



Orthopedic orthodontic treatment in a patient with anterior open bite due to tongue thrust

Tratamiento ortodóncico y ortopédico de paciente con mordida abierta anterior, por hábito de empuje lingual

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ABSTRACT

A patient of 8 years of age, female, apparently healthy, said that her reason for consultation «I need braces to close my diastema». She was diagnosed as a skeletal class II due to retrognathism; hyperdivergent growth and a dolichofacial pattern. The patient showed an anterior open bite due to a tongue thrust habit, bilateral molar class I, bilateral canine class I, bimaxillary protrusion and lip protrusion. It was decided to perform treatment in two phases: first, the orthopedic correction of the tongue thrust habit and correction of the eruption guide through the placement of a lingual trap and use of lingual reminders as well as a lingual arch for anchorage to guide the eruption and maintain Leeway space. A T4K trainer was also used. Orthodontics was the second phase: alignment, leveling, stripping, detailing and retention were performed with a non-extraction treatment. Retention was achieved through modified maxillary and mandibular Hawley retainers.

Key words: Open bite, leeway space, lingual reminders.

Palabras clave: Mordida abierta, espacio de deriva, recordatorios linguales.

RESUMEN

Se presenta paciente femenino de 8 años de edad, aparentemente sana, quien a su motivo de consulta refiere «necesito frenos por diastema». Se diagnostica una clase II esquelética por retrognatismo mandibular con un tipo de crecimiento hiperdivergente y un patrón facial dolicofacial. Mordida abierta anterior debido a hábito de empuje lingual, clase I molar bilateral, clase I canina bilateral, biprotrusión dental y biproquelia. Se decidió realizar el tratamiento en dos fases, ortopédica donde se pretendía la corrección del hábito de empuje lingual y guía de erupción a través de la colocación de una trampa lingual y el uso de recordatorios linguales para el manejo del hábito, un arco lingual como aparato de anclaje para realizar la guía de erupción, manejo del espacio de deriva y un trainer T4K. La segunda fase ortodóncica donde se realizó alineación, nivelación, *stripping*, detallado y retención, con un tratamiento sin extracciones de piezas permanentes. La retención fue dada por retenedores Hawley modificados superior e inferior.

INTRODUCTION

The open bite is a clinical condition in which there is no contact between the upper and lower anterior teeth. There are multiple definitions in the orthodontic literature: Subtelny and Sakuda (1964) assert that it is the open vertical dimension between the incisal edges of the maxillary and mandibular anterior teeth.¹ Shapiro (2002) stated that the open bite is a loss of the overbite of the anterior teeth in centric occlusion, which occurs from an imbalance within the basal vertical growth of the jaws.²

Due to its multifactorial etiology this type of malocclusion is difficult to treat since it requires a careful analysis to make a good diagnosis and determine the patient's real problem. Etiologic factors include: genetic causes, eruption problems, tooth position, skeletal causes, tongue thrust, digital

suction.³ A habit is a behavior that is repeated regularly in a conscious or unconscious way and on which the clinician must intervene in order to achieve treatment success.⁴ According to Alexander in open bite malocclusions with hyperdivergent growth, no

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orthodontic system will be successful if the tongue does not develop a normal function.⁵

CASE REPORT

A female patient, 8 years of age, without medical history of importance attended the Center for Higher Studies in Orthodontics. Upon questioning for her reason for consultation she said: «I need braces for my diastema». The patient did not recall having received prior orthodontic treatment. At clinical examination the patient showed normal growth and development (*Figure 1*), with a dolichofacial biotype, an increased lower third, abnormal smile line; upper midline deviated with respect to the facial midline 2



Figure 1. Facial frontal photograph.



Figure 2. Profile.

mm to the left; lower dental midline deviated 1 mm to the right; a convex profile, hyperdivergent growth, biprotrusive lips and poor chin projection (*Figure 2*). The functional analysis revealed an alteration by tongue thrust habit. She had a complete dentition, the upper and lower arch form was squared, an open bite and a bilateral class I molar and canine relationship.

Radiographic analysis

The analysis of the panoramic radiograph (*Figure 3*) revealed jaws under normal parameters, normal dental eruption pattern, bony ridges with proper height and no signs of periodontal disease.

The lateral headfilm analysis (*Figure 4*) showed: a sagittal mandibular deficiency (SNB 74°, SND 71°, UD Harvold 21 mm). Vertically, the mandibular angle was increased thus indicating a downward and backwards mandibular rotation (GoGn-SN 37°, facial axis 99°, AFH 50°, FMA 27°). In the dental rotation we found proclination and protrusion of the maxillary and

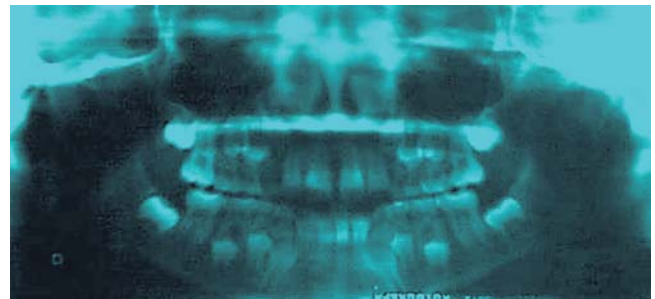


Figure 3. Initial panoramic radiograph.

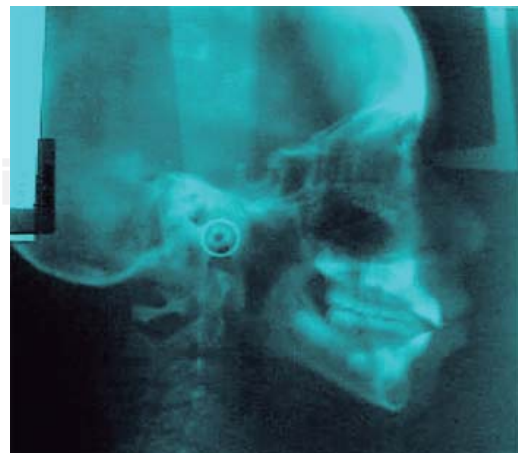


Figure 4. Initial lateral headfilm.

mandibular incisors (IMPA 111°, 1MD-NB 7 mm, 1MX-PLT 119°, 1MX-Po 8 mm). In the soft tissue analysis the mentolabial fold was increased; the nasolabial angle was decreased and the lips were ahead of the aesthetic line of Ricketts.

Intraoral examination

Upon intraoral evaluation, there was bilateral a class III molar relationship (Figures 5 and 6), anormal transverse posterior relationship, a 3 mm overjet and an overbite of -1.5 mm (Figure 7).

The space analysis for mixed dentition of Tanaka and Johnston showed an adequate space for the eruption of the maxillary and mandibular premolars and canine and upper and lower squared arch forms (Figures 8 and 9).

Diagnosis

The patient was diagnosed as a skeletal class II due to retrognathia with a hyperdivergent type of growth and a dolichofacial pattern; anterior open bite due to tongue thrust habit, bilateral molar class I, bilateral canine class I, dental biprotrusion and protrusive lips.

Treatment goals

Treatment goals may be divided into several aspects such as facial, skeletal, dental and functional. Facial goals of treatment were to achieve a straight facial profile with good lip positions. The skeletal treatment



Figure 7. Frontal view, diastema.



Figure 5. Right intraoral photograph.



Figure 8. Upper arch.



Figure 6. Left intraoral photograph.



Figure 9. Lower arch.

goals were to correct the skeletal relationships in all three planes of space (sagittal, vertical, transverse). Dental treatment goals were to: achieve bilateral canine class I, bilateral molar class I, correct dental midlines, obtain normal overjet and overbite, correct the maxillary and mandibular crowding, improve the upper and lower arch form. Functional goals of treatment were to: correct the tongue thrust, achieve good interdigtation, obtain canine and incisor guides.

Treatment plan

It was decided to perform the treatment in two phases; first, an orthopaedic phase to correct the

tongue thrust and guide the eruption by placing tongue crib and tongue reminders for habit management and tongue hyperactivity; a lingual arch would be used as an anchorage to guide the eruption and a T4K trainer. The second phase would be a non-extraction orthodontic treatment where alignment, leveling, stripping, detailing were performed. Orthodontic bands and brackets were used with 0.022" x 0.028" slot Roth prescription (Ah Kim Pech) and the following archwire sequence: 0.012", 0.016", 0.018" NiTi; 0.018", 0.020",



Figure 10. Smile.



Figure 11. Right profile.



Figure 12. Treatment progress intraoral photograph.



Figure 13. Right intraoral photograph.



Figure 14. Left intraoral photograph.

0.017" x 0.025", 0.019" x 0.025" SS. Upper tie forward, midline elastics, intramaxillary chains, class III elastics, first, second and third order bends and bilateral delta elastics were also used.

Treatment progress

During the orthopedic phase, the open bite was closed thanks to the correction of the tongue thrust habit. Subsequently, the patient presented an accentuated mandibular growth that was evident in the cephalometric tracings and progress photographs (Figures 10 and 11) as well as a tendency to an edge-to-edge bite with abnormal overjet and overbite (Figure 12) and bilateral class III molar and canine malocclusion. The correction of the class III malocclusion was through

the use of class III intermaxillary elastics and maxillary and mandibular stripping.

In treatment progress records, a molar and canines class III malocclusion is evident (Figures 13 and 14).

RESULTS

Treatment time was 4 years and 2 months. The functional and aesthetic objectives were met. The facial profile and the smile showed improvement; class I molar and canine relationship was obtained as well as a normal overjet and overbite. A nice incisor exposure during smile may be seen (Figure 15) and a proportioned facial and lip profile (Figure 16).



Figure 15. Final smile photograph.



Figure 16. Final profile photograph.



Figure 17. Final frontal photograph.



Figure 18. Final right intraoral photograph.



Figure 19. Final left intraoral photograph.



Figure 20. Final upper occlusal photograph.



Figure 21. Final lower occlusal photograph.

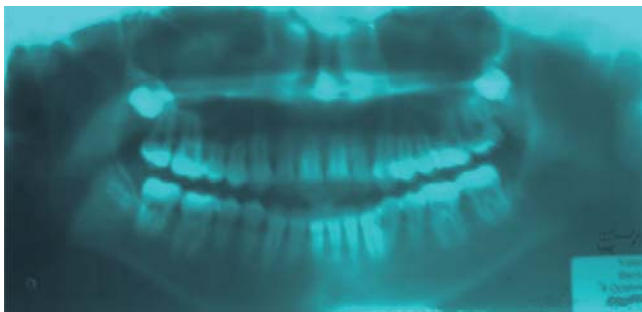


Figure 22. Final panoramic radiograph.

Intraoral results

In the frontal intraoral photographs a 2 mm overjet may be noted as well as an overbite of 20% and a less than 1 mm deviation to the right of the midline (Figure 17). In the final photographs we can see a class I canine relationship and bilateral molar class I (Figures 18 and 19). Treatment was completed with an



Figure 23. Final lateral headfilm.



Figure 24. Upper retainer.

oval arch form for both the maxilla and the mandible (Figures 20 and 21).

In the final panoramic radiograph (Figure 22) 28 teeth are observed, with the third molars in formation and absence of the 38, 48. Root parallelism may be noted.

The final lateral headfilm shows a skeletal class I patient with normo-divergent growth pattern, normal incisor position and favorable profile changes (Figure 23).

Retention was through upper and lower Hawley type retainers (Figures 24 and 25), modified with hooks in form of T in premolars and in form of C in molars (Figure 26).

DISCUSSION

One of the major paradigms of open bite malocclusion is its stability due to the problem on the vertical plane which these patients present.^{1,6-10} Alexander reported in

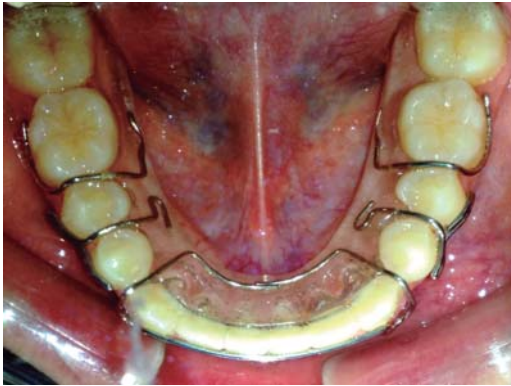


Figure 25. Lower retainer.



Figure 26. Modifications in the Hawley-type retainer.

his studies on stability that 35% of cases with anterior open bite relapse in the long term.⁵ According to Bennet, it is advisable to begin treating hyperdivergent open bite malocclusions caused by tongue thrust at an early age because of the growth potential that the patient may have.³ Shapiro focused on therapies designed to increase stability in anterior open bite patients, recommending with respect to the tongue thrust habit to wait at least two years before removing orthodontic appliances in order to obtain a good function and a high rate of success in stability.²

CONCLUSION

In this case, open bite closure was successfully achieved, as well as good aesthetic, dental and functional results. The control of the tongue thrust habit was fundamental for obtaining these results and as long as a good tongue position is maintained the results will be more stable.

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