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Effective Management of Class II Malocclusion Using Standard Twin Block Appliance-A Case Series

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Abstract: ***Twin block appliance have been proved to be best treatment options for retrognathic mandible in skeletal class II malocclusion. The use of these appliances is greatly dependent on the patient's compliance and they simplify the fixed appliance phase. The objective of this case series is to illustrate the use of twin block appliance in a class II growing patient.***

Keywords: Twin Block Appliance, Class II Malocclusion, Myofunctional Appliance, Forwardly Placed Teeth, Overjet, VTO

1. Introduction

Early treatment was proposed along the lines of "catch them in the young", and "you see it, you treat it" is the main ideology of early orthodontic treatment. Early interventions facilitate normal future growth and development by modification of aberrant muscle morphology, and decreases possibility for aggressive fixed mechanotherapy with extractions and surgery. Interception of dentofacial deformities using growth and its potential at the childhood will be more rewarding as it takes the advantage of growth while achieving the goal of occlusal harmony and dental facial esthetics.

Lack of incisal contact results in the extrusion of the upper and lower anterior dentoalveolar complex, which helps to lock the mandible and prevents normal growth and development and this abnormality is exaggerated by soft tissue imbalance[1.] Class 2 dentoskeletal disharmony do not self correct with growth and may worsen with time. Of the many functional appliances innovated and tried twin blocks have gained popularity in correction of class 2 division 1malocclusion in growing children.

Twin Block appliances are simple, comfortable and aesthetically acceptable to the patient. Positioning the mandible forward is believed to enhance its growth[2-4] . They achieve rapid functional correction of malocclusion by the transmission of favourable occlusal forces to occlusal inclined planes that cover the posterior teeth. The mode of action differs depending on the design; however, their effect is produced from the forces generated by the stretching of the muscles.[5]Many variations in appliance design have extended the scope of the technique to treat a wide range of all classes of malocclusion.

This appliance is worn by children of a growing age for certain periods to allow mandibular movement. As it is easy to wear, patient will be cooperative. The following case series illustrates the use of a standard twin block appliance for skeletal correction of a Class II division 1 malocclusion in growing patients.

Case 1:
A10 years old patient came to the department of pediatric and preventive dentistry, KVG Dental college and hospital, with the chief complaint of forwardly placed upper front teeth since 2 years and concerned about appearance and esthetics. Clinical examination showed a convex facial profile due to mandibular retrusion and a mesoprosopic facial pattern. The cephalometric analysis confirmed a marked class II dental relationship with mandibular retrusion, average growth pattern, proclination of upper and lower incisors and acute nasolabial angle. ANB value of 8 ^{o} suggested a class II skeletal pattern. The vertical proportions were within normal value. The upper incisors were proclined at incisor to N-A angle of 28^{o}and the lower incisors were of retroclined at 29°. The interincisal angle was reduced at 106°. He has incompetent lips with increased overjet of 11mm and overbite of 10mm with angle's class 2 division 1 malocclusion on class 1 skeletal base.

VTO was positive for the patient. A visual treatment objective (VTO) is like a "blueprint" used in building a house. It helps to forecast the normal growth of the patient and the anticipated influences of treatment. The VTO permits the development of alternative treatment plans. Twin block appliances are given in cases of promising VTOs. Hence the final diagnosis made was angle's class 2 division 1 malocclusion on class 1 skeletal base with increased overjet of 11mm, overbite of 10mm and retrognathic mandible and upper and lower incisor proclination.

Pre treatment

VTO

Pre-treatment front view

Lateral ceph

Treatment Objective

a) Achieving Angle's Class I molar and canine relationship.
b) Normal over jet and overbite
c) Levelling and alignment of both the arches.
d) Retention of results for long term.

Treatment Plan

As the patient was in his growing period with both skeletal and dental class II relation, a two-phase treatment had to be undertaken

Phase I: Growth modification using functional appliance (twin block)

Phase II: Fixed mechanotherapy for detailing of occlusion.

Treatment Progress

A wax bite registration was done with mandibular arch guided forwardly and twin block appliance was fabricated A 24 hours per day appliance wear was educated to the patient, where periodic recall was done every 1 month. The profile of the patient had significantly improved with marked reduction in overjet and overbite. Correction of molar and canine relation had also occurred. This correction was to be followed by retentive phase where the patient was instructed to wear a removable reverse inclined plane appliance which engaged the lower anterior teeth and retained the correction obtained

Appliance delivery

Four month follow up

Case 2:

A 12 year old male adolescent approached to the department of pedodontics and preventive dentistry, KVG Dental College, Sullia, complaining forwardly placed upper teeth and irregularly placed lower teeth since 3 years. Patient was of a good general overall health. The patient had no facial asymmetry and the lips were incompetent with the lower lip trapped at rest behind the upper central incisors. All teeth from permanent second molar have erupted in both the upper and lower arches. There was inadequate arch length in both the jaws and lingually placed 32. The incisor relationship had an overjet of 8mm and over bite of 6mm. The centrelines were coincident.

Diagnostic casts were prepared; OPG and Cephalometric essentials were taken. The cephalometric assessment showed the ANB value of 5.5° suggested a mild class II skeletal pattern. The vertical proportions were within normal value. The upper incisors were proclined at incisor to N-A Angle at 35.5° and the lower incisors were of retroclined at 20°. The interincisal angle was reduced at 120°.

Hence the final diagnosis was Angle's Class II Division I Malocclusion with lower anterior crowding and lip trap.

Pre treatment

Pre-treatment intra oral

Overjet of 8mm

Lateral ceph

The patient showed a positive VTO result
Hence the treatment was proceeded with a twin block appliance. The aims of the functional treatment phase were achieved successfully due to good patient compliance. This phase of treatment was completed over 10-12 months. The upper incisors were retroclined by 9° while the lower incisors proclined by 4°. This resulted in reduction of the overjet. The next phase of treatment was supportive phase before which lingually placed 31 was extracted, after which supportive applianceis given, where anterior bite plane was given to reduce posterior open bite. The overall treatment time was 12 months i. e.9 months active phase, 3 months supportive phase. The profile of the patient has improved after the treatment. The lower arch crowding was relieved by proclination of the lower incisors and extraction of 31. The incisor, canine and molar relationships were class I at the end of treatment.

Appliance for Supportive phase

Post-treatment frontal & profile view

Treatment Objectives

1) To correct the jaw relations
2) Improve soft tissue profile
3) Harmonise maxillary and mandibular relations
4) Attain normal overjet and overbite
5) . To create good smileline.

The patient was instructed to wear this appliance 24 hours a day for 12 months. Because this appliance covered tooth surface, the patient was instructed to clean this appliance and his oral cavity regularly before wearing it, so as caries can be prevented.

In phase 2 of treatment, the objectives were to relieve crowding on mandibular arch, level and align jaw arch, close the space in labial segment of maxilla and attain class I incisors and canine relationship

Complications Encountered During the Treatment

Compliance of the patient to wear the twin block initially was the major complication encountered during the treatment. Initially, the patient wore the twin block for a limited period. On follow up visits, he was advised to wear it for 24 hours, but he was non-compliant and did not use it for more than 4–6 hours a day. Positive reinforcement methods were used to make him compliant with the appliance. After 5–6 months, he started to use the appliance full time. The lower twin block was once fractured in midline and hence had to be repaired.

Treatment progress:

The progress of functional treatment was successfully achieved because of patient's compliance. This functional treatment was completed in 8 months. Maxillary incisors wasretroclined by 9˚, while lower incisors was proclined by 4˚. This resulted in reduced overjet. The second phase of treatment with fixed appliance was aimed to close the remaining spaces and this phase was completely done in 12 months. Maxillary posterior teeth were retained with stainless steel ligatures along canines traction to reinforce the anchorage. Total of treatment duration was 24 months (8 months of functional appliance wear, 4 months for transient phase of combination between functional and fixed appliance and 12 months for fixed appliance treatment).

Case 3

A 10 year old male patient came to the department of pedodontics and preventive dentistry, KVG Dental college Sullia, with a chief complaint of forwardly placed upper front teeth. Patient came with good general health. His facial profile is convex, apparently symmetrical. After extra-oral and intra-oral examination and cephalometric analysis, it was diagnosed that the patient had skeletal and dental class II malocclusion. The patient was in the mixed dentition with all erupted permanent first molars in maxilla and mandible. The incisors relationship was class II div I. Radiographic examination showed unerupted premolars, second molar and permanent canine.

On cephalometric analysis the ANB value was 4° and Wits appraisal of 2.5 mm, indicative of a Class II skeletal pattern. An SNB angle of 74° indicated that the mandible was retrognathic. Maxillary incisors were proclined with U1-NA-7 mm/30° and mandibular incisors were upright over the basal bone with L1-NB-4.5 mm/23°. Maxillary incisors were proclined and with mandibular anterior crowding. The interincisal angle was 106˚. Cervical vertebrae indicated acceleration period of growth. Positive results were seen on VTO.

Pre-treatment Frontal and lateral view

VTO

Intra-oral view

On occlusion

Twin block treatment for 7 months
Treatment objectives
1) Improved patient profile
2) Reduce crowding on mandibular arch
3) Reduce overbite and overjet
4) Attain class 1 molar relation

Treatment plan
After thorough discussion with the patient and the parent about the proposed treatment plan, Phase I of the treatment was started. A standard twin block appliance was delivered to the patient with a construction bite recorded with initial 9 mm of advancement of the mandible.

Treatment progress
Once the patient started using the appliance full time, subsequently, the trimming of the appliance was started. The appliance was continued for 7 months. This phase was followed by fixed appliance of maxilla and mandible (0, 022 slot brackets) for closing the remaining spaces, correction the angulation and profile of the patient.

2. Discussion

Class II malocclusion is often associated with skeletal component or a dental component. Maxillary prognathism or mandibular retrognathism or a combination of both may be presenting skeletal features associated with class II malocclusion. Identification of the etiology is extremely important for a true diagnosis and finally to device an effective treatment plan.

Twin block appliances are simple bite blocks designed for full time wear that achieve rapid functional correction of malocclusion by the transmission of favourable occlusal forces to occlusal inclined planes that cover the posterior teeth.[7, 8]

This functional appliance harnesses the adjacent neuromuscular forces so that orthopaedic and orthodontic changes can be brought, which causes mandibular displacement. The main advantage is that changes occur at rapid rate, and its comfortable nature to the patient and long-time wear allows this process to culminate.[6]

Anterior bodily movement of the mandible with elongation in condylar and ramal areas consequent to functional appliances help in class II correction. Changes in lower anterior and posterior face heights and posterior tipping of upper incisors are other contributing factors.

3. Conclusion

Functional appliance therapy is highly effective in treating skeletal Class II malocclusion with some residual growth potential; however, its use is largely confounded by patient compliance and case selection factors. Conclusive Evidence of skeletal, dentoalveolar changes leading to correction of ClassII Division 1 malocclusion with Twin Block functional appliance have been established by this study. Eventually, they help in simplifying the following phase of fixed appliance by gaining anchorage and achieving Class I molar relationship.

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