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Preserving Vertical Dimension during Skeletal Anterior Open Bite Treatment in a Hyperdivergent Growing Patient

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Abstract

Background. Anterior open bite (AOB) due to the combination of its etiological factors is challenging to the orthodontist.

Case report. A 9.11 years old boy sough orthodontic treatment with chief concern absence of overlap between front teeth and palatally erupted maxillary lateral incisors. Following clinical examination, beside typical radiographic examinations, consultation with ENT specialist was recommended since the mother confirmed suspicion for oral breathing. The radiographic examination revealed a skeletal class II malocclusion, hyperdivergent growth pattern while the ENT diagnosis was allergic rhinitis. A bonded expander was the first appliance followed by a palatal arch and tongue crib to assist atypical tongue thrust. After eruption of all permanent teeth a multibracket 022 appliance was used. The aim of this case report is to describe orthodontic treatment of skeletal AOB in hyperdivergent growing child.

Conclusion.At the end of the treatment proper alignment class I molar and canine relationship, positive OVB were obtained.

Keywords: Skeletal anterior open bite, hyperdivergent

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INTRODUCTION

One of the most obvious consequences of anterior open bite (AOB), as it results from the definition, makes it one of the easiest malocclusions to identify (1). As well as for other forms of malocclusions, anterior open bite is the consequence of interaction between genetics and environment related factors (2). Among environment causes, mouth breathing and deleterious habits such as prolonged pacifier usethumb sucking, anterior tongue thrust are common among patients with AOB.According to Cangialosi (3) concomitance of vertical growth pattern with deleterious habits strongly increases tendency toward anterior open bite.

Knowledge and control of etiological factors is the key to a successful treatment and stability. Hence, AOP bite patients should be treated by combining myofunctional therapy and conventional orthodontic treatment (4,5). There is agreement in the existing literature that children with vertical growth and deleterious habits should be treated early to avoid consequences (6). The aim of this case report is to describe orthodontic treatment of skeletal AOB in hyperdivergent growing child.

CASE REPORT

A 9.11 years old boy sough orthodontic treatment with chief concern absence of overlap between front teeth and palatally erupted maxillary lateral incisors. Main findings of clinical intraoral examination as shown in Figure 1 E-I were mixed dentition, anterior open bite (AOB), constricted maxillary arch, space discrepancy for teeth no 12.22, anterior tongue thrust. The mother answered positively to the question of oral breathing hence an ENT visit was recommended. Extraorally, patient showed slight convex profile, protruded lisp and no labial incompetency Figure nr1 A-D.

The pretreatment cephalometric investigation (T0) as shown in Table 1 revealed a biretruded skeletal class II malocclusion (ANB angle 5º) and hyperdivergent growth pattern (GoGnˆSN 40º, FMA 30º), a negative OVB -2.5mm.

Table 1. Pre and post treatment cephalometric investigation

Variable	Norms	Pre	Post
SNA	82°±2°	76°	77°
SNB	80°±2°	71°	70°
ANB	2°±2°	5°	7°
WITS	-1±2	5mm	
GoGnˆSN	32°±3°	40°	41°
ArGoˆMe		149°	134°
Ar-Go		40mm	66.5mm
FMA	26°±3°	30°	31°
MM	28±3	27°	29°
IsˆMAX	110°±5°	113°	115°
IiˆMAND	95°±3°	98°	100°
OVB	2mm	-2.5mm	1.5mm

Diagnosis from ENT was allergic rhinitis.

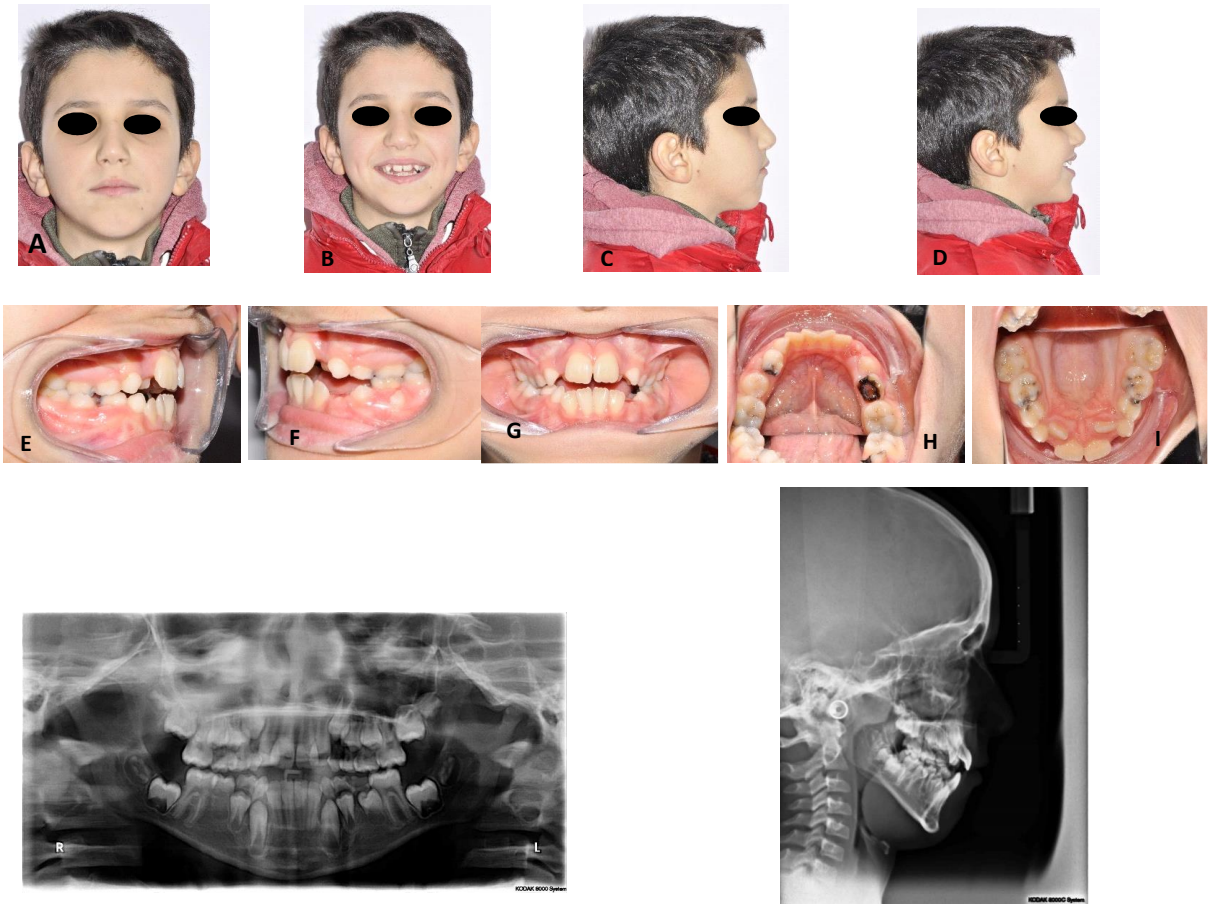

Figure 1. A-D pretreatment extraoral photos. E-I pretreatment intraoral and radiographic examination.

Treatment plan and objectives.

Based on the diagnostic finding for this patient treatment objectives were: to correct the AOB,tongue posture modification, resolve maxillary crowding, class I molar and canine relationship, improvement of facial esthetics.

Since the maxillary arch was constricted treatment begun with a bonded rapid palatal expander (RPE) as shown inFigure 2 (A). The mother was instructed to activate the expander daily for 10 consecutive days. 3 weeks after the bonded expander was substituted with a banded transpalatal arch and a tongue crib Figure nr 2 B-C. 10 months after as observed in fig 2 D-G AOB is corrected with no negative OVB. At this moment, all permanent teeth were present a multibracket 022 slot straight wire appliance was used to finish the case. It took 2.5 years to leveling, alignment and obtaining molar and canine class I with good OVJ and OVB as shown in fig 2 H-J. At debonding vacuum formed retainers were given. The maxillary one had a

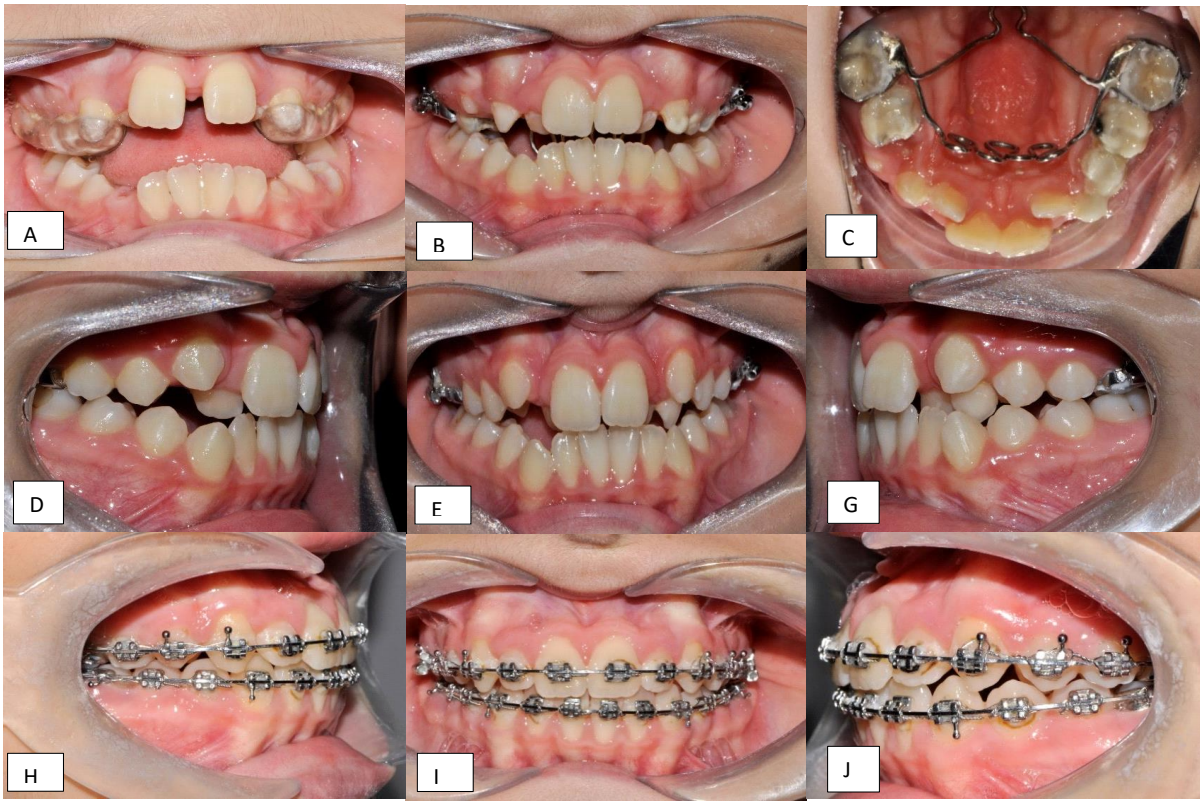

Figure 2. A-J treatment progress.

perforation located at the incisive papilla. The patient was instructed to wear the retainers 14 hours daily and to place the tip of the tongue at the perforation in the maxillary retainer.

RESULTS AND DISCUSSION

At the end of treatment, all the objectives set at the beginning can be considered accomplished. Intraorally as shown in Figure3 A-C patient has molar and canine relationship class I, normal OVJ and OVB, the median lines are coincident. The facial profile as shown in Figure3 F-G shows a slight convexity with competent lips and a pleasant smile. Mother`s chief concern regarding palatally erupted teeth 12.22 was resolved.

Orthopanoramicx ray at the end of the treatment shows proper root paralleling with no signs of resorption. Post treatment teleradiograph values (T1) are presented in Table 1. A considerable correction of OVB was achieved since at the beginning his OVB was -2.5mm.

According to Buschanget al (7) hyperdivergent individuals are poor growers and exhibit increased vertical growth and worsening of maxillomandibular relations, due to greater anteriordisplacement of the maxilla than mandible. Indeed, continuing vertical growth pattern and maxillary anterior displacement were confirmed in this case report by values of SNA and SNB angles at T1.

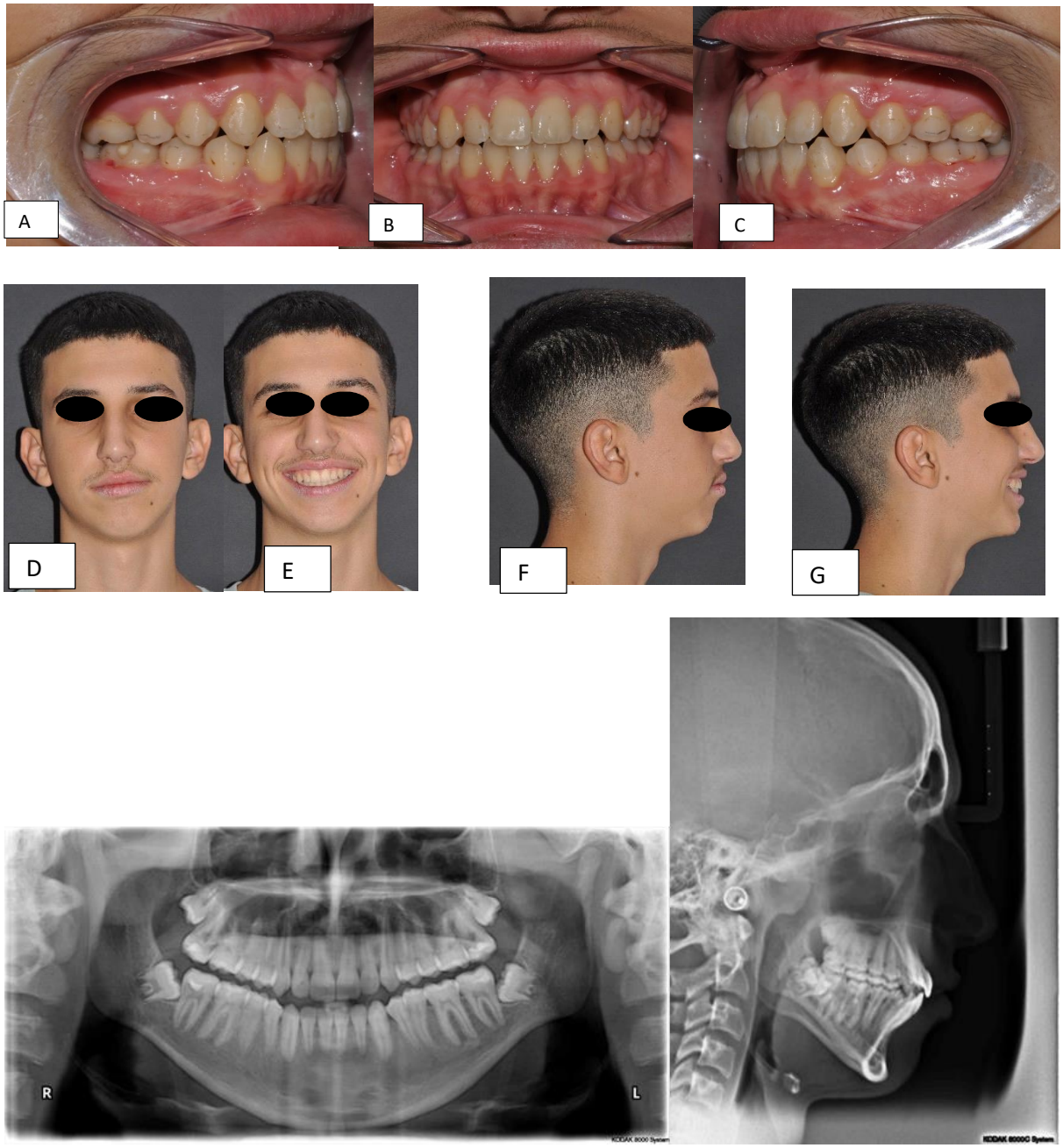

Figure 3. A-G intra and extraoral photos at the end of treatment.

Initial records of the patient presenting a hyperdivergent growth pattern and altered breathing due to allergic rhinitis represents a critical situation and the necessity to be treated early (1,5). Furthermore, the patient had crossbite in the anterior region which is another indication for early treatment. At beginning of treatment his chronological age was 9.11 years old while the skeletal age according to cervical vertebrae maturity index was CS3. It was suggested by

Bacetti et al that CS3 is the appropriate period of starting treatment because the peak of mandibular growth correspond to this stage (8).

Age, dental and skeletal characteristics of this patient required a two-phase orthodontic treatment. Besides providing some benefits such as less treatment during the second phase, better compliance the disadvantages are longer total treatment time and cost.

The first phase in accordance with previous similar reports consisted of a bonded rapid palatal expandersince in hyperdivergent patient mandibular backward rotation should be avoided (6,9).Anterior tongue posture and thrust besides being an etiological factor for AOB in many individuals may be a consequence of a previously established AOB. The main etiological factor in this hyperdivergent patient was allergic rhinitis that contributed to AOB creating therefore conditions for tongue thrust.Stability of the achieved results is among objectives of any orthodontic treatment. In skeletal AOB treatment, stability is strongly correlated with the etiological factors and presence of deleterious habits. Hence, among treatment objectives was tongue posture modification (10).

Patient collaboration is among requirements for a successful orthodontic treatment. Compliance with proper oral hygiene, elastics during second phase of treatment was obtained from the patient. During retention especially in AOB patients, compliance is crucial.

CONCLUSION

Skeletal AOB due to combination of several etiological factors with hyperdivergent growth pattern is challenging to treat and bear a strong relapse potential.

The result of this case report suggests that although it is not possible to completely redirect vertical growth, with proper diagnosis and treatment plan, maintenance of vertical dimension can be achieved.

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Conflict of Interest Statement: The authors declare that they have no conflict of interest.

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