

Palatal expansion and maxillary protraction: case report

Disjunção palatal e protração maxilar: relato de caso clínico

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Abstract

Early Class III malocclusion correction is an important factor for the patient, whereas it can avoid later surgical procedures. This malocclusion causes esthetic and functional damage; as well it can cause disturbances in patient's social life and psychological problems. This paper presents a clinical case report of palatal expansion followed by maxillary protraction, occurred at University Paulista, Brasília-DF. It was used a hyrax expander with vestibular hooks and PETIT's facial mask. Clinical results were considered satisfatories.

Descriptors: Malocclusion, Angle Class III; Facial masks; Mandibular advancement; Palatal expansion technique

Resumo

A correção precoce da Classe III é de suma importância, uma vez que previne futura correção cirúrgica. Esta maloclusão acarreta prejuízos estéticos e funcionais ao paciente, levando a problemas de ordem psicológica, podendo gerar o aparecimento de transtornos nas relações interpessoais e no convívio social. Este trabalho relata um caso clínico de disjunção palatal seguida de protração maxilar, ocorrido na Clínica de Ortodontia/Odontopediatria da Universidade Paulista, Brasília-DF. Foram utilizados um expansor Hyrax com ganchos vestibulares e máscara facial de PETIT. Os resultados clínicos obtidos foram considerados satisfatórios.

Descriptores: Má oclusão de Angle Classe III; Máscaras faciais; Avanço mandibular; Técnica de expansão palatina

Introduction

The early treatment of the Class III malocclusion has been a real challenge to Orthodontics.

The multifactorial nature and the difficulty of predicting the growth pattern of the craniofacial complex contribute to this dilemma¹. The vast majority of patients with Class III presents maxillary deficiency that may or may not be associated with mandibular prognathism². In accordance with Capelozza Filho *et al.*³ (1990), the involvement of the maxilla in the malocclusion is a determining factor for the decision of an early treatment.

The relationship of anterior crossbite, being associated or not with Class III, rarely correct itself and the fix should start as soon as the problem is diagnosed. Thereby, the early interception favors the normal development of the dentition, avoiding disruptions in facial growth and development that is consolidated with advancing age^{2,3}.

The early treatment with rapid maxillary expansion, followed by maxillary protraction by the use of face mask, aided by heavy extra-oral forces in the anterior direction, reshapes and redirects the midface bones before skeletal maturity⁴.

The effects caused by the use of the face mask on the segments of the craniofacial complex that occur on the maxilla are the growth in the anterior portion, premaxilla and frontal process⁵⁻⁶; and on the mandible, change of direction and amount of condylar cartilage growth⁶⁻⁷. On the dentoalveolar arches, the effects are the maxillary axial movement of the superior arch in relation to the osseous base, distal movement of the mandible in relation to the osseous base and mentum reshaping⁵⁻⁷.

Literature review

In 1965, Haas⁸ defended the approach of the palatine disjunction therapy in cases of Class III, maxillary atresia, unilateral and bilateral posterior crossbite, still reporting that in the case of Class III, occurs an advance and downward displacement of the maxilla after the disjunction therapy.

Hickham⁹ (1972) reported that as a result of the use of reverse traction and chin cup, occurred anterior motion of the teeth and maxillary osseous segments.

In a study, Nanda¹⁰ (1978) verified that the bones of the middle

third of the face could be previously dislocated by changes in the sutures, and when parallel forces were applied to the occlusal plane, the maxilla moved more horizontally than vertically.

Nanda¹¹ (1980) said that during the elaboration of the plan of treatment of Class III, with the option of face mask use for maxillary protraction, the presence of changes such as anterior crossbite, dental/osseous Class III and deficiency of the middle third of the face should be verified.

In accordance with Major and Glover¹² (1992), the early orthodontic/orthopedic treatment should be considered in patients with retruded maxilla, being the most suitable for maxillary traction, the use of Hyrax expander with vestibule hooks in the region of the superior canine. The authors also mention that the traction would have a stronger effect in the mixed dentition, where the skeletal changes are observed in less magnitude.

In 1994, Omnell and Sheller¹³ conducted a clinical study in Class III patients and patients with palatal cleft, where the ankylosed deciduous canines were used as anchorage for the maxillary protraction. The researchers verified that there were changes in the anteroinferior and anteroposterior directions and in the sutures of the middle third of the face without moving of the ankylosed teeth.

Weissheimer *et al.*¹⁴ (2003) assessed the cephalometric changes that occurred after the treatment of palatal disjunction e maxillary protraction in 27 patients with Class III malocclusion. The authors concluded that the combined action of palatal disjunction, accompanied by the maxillary protraction, was a very effective method for correction of the developmental disabilities of the middle third of the face. The modifications occurred as a result of the skeletal and dental changes, in both the anteroposterior and vertical directions. The maxilla moved in the anteroposterior direction and occurred anterior rotation of the palate, while the mandible had a posterior and inferior rotation.

Case report

The patient R.N.S., 10 years and 6 months, female, leukoderma, looked for the Orthodontics/Pediatric Dentistry Clinic of UNIP Brasilia in order to solve the anterior reversed bite (Figures 1, 2, 3, 4 and 5).



Figure 1, 2, 3, 4 and 5 Observe the patient with the anterior reversed bite

Using the clinic and cephalometric evaluations, it was noticed that the patient had Class III dental/osseous malocclusion and right unilateral posterior crossbite. The minor had SNA 77,1°, SNB 78,6°, ANB -1,5°, NS.PLO 11,9° e FMA 29°, so it was decided to intercept through the rapid expansion and maxillary protraction.

The suggested treatment was conducted in two stages, as professed by Baccetti and Franchi¹⁵ (2003). The first stage was constituted by the rapid expansion of the maxilla, followed by the maxillary protraction with the use of a face mask (Figures 6, 7, 8 and 9).

It was used a Hyrax expander, in order to uncross the bite and disarticulate the sutures of the nasomaxillary complex, facilitating the protraction, making it more efficient. The switch screw was daily activated 1/2 turn for a period of 10 days. It was used as a safety precaution the indication by Finizola Filho¹⁶ (1997), which recommends that the activation key of the device is tied to a piece of dental floss, to avoid accidental ingestion. Immediately after the disjunction, it was installed a PETIT face mask type, with elastics _"heavy, which liberated a force of 500g/side, measured with the aid of a dynamometer. The traction level of the elastics showed anteroinferior direction approximately 45° below of the occlusal plan; the distance between the intraoral hook and the pre-labial arch varied from 3,5 cm to 4 cm, and the elastic 1/2" heavy was far from 1 cm to 1,5 cm below of the labial commissure⁶.

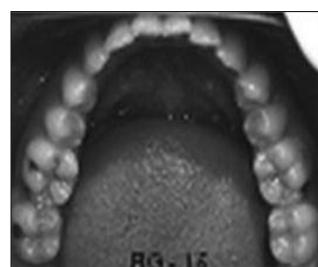
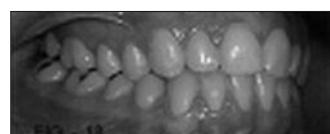
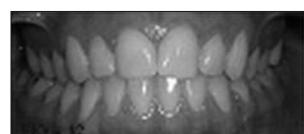
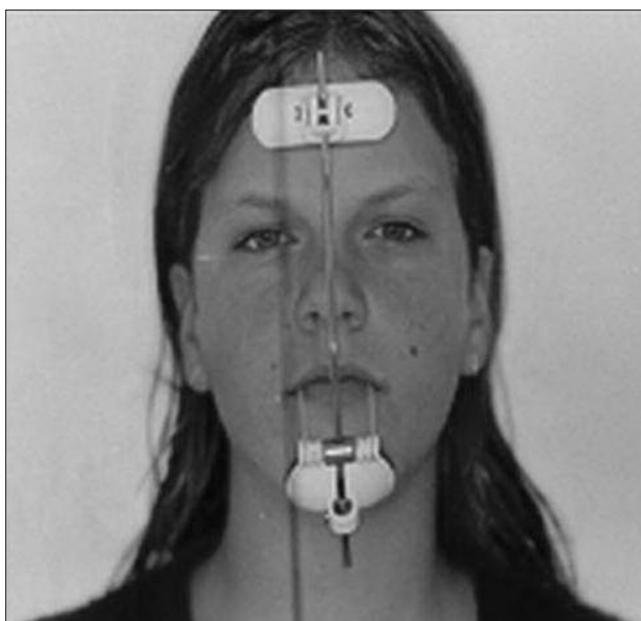
The patient was advised to use face mask for a period of 14 hours/day and the reevaluations were made fortnightly for a period of 2,5 months. After the full traction, the face mask was used as retention with the use of 10 hours/day, for a period of one year. In this step, the reevaluations were made every two months.

When the phase of retention was over, the brace was removed and the patient was advised to attend the Orthodontics Clinic every six months, for regular control and verification of stability. The treatment began in September 2001 and finished at December 2002, and the last reevaluation was made in January 2004 (Figures 10 to 16).





Figures 6, 7, 8 and 9. The rapid expansion of the maxilla, followed by the maxillary protraction with the use of a face mask



Figures 10 to 16. The patient on the last revaluation in January 2004

Discussion

The use of the face mask causes a skeletal change, because it promotes a change in the facial architecture, modifying the shape and the position of the facial bones, leading to the upper dental arch to move forward.

At the beginning of the treatment the patient had a SNA of $77,1^\circ$ and at the end, this angle was $79,7^\circ$, showing a displacement of the maxilla in relation to the mandible (displacement of the point A for-

ward), the ANB that was of $-1,5^\circ$ rose to $1,1^\circ$. This data corroborates with the previously one. Another positive result was the increase of the angle NS.PLO, which was $11,9^\circ$, rising to $14,1^\circ$, showing that occurred a clockwise mandibular rotation taking it down and back, indicating that there was a change in the position of the mandible, leading to the point B backward. The changes in the soft tissue profile became more evident in the upper lip, which was slightly projected forward.

Tweed¹⁷ (1946) reported that when the FMA is between 28° and 35°, the vector of growth is not very favorable. However, if the angle approaches 28°, the prognostic is more favorable than when it approaches 35°. We agree with this finding since the patient had the FMA in 28.9°, what favored the success of the treatment.

In accordance with Silva Filho⁴ (1997), the palatal expansion and the maxillary protraction are well documented in the literature, and the results are relatively stable. The stability of the results seems to be associated with the post-treatment holding time, suggesting the use of the face mask for 10 hours/day, during 4 to 6 months. In this case, we obeyed the guidance of the author as for the use of the mask for a period of 10 hours/day. However, we preferred to leave the patient for a longer period of contention, for 12 months, due to the age of the patient being above the limit proposed by Proffit and Fields⁵ (1995).

The level of force to be applied varies according to the author. Hickham¹⁸ (1991) recommends from 600 g to 800 g/side, while for Baccetti *et al.*¹⁹ (1998), from 225 g to 400 g/side would be enough to protraction. Juan Águila⁶ (2001) uses from 600g to 900g/side. In this study, we used the level of force of 500/side, differing from the proposed by the authors cited above.

The case was considered satisfactory, mainly if we take into account the age of the patient (10 years and 6 months), greater than the ideal maximum limit proposed by Proffit and Fields⁵ (1995), which is 8 years.

Conclusion

The orthodontics/orthopedic treatment provides us efficient results in the esthetic, osseous and functional fields of the maxillofacial complex.

We conclude the therapeutic capacity with good clinical results of the maxillary expansion associated with maxillary protraction, when using fixed aparatology with Hyrax expander, associated with vestibular hooks and PETIT face mask.

We must consider that the period of time of the treatment was relatively short. However, we achieved a considerable gain in the lateral and posteroanterior dimensions of the maxilla, and a ant11. Nanda R. Biomechanical and clinical considerations of a modified headgear. Am. J. Orthod. Dentofacial Orthop. 1980;78(2):125-39.

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FIGURES

Figures 1, 2, 3, 4 and 5 – Observe the patient with the anterior reversed hida I, Ishii H, Yamaguchi, Mizoguchi I. Maxillary protraction and chincap appliance treatment effects and long-term changes in skeletal Class III patients. Angle Orthod. 1999;69(6):543-52.

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