

Elastic Activator for Treatment of Open Bite

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Abstract. *This article presents a modified activator for treatment of open bite cases. The intermaxillary acrylic of the lateral occlusal zones is replaced by elastic rubber tubes. By stimulating orthopaedic gymnastics (chewing gum effect), the elastic activator intrudes upper and lower posterior teeth. A noticeable counterclockwise rotation of the mandible was accomplished by a decrease of the gonial angle. Besides the simple fabrication of the device and uncomplicated replacement of the elastic rubber tubes, treatment can be started even in mixed dentition when affixing plates may be difficult.*

Index words: Elastic Activator, Functional Appliance, Open Bite, Reduction of Anterior Facial Height, Vertical Malocclusion.

Refereed Paper

Introduction

Correction of skeletal open bite is one of the most difficult problems in orthodontic practice. In severe cases orthodontic treatment alone may be insufficient (Subtelny and Sakuda, 1964). Not only the growth pattern of the patient, but also tongue habits and finger-sucking are regarded as possible aetiological factors, and if there is persistent imbalance between tongue and orofacial muscular activity, treatment of open bite often fails. Numerous orthodontic techniques have been proposed to obtain bite closure, extrusion of the incisors, intrusion of the posterior teeth, and mesialization of the posterior teeth, as well as uprighting the incisors after dental extractions (Nielsen 1991; Rinchuse, 1994; Enacar *et al.*, 1996). In many cases, anterior dentoalveolar compensation of the malocclusion is undesirable for functional and aesthetic reasons. In order to obtain autorotation of the mandible by intruding the posterior teeth orthopaedic appliances, such as high-pull headgears (Kuhn, 1976), bionators (Pearson, 1978), Fränkel functional regulators (Fränkel, 1980), and Teuscher activators (Teuscher, 1978) have been used. Open bite correction using bite-blocks with repelling magnets on the upper and lower posterior teeth was also reported (Dellinger, 1989). However, besides precise impressions of the upper and lower jaw, this technique demands absolutely correct placements of the magnets. Since then, several modifications of this treatment method have been presented in which open bite reduction has been attained partly by growth inhibition of the posterior segments (Kaira *et al.*, 1989; Kiliaridis *et al.*, 1990; Breunig and Rakosi, 1992). In addition, spring-loaded bite-blocks in the lower jaw (Woodside and Linder Aronson, 1986) were suggested for open bite correction as they exert an intrusive force on the posterior teeth due to the spring mechanism. One disadvantage of this technique may be the breakage of the springs as reported by Kuster and Ingervall (1992).

The Stockfisch kinetor (Stockfisch, 1959), however, remained largely unnoticed in the Anglo-American litera-

ture. The kinetor consists of two plates, that are connected by a horizontal wire loop in the vestibulum and interchangeable rubber tubes are fixed on the lateral occlusal zones. Through tight fitting of the rubber tubes to the posterior teeth in rest position they exert an intrusive vertical force when swallowing or chewing. This article presents a modified activator appliance for treating open bite cases. In this activator, elastic posterior bite blocks are being incorporated.

Fabrication

Figure 1 shows details for construction of the elastic activator. The rigid intermaxillary part of the lateral occlusal zones is replaced by elastic rubber tubes which is pushed on a wire loop with a diameter of 8 mm and thickness of 1.5 mm. It is advisable to use highly resilient wire to avoid breakage during mastication. The rubber tubes are exchanged every 2-3 months for maintaining continuous tension in the neuromuscular system. Furthermore, the design of the activator incorporates labial bows for control of the upper and lower anterior teeth. Facets cut in the acrylic help directing the eruption of the anterior teeth. The upper and lower front teeth should be at least 2 mm away from the acrylic when the patient has the appliance in the mouth and bites on it with the maximum force (Figure 2). The anteroposterior position is controlled with posterior clasps pressing against the mesial surface of the first molars. If there is a history of tongue hyperactivity a crib is incorporated for behaviour modification by interfering with an anterior tongue position.

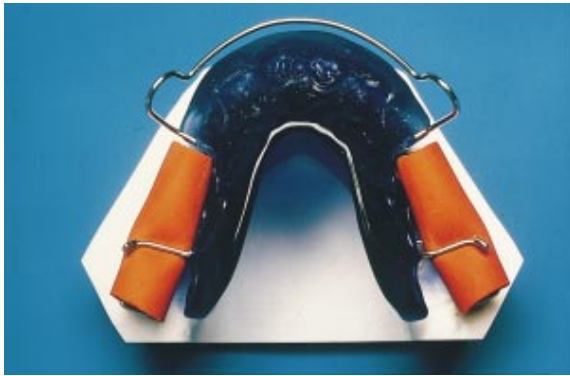
Case CF (9 years 4 months, female)

Clinical examination showed bilateral Angle Class I, well developed symmetric dental arches and no space deficiency. The patient exhibited a median diastema with deep insertion of the labial fraenum. Due to dummy use until the age of 5 years, as well as tongue thrust swallow the patient revealed an open bite of 3.5 mm, protruded maxillary

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(a)



(b)

FIG. 1 Elastic activator.



(a)



(b)

FIG. 3 Case 1. 9-year-old female patient before treatment.



FIG. 2 Simulation of maximum bite force.



FIG. 4 Case 1. Seated elastic activator.

incisors, and an increased overjet (Figure 3). Cephalometric analysis showed skeletal Class I with a slight vertical growth pattern.

Treatment objectives were:

1. Elimination of habits.
2. Retrusion of upper front teeth and correction of the overjet.
3. Treatment of open bite.
4. Frenectomy and diastema closure.

Therapy was started with an 'elastic activator' which should be worn 14 hours per day (Figure 4). Closure to open bite

occurred within the first 8 months after placement of the appliance. During this time the proclined maxillary incisors were uprighted and overjet was corrected by activation of the upper labial bow (Figure 5). Besides requisite retrusion of the protruded incisors, cephalometric analysis show slight autorotation of the mandible accomplished by a decrease of the gonial angle from 129 to 127 degrees (Figure 6a,b,c.). The Jarabak percentage increased from 57 to 59 degrees, while the NS-Gn angle decreased from 66 to 64 degrees. At this point, treatment will be finished with frenectomy and diastema closure using a fixed appliance in the upper jaw.

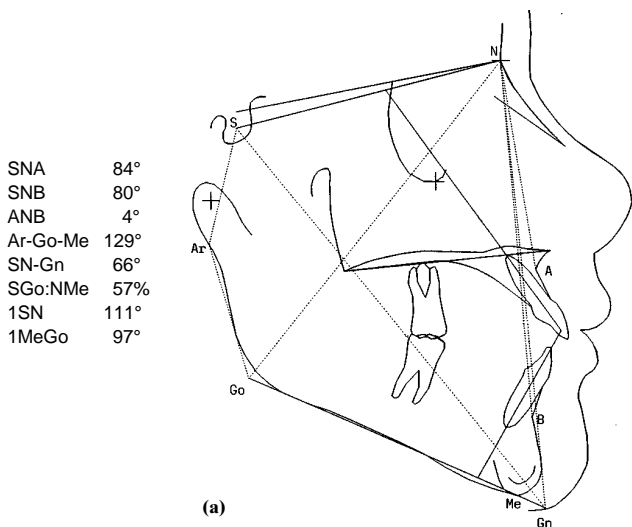


(a)

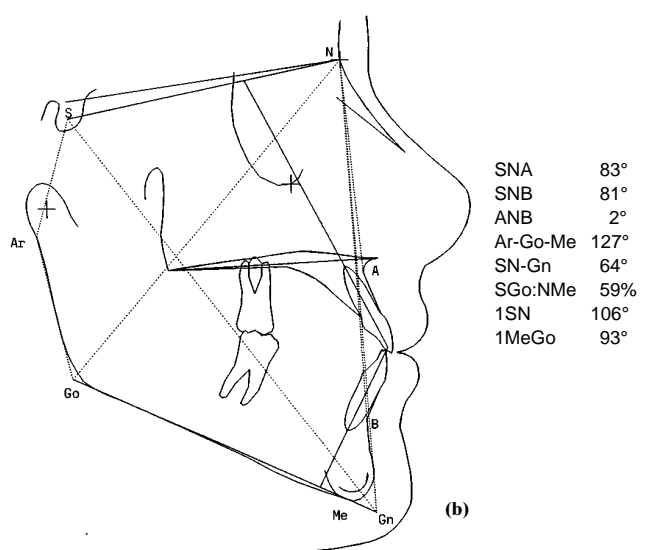


(b)

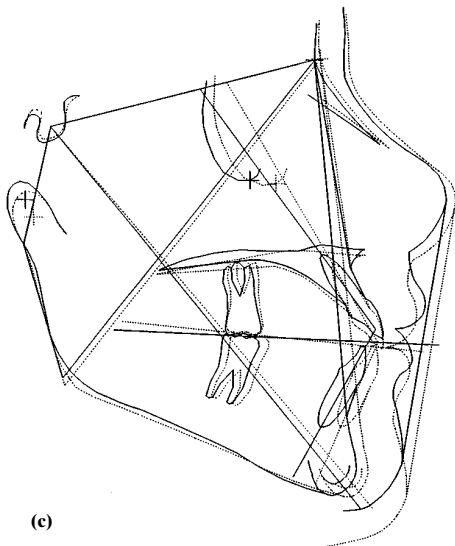
FIG. 5 Case 1. Patient 8 months after placement of the elastic activator.



(a)



(b)



(c)

FIG. 6 Case 1. (a) before treatment; (b) after elastic activator treatment; (c) superimposition (— before, ---- after treatment).

Conclusions

The presented design was highly reliable as breakage did not occur in the clinical practice and the elastic activator seems to be an efficient functional appliance in anterior

open bite correction. In the presented case, there was clear evidence of anterior rotation of the mandible. This together with a marked uprighting of the incisors, resulted in closure of the open bite. The following advantages of the elastic activator are apparent:

1. Relative simple fabrication.
2. Uncomplicated replacement of the elastic rubber tubes.
3. Stimulation of the orofacial muscular system by orthopaedic gymnastics (myofunctional therapy).
4. Enhancement of compliance by the inherent chewing gum effect. In contrast to the rigid intermaxillary acrylic of conventional functional appliances, the elastic posterior bite blocks stimulate continual masticatory movements. Thus, enlarged intrusive forces are transmitted to the periodontium of the posterior teeth.
5. Possibility of eliminating habits by supplementary incorporation of a crib.
6. Possibility of early treatment. Even in the mixed dentition, when affixing a plate in the upper or lower jaw may be difficult, the elastic activator therapy can be started.
7. The appliance can be used on its own, in combination with a headgear or a fixed appliance, or as a retention device.

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