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Compliance-free and non invasive treatment of an anterior open bite in a 11-year-old girl

ABSTRACT

Background This case report shows a compliance-free treatment of an anterior open bite in a 11-year-old girl. This treatment is also non invasive, therefore well accepted by the patient and her parents.

Keywords Anterior open bite treatment; Non-invasive treatment; Compliance-free treatment, Vertical growth control.

Introduction

Open bite (OB) is a clinical condition characterised by the lack of vertical overlap of the upper and lower front teeth when the posterior teeth are in occlusion [Lentini-Oliveira et al., 2014].

The aetiology of the open bite is multifactorial [Lentini-Oliveira et al., 2014], and both genetic and enviromental factors play a role in the onset and progression of this condition. Unfavourable growth patterns as well as oral breathing, tongue size, tongue-thrusting and tongue resting position, thumb sucking and prolonged use of the pacifier have been considered to causative or worsening factors of anterior open bite.

Within this aetiological context, several types of devices and treatments have been proposed to correct the open bite, such as orthopedic forces (high-pulls headgear, vertical-pull chin caps) [Orton et al., 2002;



FIG. 1 Initial orthopantomography.



FIG. 2 Initial lateral head film.

Pearson, 1978], vertical holding appliances (VHA)[Gracco et al., 2008], posterior resin bite block (PRBB)[Isacan and Sarisoy, 1997], rapid molar intruder [Carano et al., 2005], palatal crib, bonded spurs [Leite et al., 2015], orthodontic intervention using mini-implants [Alsafadi et al., 2016] or mini-plates [Alsafadi et al., 2016; Umemori et al., 1999], orthodontic treatment and various orthognathic surgery combinations [Teittinen et al., 2012]. Specifically, the VHA [Deberardiniset al., 2000] is recommended in order to control the vertical dimension. It is fabricated from a 0.040 inch wire with 4 helixes, 2 just distal to the upper first molars and 2 at the centre of the appliance, incorporated in an acrylic button. The button should also be 2-5 mm from the palate, in order to allow the tongue to express its intrusive force. PRBB [Isacan and Sarisoy, 1997] is used in the early treatment of skeletal open bite and produce a forward and upward mandibular rotation by transmitting the masticatory muscle forces to the buccal dentoalveolar regions and preventing their vertical growth.

This article describes the skeletal open bite treatment of a 11-year-old girl with the combined use of a modified VHA and the PRBB.



FIG. 3 Initial extraoral photographs.



FIG. 4 Initial intraoral photographs.



FIG. 5 VHA in place and sectional wires to control the eruption of premolars and upper second molars.



FIG. 6 PRBB in place and sectional wires to control the eruption of the lower second molars.



FIG. 7 PRBB in place and sectional wires to control the eruption of premolars and lower second molars.

Case report

The patient CB came for a second opinion consultation in 2008 with a previous orthopantomography and a lateral head film (Fig. 1, 2). Clinically she had anterior open bite and atypical deglutition. The parents received initial information about the orthodontic treatment and a new appointment was made for the initial orthodontic

records and treatment plan discussion. Nevertheless, the parents came back only in 2011 to start the treatment. At that time all the permanent teeth were erupted, except for teeth 1.5, 2.5, 3.5 and 4.5 (Fig. 3, 4).

The parents did not accept the use of high headgear or TADs to control the vertical growth, so the treatment consisted of the application of a VHA (Fig. 5) made of a 0.040 inch wire without helix and with an acrylic

button 4 mm from the palate. Two PRBBs (Fig. 6) were also applied on the occlusal surface of the lower first and permanent molar in order to increase the vertical control.

Posterior sectional wires were then applied in order to control the eruption of the upper and lower second molars and premolars (Fig. 5, 6).

The parents were informed about the maxillofacial surgery option in case of unfavourable growth.

At the eruption of the premolars the sectional wires were extended from the upper and lower second molars to the upper and lower first premolars in order to prevent over-eruption of the premolars (Fig. 5, 7).

Eighteen months later the OB still persisted from canine to canine, but the overbite was significantly

improved (Fig. 8).

Twenty-four months after the beginning of the treatment, fixed appliances were placed on all the remaining teeth for detailing and finishing of the occlusion. Vertical elastics between the upper and lower incisors were not used during the treatment.

Brackets remained in place for 17 months. After debonding, 2 removable Hawley retention devices were prescribed for use during the night.

The atypical deglutition persisted also after the closure of the open bite. Eighteen months after the end of treatment a slight relapse of the overjet occurred, but the condition was still acceptable (Fig. 9, 10).

Final x-rays were taken (Fig. 11, 12) and the superimposition of the initial (Fig. 13) and final (Fig. 14) x-rays tracings showed a very good vertical control of the maxilla associated with a favourable growth of the mandible (Figs. 15, 16, 17). The VHA and the RPBB proved effective for controlling the vertical growth of the maxilla (Fig. 16).

During the treatment some extrusion of the lower molars still occurred (Fig. 17), but it was compensated by the remarkable growth of the mandibular ramus. Together with a remarkable growth of the mandible,



FIG. 8 Intraoral condition and OVB improvement after 18 months of treatment.



FIG. 9 Extraoral photographs 18 months after the end of treatment.



FIG. 10 Intraoral photographs 18 months after treatment.





FIG. 11 Final orthopantomogram.



FIG. 12 Final lateral head film.

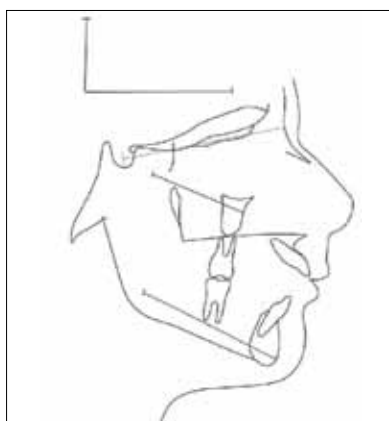


FIG. 13 Initial lateral head tracing

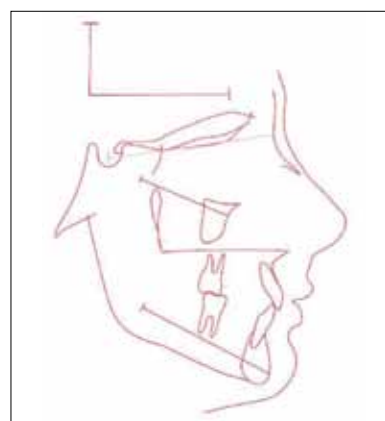


FIG. 14 Final lateral head tracing.

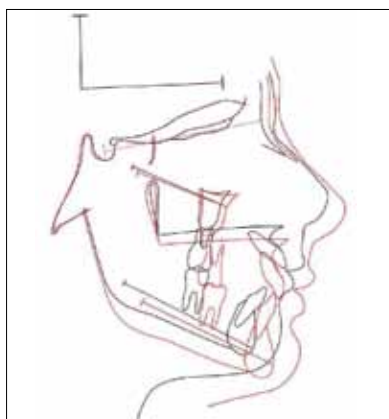


FIG. 15 Superimposition on the cranial base.

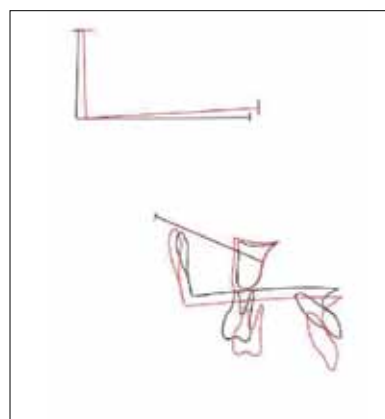


FIG. 16 Maxillary superimposition.

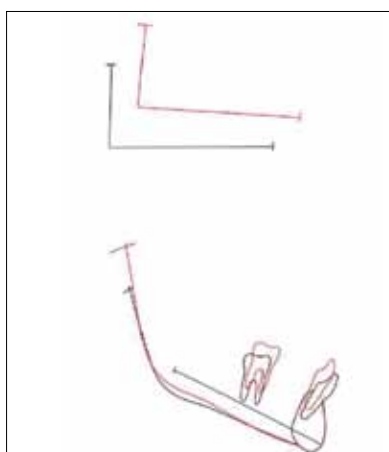


FIG. 17 Mandibular superimposition

the direction of the growth of the facial complex was helpful in correcting the malocclusion.

Discussion and conclusion

The control of the direction of growth is essential in improving and/or correcting an anterior open bite in growing subjects.

High-headgear is a very common treatment to control the vertical growth of the maxilla, but it requires the patient's compliance.

New methods such as TADs have been proposed in

order to obtain similar results without cooperation. Recently many publications have focused their attention on the application of miniscrews in the palate, especially behind the third palatal rugae. It is a safe place, far from the teeth, with a high degree of success [Gracco et al., 2008; Kim et al., 2010]. Nevertheless, the miniscrews can sometimes become loose and are not always accepted by patients and parents.

Our case report showed a non invasive and compliance-free treatment of an anterior open bite.

The application of a PRBB in association with VHA is a simple solution to deal with this condition. It is surely easy to perform and less demanding compared to other compliance-free devices such as TAD.

Obviously, the direction and the amount of growth play a crucial role in the resolution of this kind of malocclusion.

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