and lower anteriors
- Reduction of overjet and overbite
- Decrowding and arch alignment
- Correction of midline
- Achieve Class I molar and canine relationship
- Enhance facial esthetics

**Treatment plan**
- Enucleation of median mandibular cyst
- Myofunctional appliance therapy to advance the mandible
- Second phase of treatment with extraction of all the first premolars
- Pre-adjusted edgewise appliance
Twin Block

Twin block appliance was placed for 8 months. The mandibular block was extended on to the incisal edges of the mandibular teeth to prevent their proclination [Figure 4a–d].

Retention phase for the twin block therapy
Then, a maxillary anterior bite plate with groovings in the anterior palatal region was given for another 6 months to maintain and retain the skeletal corrections [Figure 5].

Post-retention occlusion before the start of fixed orthodontic appliance
During the retention period, the posterior open bite decreased and the occlusion got partially settled [Figure 6a, b].

Phase II fixed appliance treatment
Roth prescription 022 slot pre-adjusted edgewise appliance
was used after all 1st premolar extractions. Alignment was carried out using coaxial wire and Niti wire. Wire size was progressively increased to 0.019 × 0.025 inch in both maxillary and mandibular arches and then extraction spaces of all 1st premolars were closed using E-chains and sliding mechanics [Figures 7a, b and 8a–f].

**Post treatment radiographic findings**
- SNA 81, SNB 78 (pre 80, 74)
- Increased mandibular plane angle 30°
- AO ahead of BO by 2 mm

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**Figure 6:** At the end of phase 1

**Figure 7:** (a, b) With fixed appliance therapy

**Figure 8:** (a–f) Post-treatment photographs
Figure 9: Cephalometric superimposition

- UI to NA 7 mm, 23° (12/41)
- LI to NB 8 mm, 31° (12/40)
- Interincisal angle 123° (proclined incisors) (93°)
- IMPA 98°
- Base plane angle 25°
- Inclination angle 83°

**Superimposition**

Superimposition [Figure 9] of the cephalometric findings shows that the molar and canine relationship had corrected and the incisor proclination reduced. The chin lip contour improved with decreased protrusion of the lips. Lower facial height remained constant.

**Discussion**

There are obvious advantages of treating Class II patients with one removable functional appliance prior to fixed appliance therapy. Management of distal occlusion with functional appliances can lead to improvement in oro facial function through muscle adaptation along with dental and skeletal changes.[3] The ideal timing for orthopaedic treatment for mandibular deficiency is after onset of pubertal growth spur.[4] The orthopaedic phase and orthodontic treatment phase should be combined in one single treatment, as studies have demonstrated that very early treatment involving two separate phases of therapy do not have any benefits[5,6,7] other than a positive effect on self esteem.[8] Success with this treatment result depends upon slight over-correction of the buccal segments (molars and canines) to a super Class I, which builds anchorage into the system prior to placement of the fixed appliances and allows for slight rebound. Class II correction is maintained with an inclined clip overbite plane during the transition to fixed appliances. Lateral open bite reduction is commenced in the twin block phase by removal of the lower Adams clasps and judicious trimming of the upper blocks. Any residual open bites, characteristically seen at the end of the functional phase, will correct by buccal segment eruption during the leveling and aligning phase. As in this case, there was too much of incisor proclination at the end of fixed appliance phase which can be corrected by extraction of premolars with conventional fixed orthodontic appliance therapy using sliding mechanics.

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