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Case Report

Arrested Growth: Myth or Reality

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***Abstract*:**

In Class II, Division I malocclusion is a common problem often associated with mal-relationship of dental bases and mal-alignment of dentition. The approaches to treat Class II, Division I malocclusion include growth modulation, dental camouflage and surgical orthodontics. A 16-year-old female patient with Class II, Division I malocclusion associated with excessive over jet, deep bite, and retrognathic mandible reported to the Department of Orthodontics and Dentofacial Orthopedics, Kothiwal Dental College and Research Center and Hospital, Moradabad. The case was treated with twin block appliance by taking into consideration the over jet which was to the tune of 13 mm and the mandible which was fully locked within the maxilla. The patient was post-pubertal by 3 years and by seeing lateral cephalogram, it falls in CVMI5 stage which mean normally that the growth is only 10% left and theoretically, not appropriate for functional appliance therapy. The patient was treated with twin block appliance to catch up with the arrested growth of mandible followed by fixed mechanotherapy. The result was tremendous and up to the mark.

Key Words: Arrested growth, functional appliance, post-pubertal, twin block

Introduction

In Class II, Division I malocclusion is a common problem often possessing mal-relationship of dental bases and mal-alignment of dentition. Its main clinical feature is an increased over jet, with proclined upper incisors, overbite is frequently increased, though shallow overbite is also presented clinically. The skeletal pattern is generally Class II and the severity of the malocclusion is mainly associated with the degree of the skeletal discrepancy.[1,2] McNamara demonstrated the broad variations of skeletal discrepancy in Class II malocclusion.[3] Retrusive mandible and excessive height of lower face were the dominant characteristics, which were respectively around 60% and 45% of overall Class II subjects. The cases with reduced mandibular plane angle in his study were only 33%. The other etiological factors contributing to Class II, Division I malocclusion include digit-sucking habit, unusual swallowing behavior and indifferent soft tissue pattern, such as lower lip resting against the palatal surface of maxillary incisors.

Functional appliances are used to correct the abnormal functions responsible for the abnormal growth and development of the underlying hard tissues. Altering and directing the neuromuscular activity of the oral cavity to normal limits is the major goal of applying this method of the treatment. When there is mandibular retrognathic, positioning the mandible forward is believed to enhance its growth.[1,4-8]

Case Report

A 16-year-old female in her permanent dentition came to Orthodontic and Dentofacial Orthopedic Department, Kothiwal Dental Collage for orthodontic treatment. Initial examination revealed a skeletal and dental Class II malocclusion with a retrognathic mandible, a severe overbite and over jet, malalignment of both arches, rotations, missing 35 and 45 in the mandibular arch and decayed tooth with respect to. Cephalometric analysis revealed a Class II, Division I skeletal malocclusion (ANB = 10°)with a high mandibular plane angle (GoGn-SN = 38°, FMA = 33°), reflecting a high-angle facial pattern and a procumbent inter incisal angle (U1-L1 = 120°) (Table 1). The maxilla was protrusive (SNA = 83°), while the mandible was largely retrusive (SND = 68°, ANB = 10°). It represents a bi-jaw defect leading to severe skeletal Class II malocclusion (Figure 1a-h).

Treatment plan

The primary treatment objectives were to reduce the overbite, to achieve bilateral Class I molar and canine relationship and to improve the esthetics while allowing for mandibular growth. A two-stage treatment process beginning with myofunctional appliance for mandibular growth, followed by treatment with fixed mechanotheraphy.

1. First stage: Application of myofunctional appliance (Clark's twin block)[9] to modify mandibular growth, reduce over jet and attain skeletal Class I relationship.
2. Second stage: Fixed mechanotheraphy to attain ideal Class I molar and canine relationship with ideal over jet and over bite.

Table 1: Cephalometric data.				
Angle	**Norms**	**Pre-treatment**	**Progress**	**Post-treatment**
SNA	82	81	82	83
SNB	80	71	78	80
SND	78	68	73	74
ANB	2	10	4	3
GoGn-Sn	32	38	36	38
Occlusal plane to Sn	14	25	28	20
U1-NA	4 mm	11 mm	5	3
U1-NA	22	28	22	20
L1-NB	4 mm	4 mm	7.5	8.5
L1-NB	25	26	29	31
Interincisal angle	131	120	122	128
Over jet	2	14	8	3
Overbite	2	6	4	2
FMA	25	33	33	32
FMIA	65	55	53	44
IMPA	90	92	94	104

Treatment progress

Initially, a twin block appliance was given to modify the mandibular growth and to reduce the excessive over jet. After 1 year, full mouth strap up with standard edgewise appliance was done and an initial 0.014″ Ni-Ti wire was ligated to align the upper and lower dentition (Figure 2). Subsequently U/L 0.016″ ss, U/L 0.016″ × 0.022″ ss, U/L 0.017″ × 0.025″ ss, U/L 0.019″ × 0.025″ ss wire were inserted in the same order. Retraction was done with sliding mechanics in the 0.019″ × 0.025 ss wire. Finishing and detailing was carried out by vertical elastics.

Treatment result

Stage 1: Twin block therapy

The treatment result of function appliance revealed the noticeable reduction of over jet and overbite. The axial inclination of the originally proclined incisors was also corrected to an extent. The skeletal Class I facial profile indicated the signification modification of mandibular growth. Nevertheless, the potential incompetent lips and other intraoral features such as anterior spacing, lateral open bite persisted (Figure 3a-h).

Stage 2: Fixed appliance therapy

The extra orally facial profile of post-treatment demonstrated noticeable improvement with good facial esthetics straight facial profile and balanced competent lips. The intraoral occlusion after treatment revealed the significant changes and satisfactory result with characteristics of well-aligned dentition, acceptable over jet and overbite. Class I canine and molar relationship and good buccal interdigitation were also achieved. Post-treatment panoramic radiograph showed healthy and parallel roots. Superimposition also showed ideally torqued central incisors and good condylar growth (Figure 2a-h).

Figure 1: (a-h) Pre-treatment.

Figure 2: (a-h) Present stage.

Discussion

The configuration of the twin block applied in this report followed the original design by Clark.[9] There are obvious advantages of treating Class II patients with a removable functional appliance prior to fixed appliance therapy. Management of distal occlusion with functional appliances can lead to improvement in oro-facial function through better muscle adaptation concurrent to the dental and skeletal changes achieved.[10]

Ideal timing for orthopedic treatment for mandibular deficiency is after onset of pubertal growth spurt.[11] Despite Tulloch *et al.* in another study concluded two-phase treatment might not be more clinically effective than single

Figure 3: (a-h) Post-function.

phase treatment.[12] Nevertheless, Todd and Dodd found that the risk of incisal fracture in an excessive untreated over jet is greater than that in the other malocclusions.[13] Meanwhile, with huge over jet and deep overbite of this Class II, Division I patient, it would be very likely that the lower lip tended to push against palatal surface of upper incisors, and worsened the over jet and axial inclination of upper incisors. That's the reason why huge overjet >9 mm is listed in the category of "Grade 5a" in the dental health component of index of orthodontic treatment need. Fixed mechanotheraphy is mandatory after functional phase of treatment to achieve ideal dental relationship leading to a pleasant and pleasing profile. The over jet reduction in this reported case was achieved by favorable growth of mandible to bring the lower incisors forward and dentoalveolar effect to retrocline the upper incisors by twin block.

Conclusion

The advantages offered by a two-phase correction of skeletal Class II presented in a growing patient have been discussed. The case outlined is the perfect representation of the type that would benefit optimally with such an approach. The all-round improvement in having achieved a better soft tissue balance, a near perfect occlusion and imparting a positive personality change with a concurrent improved self-esteem have underlined the merits of this approach.

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