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Functional appliance therapy with U-Bow activator

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Abstract

Introduction: U bow activator can be used to enhance the dentofacial appearance by combined skeletal and dentoalveolar effects. The aim of this study was to evaluate the changes in sagittal plane that can be brought by using U bow activator.

Material and Methods: Sixty patients in the age range of 9-14 years were selected for this study. The patients were included if they had Class II skeletal pattern with ANB greater than 4° and retrognathic mandible. A custom fabricated U bow activator was given to each patient for full time wear. On the basis of improvement in cephalometric readings and facial profile these patients were categorized into groups of major improvement and minor improvement.

Results: The readings of pretreatment and post treatment cephalograms were compared and it was shown that 35 (58.9%) of the patients had major improvement whereas 8 (13.9%) showed mild improvement. 15 patients (25.0%) proved uncooperative in terms of compliance for appliance wear whereas 2 (3.9%) failed to return for follow up visits.

Conclusions: U bow activator plays vital role in functional jaw orthopedics, if treatment is initiated during peak pubertal growth spurt, maximum results may be achieved.

Keywords: Sagittal discrepancy; retrognathic mandible; functional appliances

Introduction

A functional appliance is defined as a removable or fixed appliance that alters the posture of the mandible. As a reaction the neuromuscular environment is changed and the resulting stretch of the muscles and soft tissues transmits the forces to the dental and skeletal tissues to modify growth and development of occlusion.[1]

The concept was introduced in 1880 by Kingsley who explained the term "jumping the bite" for patients with retrusive mandible. He developed a vulcanite palatal plate with an anterior incline that guided the mandible to a forward posture when the patient closed the jaws.[2] Inspired by his work Andresen developed a mobile, loose fitting appliance modification that transferred functioning muscle stimuli to the jaws, teeth and supporting tissues.[3] This appliance which was originally used as a retainer is a modification from Kingsley appliance, to which he added lateral extensions to cover the lingual aspects of the mandibular teeth. He found the results of the previous treatment were not only preserved but in many cases actually improved during the retention period.[4]

In 1964, Rudolf Karwetzky from Wilhelms University Münster designed U bow activator or U Bügel Activator (UBA) as a modification of Andresen's Functional Appliance. He introduced it as a new functional appliance based in the principle of functional modification. Karwetzky modified the split activator of Shwartz and designed a U bow joining the maxillary and mandibular plates at 1st molar region. The activator is fabricated by repositioning the mandible sagittally and vertically. For example in Class II retrognathic mandible when it is placed in the mouth, it postures the mandible forward, the retractor muscles of mandible are activated and try to bring the mandible in its original position while the appliance tries to keep the mandible forward. The resultant forces are transmitted to the condyle, maxilla and dentoalveolar

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structures stimulating changes in sagittal and vertical plane. The aim of this study was to evaluate the changes in sagittal plane that can be brought by the sole use of U bow activator.

Material and Methods

A total of 500 children requiring orthodontic treatment were examined at Armed Forces Institute of Dentistry, Rawalpindi. Sixty patients in the age group of 9-14 years were randomly selected over the period of five years meeting the inclusion criteria. All patients had skeletal Class II facial pattern with ANB greater than 4° and retrognathic mandible on profile assessment. The status of growth was assessed on lateral cephalogram which was obtained for all patients as a routine pre-treatment diagnostic record and a custom designed U bow activator was fabricated for each patient depending on the type of malocclusion. The main readings observed on cephalometric analysis were SNA, SNB and ANB both before and after the functional appliance treatment. All measurements were recorded by the same examiner and re-evaluated after 2 weeks. The patients were then categorized on the basis of treatment outcome, as those who have shown major improvement and those with minor improvement. The former group contained patients who had changes in SNB and ANB angles whereas the latter group contained patients having no improvement in cephalometric readings however the facial profile improved due the dentoalveolar compensation only.

Results

The total number of patients treated with U bow activator was 60 out of which 24 were males and 36 were females. The stage of dentition varied with 41 patients having mixed dentition and 19 having permanent dentition. The malocclusion pattern among all these patients was also different, 42 patients having Class II div 1, 10 having Class I, 5 having Class II div 2 malocclusion and 3 having open bite (Table I). The readings of pretreatment and post treatment cephalograms were compared and it was shown that 35 (58.9%) of the patients had major improvement whereas 8 (13.9%) showed mild improvement. 15 patients (25.0%) proved uncooperative in terms of compliance for appliance wear whereas 2 (3.9%) failed to return for follow up visits(Table II).

Table I

Malocclusion	Number of patients	Type of U bow Activator
Class I	10	I & II
Class II div 1	42	I
Class II div 2	5	I
Open bite	3	I
Total	60	

Table II

Sr. No	Treatment outcomes	Number of patients	Percentage
	Major improvement	35	58.9%
	Minor improvement	8	13.9%
	Uncooperative	15	25.0%
	No prognosis	2	3.9%

Discussion

Effectiveness of the activator has been demonstrated in orthodontics.[5-8] As postulated by Karwetzky in 1964, UBA is benefitted best when the operator can do forward positioning of the mandible gradually than a direct anterior reposition. His postulation was later proved by Petrovic

in 1975.[6] With his experiments on rats that showed that gradual mandible reposition will give result that is more stable and can enhance the growth in condyle more effectively.

Various studies have come up with different results regarding the efficacy of this appliance in orthodontic therapy. A study by Cozza[7] et al shows that the therapy promoted a combination of skeletal and dental changes that led to an improvement of the sagittal discrepancy. There was more skeletal contribution than the dentoalveolar correction and the mandibular changes (73%) exceed the maxillary contribution (27%) for the correction of Class II molar relationship. Similar results have been shown by our study where skeletal and dento-alveolar effects are predominant in 58.9% and 13.9% of the subjects respectively however the maxillary and mandibular changes were observed collectively.

In another study by Cozza et al, the activator appliance was effective in treating mandibular deficiency in growing patients. The correction achieved was of Class II malocclusion by a combination of skeletal and dental changes.[8] The skeletal changes included both mandibular advancement and maxillary growth restriction, however the former being the predominant of all effects. These results are also similar to those of this study in which skeletal effects are more prominently seen.

In a study by Remmer[7] et al, the patients treated with activator showed a considerable increase in the linear mandibular length, with an average increase of 3.2 mm and no significant vertical change but our study shows a combined effect in terms of change in ANB angle. The overall efficacy of activator in both the studies is however similar.

The results of the study by W et al are different from those of ours which reveal that the average orthopedic effect of treatment was limited, in spite of individual cases with excellent response. There was an improvement of the anteroposterior relationship between the maxilla and the mandible, an increase in the lower face height and a slightly steeper mandibular plane angle but no differences in the amount of mandibular growth were recorded.[8] Also the sagittal increase in the mandibular length was nullified by its downward rotation. Our study however shows the combined skeletal effects which were significant and more predominant than the dentoalceolar changes.

Conclusions:

Functional appliance therapy with U bow activator plays vital role in functional jaw orthopedics, if treatment is initiated during mixed dentition and period of pubertal growth spurt maximum results may be achieved however proper case selection, cooperation of the patient and careful management are required.

The best results have been achieved in cases of Class II malocclusion with retrognathic mandible and horizontal growth pattern. The correction of individual features of malocclusions has to be followed by fixed or removable mechanotherapy.

References

1. Daskalogiannakis J. Glossary of orthodontic terms. 1st ed. Berlin: Quintessence Publishing; 2000. p. 18,123
2. Graber TM, Neumann B. Removable orthodontic appliance. 2nd ed. Philladelphia: WB. Saunders Co; 1984. p. 175–243
3. Graber TM, Rakosi T, Petrovic AG. Dentofacial orthopedics with functional appliance. 2nd ed. St Louis: Mosby; 1997. p. 161–222
4. Budihardja A, Sjamsuddin J. U bow activator, an alternative functional orthodontic appliance. Dental Journal 2007 Mar 1;40(1):20-6
5. Cozza P, De Toffol L, Iacopini L. An analysis of the corrective contribution in activator treatment. The Angle Orthod 2004 Dec;74(6):741-8
6. Cozza P, De Toffol L, Iacopini L. An analysis of the corrective contribution in activator treatment. The Angle Orthod 2004 Dec;74(6):741-8
7. Cozza P, De Toffol L, Colagrossi S. Dentoskeletal effects and facial profile changes during activator therapy. Eur J Orthod 2004;26
8. Wieslander L, Lagerstrom L. The effect of activator treatment on Class II malocclusions. Am J Orthod 1979;75:20–6