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CASE REPORT

Vertical control of dolichofacial patient with an ACCO

Control vertical de un paciente dolicofacial con un ACCO

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ABSTRACT

Introduction: Poor anteroposterior mandibular relations comprise the largest number of cases. In this group class II malocclusion is the most frequent. Orthodontists began using extraoral forces with modified Hawley retainers many years ago. Margolis realized that removable appliances combined with extraoral forces could not only serve as good containers, but be used as effective correction mechanisms. He called his appliance ACCO (AC acrylic, CO cervico occipital anchorage). **Objective:** The objectives of the case hereby presented were maxillary growth control and try to protrude the mandible. **Case presentation:** A 10 year-3 month-old female patient attended the Orthodontics Clinic at the Division of Postgraduate Studies and Research at the National Autonomous University of Mexico. She presented a skeletal class II due to mandibular retrusion and maxillary protrusion, a vertical growth pattern, excessive growth of the nasomaxillary complex and protrusive incisors. **Treatment:** Orthopedic: ACCO with high traction and impact to retrude the maxilla and decrease vertical growth; with expansion screw (one turn a week). Headgear: nocturnal use and three to four hours in the afternoon. Active plate 24 hours and the patient was told to remove it for eating. Orthodontic treatment: .022 Roth fixed appliances retention: bimaxillary appliance for nocturnal use. **Results:** After five months of ACCO use, cephalometric tracings were performed again and the following values were obtained: maxillomandibular relationship: ANB 5º (initial 11º), Wits 2 mm (initial 3 mm), Bimler overjet 9 mm (initial 10 mm) convexity 6 mm (initial 11 mm). Maxillary position: SNA 82º (initial 87º) mandibular position: SNB: 78º (initial 76º). Facial pattern: facial cone of 67º (61º initial dolichofacial). Vertical dimension: SN-mandibular 36.5º (initial 42º), FMA (Tweed) 35º (initial 43º), Goniac (Jarabak) 130º (initial 128º). Incisor Inclination: UpI/SN 114º (initial 117º), LowI/Mand remained the same (95º). **Conclusions:** Orthopedics in conjunction with orthodontics harmonizes the maxilla and mandible and at the same time provides natural facial aesthetics, while maintaining proper functions: chewing, swallowing, phonation and breathing. It is vitally important to perform a timely diagnosis in order to intervene orthopedically, correct this kind of malocclusions and limit or prevent its severity.

RESUMEN

Introducción: Las malas relaciones mandibulares anteroposteriores comprenden el mayor número de casos. En este grupo, la maloclusión de clase II es la más frecuente. Los ortodoncistas comenzaron utilizando extraorales con contenedores de Hawley modificados hace muchos años. Margolis se dio cuenta que los aparatos removibles combinados con la fuerza extraoral podían no sólo servir como buenos contenedores, sino ser utilizados como efectivos mecanismos de corrección. Llamó a su aparato ACCO (AC acrílico, CO anclaje cervicooccipital). **Objetivo:** Los objetivos óseos del caso fueron controlar el crecimiento maxilar y tratar de protruir la mandíbula. **Presentación del caso:** Se presenta en la Clínica de Ortodoncia de la División de Estudios de Postgrado e Investigación de la Universidad Nacional Autónoma de México paciente femenino de 10 años con 3 meses, clase II esquelética por retrusión mandibular y protrusión maxilar, patrón de crecimiento vertical, crecimiento excesivo del complejo nasomaxilar, protrusión de incisivos. **Tratamiento:** Ortopédico: ACCO con tracción alta para retruir e impactar el maxilar y disminuir el crecimiento vertical; con tornillo de expansión (una vuelta a la semana). Arco extraoral uso nocturno y de tres a cuatro horas por las tardes. Placa activa 24 horas y se indica quitar para comer. Tratamiento ortodóntico: aparatología fija Roth .022. Retención: aparato bimaxilar de uso nocturno. **Resultados:** Después de cinco meses de uso del ACCO se volvieron a hacer trazados cefalométricos y se obtuvieron los siguientes valores: relación maxilomandibular: ANB 5º (inicial de 11º), Wits 2 mm (inicial 3 mm), resalte Bimler 9 mm (inicial 10 mm), convexidad 6 mm (inicial 11 mm). Posición maxilar: SNA 82º (inicial 87º). Posición mandibular: SNB: 78º (inicial 76º). Patrón facial: cono facial de 67º (inicial 61º dolicofacial). Dimensión vertical: SN-mandibular 36.5º (inicial 42º), FMA Tweed 35º (inicial 43º), Goniaco Jarabak 130º (inicial 128º). Inclinación de los incisivos: I Sup SN 114º (inicial 117º), I infMand se mantuvo igual (95º). **Conclusiones:** La ortopedia en conjunto con la ortodoncia armonizan los maxilares y al mismo tiempo proporcionan estética facial natural, mientras mantienen el adecuado funcionamiento de la masticación, la deglución, la fonación y la respiración. Es de vital importancia realizar un diagnóstico oportuno para poder interceder ortopédicamente y llegar a corregir este tipo de maloclusiones y limitar o evitar su severidad.

Key words: ACCO, headgear, vertical control.
Palabras clave: ACCO, arco extraoral, control vertical.

INTRODUCTION

In orthodontic practice, poor anteroposterior mandibular relationships comprise the largest number of cases. In this group, class II malocclusion is the most frequent.[1]

Teeth are positioned where they are because of an inadequate relationship of the bones, aided and

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supported by a deforming and adaptive muscular activity.[2] The correction of the anteroposterior dysplasia should be the first goal of treatment.

Extraoral forces are directed against the maxilla in order to harmonize the direction and the increments of movement in that area with the mandibular pattern.[3]

Orthodontists began using headgears with modified Hawley retainers many years ago, when there was a dominant class II pattern.

Margolis realized that removable appliances combined with a headgear could not only serve as good containers, but be used as effective correction mechanisms. He called his appliance ACCO (AC acrylic, CO cervicooccipital anchorage).[4]

The acrylic adaptation over the labial arc of the Hawley-type retainer provides better stability and retention to the appliance and reduces the tilting action that may occur due to the reception of the extraoral force arms in the anterior region. It incorporates an inclined plane to release the mandible thus allowing as much anterior growth as possible and eliminating functional retrusion. Keeping the anterior upper and lower antagonist teeth separated stimulates the eruption of the lower teeth, reducing the overbite and the excessive curve of Spee *(Figure 1)*.

Graber performed a modification of the original Margolis appliance by adding a screw to achieve the necessary expansion.

Figure 1. ACCO appliance (AC acrylic, CO cervico occipital anchorage).

Margolis instructed his patients to use the ACCO 24 hours a day, plus the headgear for at least 12 hours a day.[5]

Generally fixed appliances are used to correct rotations, intrude teeth or close spaces and produce the required root torque in that area. Then again the ACCO for any residual necessary distalization plus the retention.[6]

CASE REPORT

A Mexican female patient of 10 years and 3 months of age with a habit of oral breathing attended the Orthodontics Clinic of the Division of Postgraduate Studies and Research at the National Autonomous University of Mexico. The reason for consultation referred by the patient was «my front teeth show too much».

Clinical exam

Dolichofacial patient, her facial thirds are not proportionate (increased middle third), mild facial asymmetry: asymmetric superciliar, bipupilary subnasal and commissural planes, asymmetric ear implantation, wide nose, slightly asymmetric with good extension round nostrils, thick lips, convex profile, her facial midline does not match the dental midline, gingival smile (she shows the complete crown of the upper incisors and 2 to 3 mm of gingival margin). The upper lip was 6 mm and the lower lip 9 mm with respect to the aesthetic line of Ricketts. She is an oral breather *(Figure 2)*.

Intraoral features

The upper midline does not match the lower midline, molar and canine class I on the left side and on the right side, the canine class is non-assessable and the molar is class I.

3 mm overjet, 7 mm overbite, 10 permanent teeth on the upper arch, the right first premolar and canine are partially erupted. On the lower arch there are 12 permanent teeth. Upper and lower incisor proclination *(Figure 3)*.

Cefalometric analysis

Maxillary-mandibular relationship: ANB: 11°, Wits: 3 mm, Bimler: 10 mm, convexity: 11 mm. Maxillary position: SNA: 87°. Mandibular position: SNB: 76°. Facial pattern: facial taper of 61°, dolichofacial. Vertical dimension: SN-mandibular: 42°, FMA (Tweed): 43°,

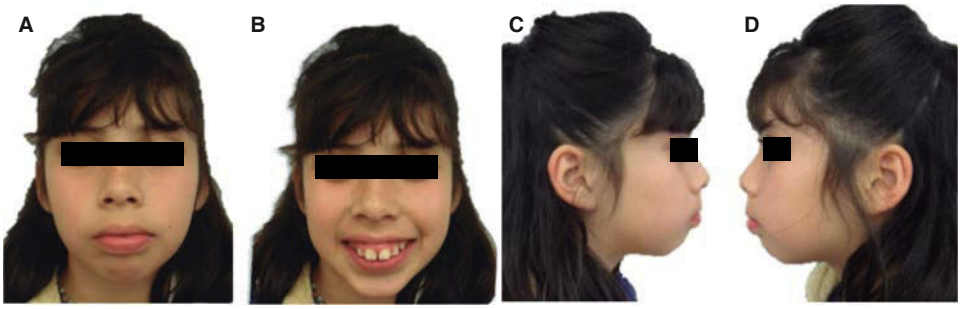

Figure 2.

Facial photographs: **A)** Front, **B)** Smile, **C** and **D)** Right and left profile.

Figure 3.

Intraoral photographs. **A)** Front, **B)** Right side, **C)** Left side.

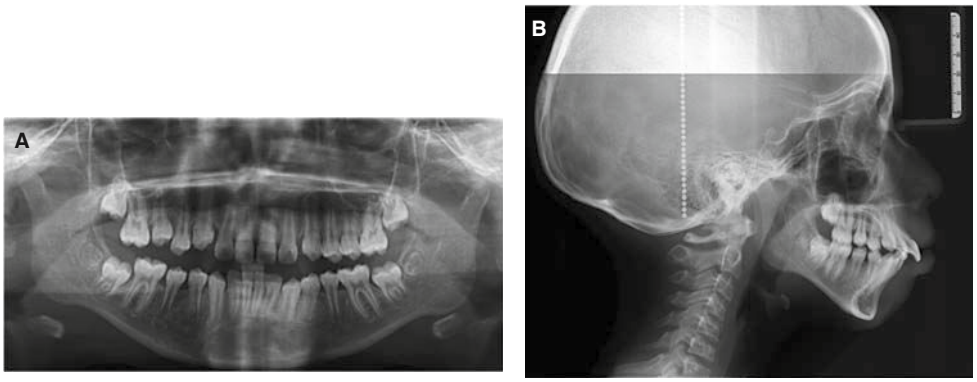

Figure 4.

Initial X-rays. **A)** Panoramic. **B)** Lateral headfilm.

Goniac (Jarabak): 128°. Incisor proclination: UpI/SN 117°, Lo I/Mand 95°.

The patient was diagnosed as a skeletal class II due to mandibular retrusion and maxillary protrusion with a vertical growth pattern, excessive growth of the nasomaxillary complex, a short and flat cranial base, vertically short mandibular ramus and protrusive incisors *(Figure 4)*.

DIAGNOSIS AND TREATMENT PLAN

The facial and functional objectives of the treatment plan were: to decrease vertical growth, improve lip competence, the profile and the smile. Also, it was aimed to maintain the opening pattern and eliminate the mouth breathing habit.

Dental goals: maintain canine and molar class (class I), correct the overjet and rotations, achieve an ovoid shape in both arches and retrocline the upper incisors.

Skeletal objectives: control maxillary growth and try to protrude the mandible.

Orthopedic treatment: ACCO with high-pull headgear (to retrude and impact the protrusive maxilla and decrease vertical growth) and an expansion screw (one turn per week). The headgear must be worn at night and three to four hours in the afternoon. The active plate should be worn 24 hours daily and be removed for eating.

Orthodontic treatment: .022 Roth fixed appliances.

Retention: Night time use of a bimaxillary appliance.

TREATMENT

December 14 2011: ACCO placement with headgear (12 oz). Expansion screw 1 turn per week *(Figure 5)*.

March 12 2012: plate activation was suspended and the screw was blocked with acrylic. Headgear use was continued with a 14 oz force.

June 18 2012: 0.022"-slot Roth appliance placement. Upper and lower 0.014-inch NiTi archwires were placed *(Figure 6)*.

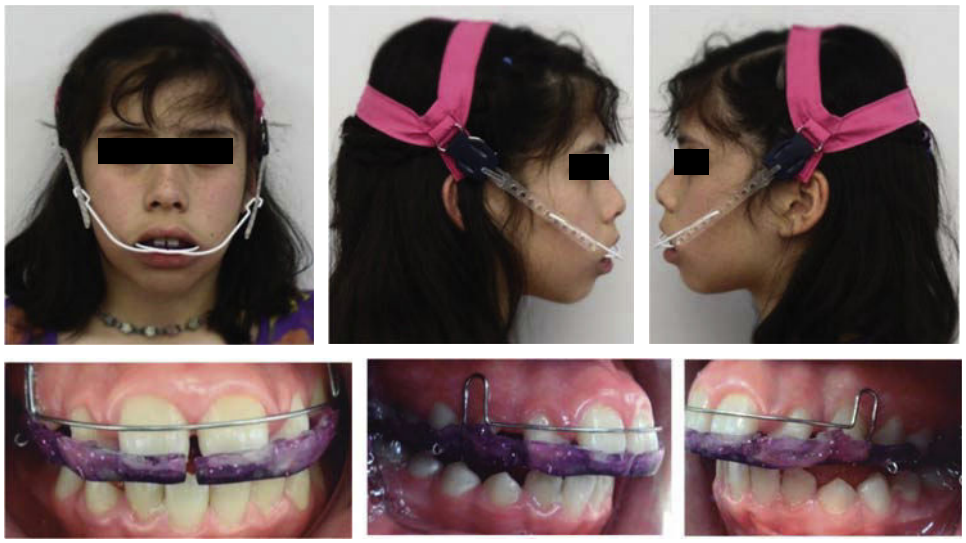

Figure 5.

ACCO placement with high-pull headgear, instructed to turn the screw once a week.

Figure 6.

Six months after using the ACCO .022 Roth brackets were placed with .014 NiTi archwires.

Figure 7.

Gingivoplasty and frenilectomy.

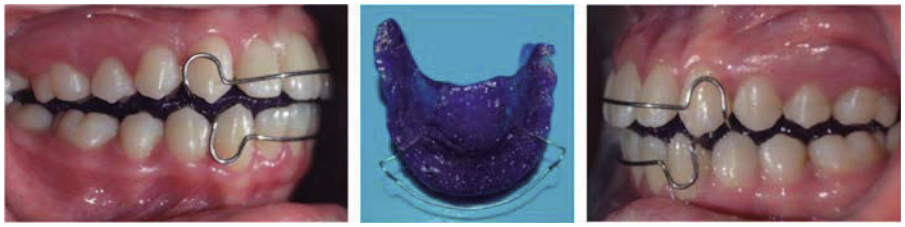

Figure 8.

Bimaxillary retainer, night time use.

Figure 9.

Comparison of initial and final facial and intraoral photographs. Initial and final lateral headfilms.

In November 2012 a gingivoplasty and a frenilectomy were performed in the Periodontics Department of the Division of Postgraduate Studies and Research at the National Autonomous University of Mexico *(Figure 7)*.

In February of 2013 a single-keyhole loop archwire (SKL) was placed for space closure. Nine months later, 3 ½ oz class II elastics were placed and used for a month. Brackets were maintained for a month as containment and in March 2014 they were removed. A bimaxillary retainer for night use was placed *(Figure 8)*.

RESULTS

After five months of ACCO use, cephalometric tracings were performed again and the following values were obtained: maxillomandibular relationship: ANB: 5º (initial 11º), Wits: 2 mm (initial 3 mm), Bimler: 9 mm (initial 10 mm), convexity: 6 mm (initial 11 mm). Maxillary position: SNA: 82º (initial 87º). Mandibular position: SNB: 78º (initial 76º). Facial pattern: facial taper: 67º (61º initial, dolichofacial). Vertical dimension: SN-mandibular: 36.5º (initial 42º), FMA (Tweed): 35º (initial 43º), Goniac (Jarabak): 130º (initial 128º). Incisor proclination: UpI/SN: 114º (initial 117º), LowI/Mand remained the same (95º) *(Figure 9)*.

DISCUSSION

The use of extraoral forces in orthodontics for solving sagittal problems is not new: Kingsley described the extraoral appliances used today in 1880.[7] The introduction of the intermaxillary anchorage in 1893 almost completely eliminated the use of extraoral appliances. However, the Viennese Oppenheim in 1930 reintroduced the headgear in the United States.[8]

CONCLUSIONS

Orthopaedics in conjunction with orthodontics harmonize the maxilla and the mandible while providing natural facial aesthetics and maintaining the proper function of chewing, swallowing, phonation and breathing. It is vitally important to make a timely diagnosis to be able to intervene orthopedically in order to correct this type of malocclusions and limit or prevent its severity.

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