Simplified Bite Jumping Appliance (SBJA): An Innovative Alternative for Mandibular Advancement in Growing Individuals – A Case Report

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Abstract:

Class II malocclusion is one of the most prevalent orthodontic conditions throughout the world and is characterized by backward positioning of the mandible, forward positioning of maxilla and/or combination of both. Patients with retrognathic and small mandible require functional appliance therapies that stimulate the growth of the mandible. It has been demonstrated that the effectiveness of functional treatment of mandibular growth deficiencies strongly depends on the biological responsiveness of the condylar cartilage. This ultimately depends on the growth rate of mandible. The best time for the treatment of Class II disharmony is during or slightly after the onset of the pubertal peak in growth velocity. This Case report shows the effects of Simplified Bite Jumping Appliance in an adolescent patient.

INTRODUCTION

Normal occlusion can be defined as an aesthetically acceptable and functionally stable relationship of the teeth when the jaws approach each other. Class II malocclusion is one of the most prevalent orthodontic conditions throughout the world and is characterized by backward positioning of the mandible, forward positioning of maxilla and/or combination of both. This malocclusion can be treated efficiently with growth modulation during the appropriate time of growth.[1]

According to Khandelwal et al, the prevalence of a class II malocclusion in the age group of 12-15 years was found to be 18.9% in India.[2] Treating a class II malocclusion during the growing period of a child provides the advantage of the skeletal correction and achieving better aesthetics in comparison to camouflaged treatment after growth completion.[3]

The complexity of wire bending and fabricating wire components for an appliance led to the discovery of the Simplified Bite Jumping Appliance (SBJA) which does not involve any wire component in its fabrication for sagittal correction of mandible.

This Case report highlights the results achieved in a case of Angles class II div 1 malocclusion that was treated by Simplified Bite Jumping myofunctional appliance to bring the mandible forward.

DIAGNOSIS AND ETIOLOGY

A 12 year old female patient reported in the department of Orthodontics and Dentofacial Orthopedics with a chief complaint of proclined upper incisors. Patient had a convex profile with

incompetent lips (FIG 1). On frontal examination it was observed that the amount of incisor exposure during speech was 5mm and during smile was 9mm. She had a positive VTO (FIG 2).Intra-oral and dental cast examination (FIG 3) demonstrated bilaterally Class II molar and canine relationship and proclined upper and lower anterior teeth. Patient had upper and lower dental midline shifted on the right side.On lateral cephalometric examination (FIG 4) patient had a skeletal Class II and hypodivergent jaw base tendency with orthognathic maxilla and retrognathicmandible. A diagnosis of Angles Class II Div 1 malocclusion was made. Parameters suggestive for these are mentioned in Table no-1 in results section.

FIG 1: Pretreatment Extra-oral photographs of patient

FIG 2: VTO of the patient

FIG 3: Pretreatment Intraoral Photographs of patient

FIG 4: Pretreatment Lateral Cephalogram of patient

Fabrication and Mode of Action of Simplified Bite Jumping Appliance

1.5 mm thick thermoplastic polycarbonate sheet was used for the upper and lower base plates.Expansion screwswere incorporated in upper and/or lower plates as and when required in the case and are stabilized by self-cure acrylic resin.Custom made prongs made of Cobalt Chromium were used in the upper appliance andadjusted to the lower lingual vestibular depth in the patient. The prongs were positioned at an angle of 60^0-70^0 to the occlusal plane facing downward and forward to hold the mandible in a forwarded position (FIG 5). Eruption holes were made in upper and lower posterior area to facilitate eruption of the permanent teeth.

If additional activation for further advancement of mandible was required, self-cure acrylic was added on the lingual surface of the lower polycarbonate sheet to facilitate early contact of the

prongs with the lower plate to position the mandible in forwarded position.

FIG 5: Maxillary and Mandibular appliances on Study Models and In Patients mouth

RESULTS

TABLE 1

SKELETAL PARAMETERS		
PARAMETERS	**PRE-TREATMENT**	**POST-TREATMENT**
Beta angle	22^0	28^0
SNA	80^0	82^0
SNB	75^0	81^0
ANB	06^0	01^0
Effective mandibular length (linear)	90mm	90mm
Down's Y axis (Go – Me to FH)	57^0	54^0
Mandibular plane angle (SN-GoGn)	28^0	25^0
Saddle angle	130^0	115^0
Gonial angle	128^0	126^0
Lower gonial angle	68^0	70^0
Articulare angle	128^0	144^0
Facial axis angle	98^0	100^0
DENTO –ALVEOLAR PARAMETERS		
PARAMETERS	**PRE-TREATMENT**	**POST – TREATMENT**
UI TO NF linear	21mm	21mm
LI TO Tangent to Mandibular plane	96^0	104^0
OP-HP ANGLE	08^0	05^0
AO-BO	-3mm	0mm
UI-NA ANGLE	47^0	38^0
LI-NB ANGLE	26^0	36^0

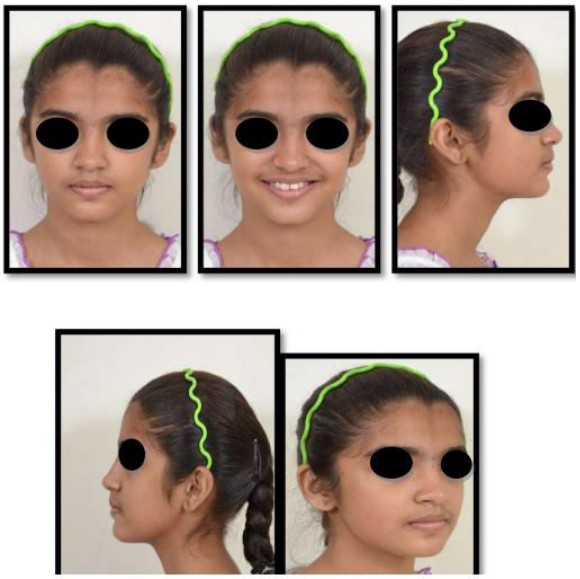

FIG 6: Post Myofunctional phase extra-oral photographs of patient

FIG 7: Post Myofunctional phase intraoral photographs of patient

DISCUSSION

The evolution in configuration of newer functional appliances emphasizes more patient comfort, ease of fabrication and efficient correction of skeletal malocclusion. Ken Miyazawa et al. constructed a simple appliance that comprised of a clear hard thermoplastic resin known as SBJA. They claim it to be trouble-free to fabricate, deliver and easy to handle at chair side.[4]

The optimal timing for treatment of children with Class II malocclusions remains controversial. Some clinicians believe strongly that beginning treatment in the mixed dentition before adolescence is advantageous while others are convinced that early treatment is often a waste of time and resources. The decision for early treatment should be based on special indications for

each child. In fact, early treatment as a standard of care can be justified only if it will provide additional benefits to the patients.[5] Treating a class II malocclusion during the growing period of a child provides the advantage of the skeletal correction and achieving better aesthetics in comparison to camouflaged treatment after growth completion.[6]

The main objective of therapy with functional appliance is to induce supplementary lengthening of the mandible by stimulating increased growth at the condylar cartilage. It has been demonstrated that the effectiveness of functional treatment of mandibular growth deficiencies strongly depends on the biological responsiveness of the condylar cartilage. This ultimately depends on the growth rate of mandible. The rate of mandibular growth, however, is not constant throughout the juvenile and adolescent periods. The onset, duration, and intensity of the pubertal spurt in mandibular growth vary on an individual basis. The best time for the treatment of Class II disharmony is during or slightly after the onset of the pubertal peak in growth velocity. During this growth period, various removable and fixed functional appliances are used for skeletal Class II correction.[1]

On comparison between pre and post treatment effects of the myofunctional therapy with the Simplified Bite Jumping Appliance, it was observed that majority of the parameters showed predictably significant effects.Gonial angle and UI to NF linear measurement were observed almost stable and unchanged. This observation could be attributed to the comparatively better control over eruption of posterior teeth and full coverage of dentition by the appliance which maintained the teeth in their original position in SBJA.

When compared with the effects of the standard Twin Block Appliance therapy, the SBJA revealed lesser Proclination of lower incisors which could be attributed to full coverage of dentitions in the SBJA therapy. However, one limitation of this appliance as observed was the intricacy in fabrication of the prongs, breakage of the polycarbonate sheet and detachment of the prongs for which some modifications can be made in the appliance.

Easy formation of polycarbonate base plates, reusable prongs and better patient acceptance were found to be the prime advantages of SBJA whilea better restraining effect on the maxillawas an additional advantage.

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