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Versatile functional appliance- Twin block

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Abstract

Twin block appliance, a functional appliance used to correct skeletal malocclusions in growing patients. Ever since it was introduced by Clark, It has gained popularity for treating both class II and Class III malocclusions. In this article we will briefly discuss about role of twin block appliance in class II and Class III malocclusion treatment.

Keywords: Malocclusion, protrusion, maxilla, mandible.

Introduction

Inter-arch problems such as class II and class III malocclusions are genetic in nature. Skeletal class II malocclusion can have variants in different regions: Maxillo-mandibular relationship that is mandibular retrognathism, maxillary protrusion or both, increased length of anterior cranial base contribute to midface protrusion while increased length of posterior cranial base positioned temporomandibular articulation in more retrusive position.[1]

Class III malocclusion is considered to be most complicated orthodontic problems to treat.[2] It may be due to maxillary retrusion, mandibular protrusion or combination of two.[3,4] Class III malocclusion patietnts show both skeletal and dentoalveolar components such as short anterior cranial base length, acute cranial base angle, short

and retrusive maxilla, proclined maxillary incisors, retroclined mandibular incisors, excessive lower anterior face height and obtuse gonial angle.[2]

Twin block appliance has been used to correct class II malocclusion for decades and has been reported to be one of the most efficient appliances, based on its ability to induce mandibular elongation.[5]Twin block appliance is also commonly used to treat class III malocclusion. Clark described version of twin block appliance that can be used for treatment of class III malocclusion, referred as class III twin block appliance or reverse twin block.[6]

Principle of Twin block therapy

This appliance was developed by Dr. William J. Clark in Scotland. Twin block appliances are based on the same principle as the protrusive functional appliances used on monkeys by McNamara and others.[7-11]

The occlusal inclined plane is the fundamental functional mechanism of natural dentition. In normal development, cuspal inclined planes play important role in determining the relationship of teeth as they erupt into occlusion. Occlusal forces transmitted through dentition provide constant proprioceptive stimuli to influence the growth rate and adaptation of trabecular structure of the supporting bone.

Twin blocks are simple bite-blocks that effectively modify the occlusal inclined plane. This appliance achieves rapid functional correction of malocclusion by transmitting favorable occlusal forces to the occlusal inclined planes covering the posterior teeth and guiding the mandible forward into correct occlusion. With the appliance in the mouth the patient cannot occlude comfortably in former distal position, and the mandible is encouraged to adopt a protrusive bite with inclined planes in occlusion. Thus unfavorable cuspal contacts of distal occlusion are replaced by favorable proprioceptive contacts of the inclined planes of the twin blocks, correcting the malocclusion and freeing the mandible from its locked distal functional position.[12]

Skeletal effects of twin blocks:

Twin block appliances produce both skeletal and dentoalveolar changes for correction of class II malocclusion**.** Various studies reported that twin block appliance treatment results in, increased mandibular length[13-16] increased SNB angle,[17-21]no significant restraining effect on maxillary growth[16,19,22,23,24]. But some studies observed some headgear effect resulting in slight inhibition of forward maxillary growth.[16,21] Singh and Hodge also concluded that Twin block appliances along with extra oral traction causes growth modulation in specific regions of midfacial complex and changes position of mandible.[25] Lower facial height also increased with twin block therapy,[16,17,19] but Nicole et al demonstrated good vertical control on mandibular plane angle with twin block appliance therapy as compared to Herbst, Bionator and MARA appliances.[26] Another study showed that after twin block treatment, there is significant increase in posterior facial height, total anterior facial height and lower anterior facial height by 3.4 mm,5.5 mm,4.4 mm respectively. Clinically significant rotation of mandible in clockwise direction resulting in decrease in overbite and increase in facial height which is beneficial in class II division 1 patients having deep bite and reduced lower anterior facial height.[21]

Dental effects of Twin blocks:

Overjet reduction with twin block appliances is mostly due to dentoalveolar changes. Further modifications to twin block appliances might attempt to minimize the contribution from dentoalveolar tipping and maximize skeletal changes by including the use of headgear to maximize maxillary restraint and torquing spurs to upper labial segment [19.] Many attempts have been done to minimize tipping of lower incisors. The best results achieved by using Sounthend clasps and acrylic cover for lower incisors.[27] Dental changes that resulted in overjet reduction are retroclination of maxillary incisors and proclination of mandibular incisors. Buccal segment relationships of class II malocclusion corrected by lower molar eruption in anterior and superior direction, forward growth or

repositioning of mandible and restricted eruption of the upper molars.[19]Various other studies also showed same results that are proclination of lower incisors, retroclination of upper incisors, [16-18,20,22] lower molar eruption and mesial movement of lower molars,[16-19,22,,28] headgear like effect resulting in distal movement of upper molars. [16,17,19,28]The proclination of mandibular incisors was probably due to mesial force on mandibular incisors induced by protrusion of mandible.[16,29] Toth and McNamara[16] concluded that lingual tipping of the maxillary incisors is due to the contact of the lip musculature during Twin-block treatment. This lingual tipping can also be due to the labial wire in Bionator and twin block appliances, which might come into contact with the incisors during sleeping, causing them to retract. But Yaqoob et al found that twin block showed similar results in terms of dentoalveolar and skeletal change when designed with or without a labial bow, indicating no effect of labial bow.[30]

Soft tissue changes

Skeletal convexity and H angle decreased, mentolabial angle increased [31] and reduction in the prominence of lower lip [32] after treatment. Lower lip, lower lip sulcus and soft tissue pogonion moved anteriorly after twin block treatment.[30,33] Singh and Morris et al reported anterior and inferior movement of chin. [34,35]

Reverse twin block

In reverse twin block correction of class III malocclusion is achieved by reversing the angulation of inclined planes and harnessing occlusal forces for maxillary advancement, and mandibular arch act as source of anchorage for this. It also has restricting effect on mandibular development. Position of bite blocks changed in this type of twin block compared to twin block used for class II malocclusion treatment. The occlusal bite blocks are positioned on upper deciduous molars and lower first molars. Reverse twin blocks enhance maxillary development by action of reverse occlusal inclined planes placed at angulation of 70 degrees, driving maxillary teeth forward by occlusal forces and restrict forward mandibular development.[6]Chugh et al revealed considerable improvement in soft tissue profile of patient after treatment with combination of reverse twin block and face mask. They found sagittal advancement of maxilla by 2.5 mm, increased SNA angle from 76 to 81 degrees and increase in vertical dimension also. The maxillary incisors proclined and mandibular incisors became slightly retruded due to face mask therapy.[36]

Summary and conclusion

Twin block, in comparison with other functional appliances, has separate upper and lower appliances with occlusal bite blocks so the appliance gives greater freedom of movement in anterior and lateral excursions and cause less interference in normal function. The patient can eat comfortably with the appliances in mouth and patient can learn to speak normally with twin blocks as the appliance does not distort speech by restricting movement of tongue, lips or mandible. Twin blocks can be designed with no visible anterior wires without losing its efficiency in correction of arch relationships. Twin blocks may be fixed to teeth temporarily or permanently to guarantee patient compliance. Removable appliances can be fixed in mouth for first week or 10 days of treatment to ensure that the patient adapts fully to wearing them 24 hours per day. Adjustment and activation is simple and chair side time is reduced in achieving major correction.[37.] It is versatile appliance as able to correct transverse discrepancy by incorporating midline jackscrew since a deficiency in transverse plane is often encountered with a skeletal class II malocclusion. Therefore the twin block appliances due to its acceptability, adaptability, versatility, efficiency and ease of incremental mandibular advancement without changing the appliance has become one of the most widely used functional appliance in correction of malocclusion.

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