SURGICALLY ASSISTED RAPID MAXILLARY EXPANSION: REPORT OF A CLINICAL CASE

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ABSTRACT

The posterior crossbite resulting from a deficiency in maxillary growth, when present in individuals with advanced bone maturity, can be corrected appropriately and provide stable and satisfactory results, by means of a maxillary expansion coupled to the osteotomy of the bone structure which resist to expansive forces. This study presents a case report of an adult patient with transverse discrepancy and unilateral crossbite, which was treated by surgically assisted rapid maxillary expansion, with satisfactory outcomes with crossbite correction with preservation and stability after 3 years.

KEYWORDS: Crossbite, Rapid maxillary expansion, Maxillary Osteotomy.

1. INTRODUCTION

The esthetic necessity has led a large number of adult patients seeking for orthodontic treatment in dental offices. Approximately 8 to18% of the patients seeking professional complaining of dentofacial deformity have a transverse maxillary deficiency[8,14].

This growth deficiency creates a discrepancy between the apical bone bases, when faced with reduced transverse dimension greater than observed important clinical features such as: ogival palate, narrow maxillary dental arch, crowded, rotated and proclined teeth, asymmetry of the hemi-arches and wide buccal corridor[5,6,10,19].

The clinical feature commonly found in these transversal disharmonies is the posterior crossbite that can be classified as: dental and/or skeletal functional posterior crossbite, that can be uni or bilateral. The correct diagnosis of the malocclusion is crucial for a successful treatment[5,18].

Rapid maxillary expansion (RME) recommended by ANGEL[1] (1860) and used in 1961 by HASS[10] is indicated for the treatment of this transverse deformity in the growth stage, when there is low resistance in the maxillary bone, producing thus more stable results[16]. However, when faced with a maturation of the maxillary suture, the use of orthodontic-orthopedic appliances lose their effectiveness using a rapid maxillary expansion associated with osteotomy of the bony structures, making it necessary to resist to expansive forces[21]. In this case, it was possible to successfully obtain the disjunction of the suture of the maxillary processes, without the expense of supporting structures involved, a procedure known as Surgically Assisted Rapid Maxillary Expansion (SARME)[4,7,22].

Both the RME and SARME using the expander deappliance may be the tooth-borne (Hyrax) or tooth-tissue-borne (Haas) both with screw activator.

The objective of this study is to present a case report of an adult patient who presented with posterior crossbite, which was subjected to an associate orthodontic treatment there is a surgically assisted rapid maxillary expansion (SARME).

2. CASE REPORT

The Patient F.D.S. male, 23 years old, leucoderm, sought to orthodontic treatment with the complaint of discontent facial aesthetics and dental, as well as dissatisfaction with the smile. When extraoral clinical examination revealed that the patient had a facial asymmetry within normal limits, profile gently convex, dolichofa-

cial standard and passive lip seal (Figure 1).

On physical exam was diagnosed Class II malocclusion right subdivision with absence of the right lateral incisor, high palate with transverse maxillary atresia, right posterior crossbite and moderate crowding, it was still observed that the maxillary and mandibular dental midlines were coincident with each other and the median sagittal plane (Figure 2).

Figure 1. Initial extraoral photographs.

On the analysis of the panoramic radiograph was observed that the dentoalveolar structures were normal with the absence of dental elements 12, 18 and 38, also observed suggestive endodontic treatment of tooth 21 and restorative treatment of the teeth 16, 17, 21, 26 , 27, 38, 37, 46 and 47 (Figure 3).

Figure 2. Initial intraoral photographs.

In the initial lateral radiograph was identified a divergence of the horizontal planes, featuring a dolichofacial pattern combined with a moderate convexity of the bone and soft tissue profile (Figure 4).

Figure 3. Panoramic radiograph.

Figure 4. Initial lateral cephalogram.

After clinical evaluation of the patient and gathering all the information, disclosure of a unilateral posterior crossbite, in the case of a patient with advanced bone maturity, the proposed treatment plan was an ortho-surgical interaction, starting from the previous installation of the Hyrax appliance (Figure 5).

Figure 5. Occlusal, front and side view of the Hyrax appliance.

After the osteotomy, the cycle of activation of the expansion device was initiated. The protocol established was the activation of ¾-turn on the first postoperative day, followed by ¼-turn in the morning and another ¼-turn in the afternoon until it reaches 5 mm of interdental diastema, after 18 days of activation the desired expansion resulted in the opening of the palatine suture (Figure 6).

Figure 6. Intraoral view after activation of the Hyrax appliance.

After obtaining the transverse expansion of the maxilla and overcorrection of the crossbite, evidenced by the presence of interincisive diastema (Figure 6), the Hyrax appliance remained for a period of 6 months as a retainer, and then was removed for the fixed appliance installation for aligning and leveling the teeth with 0.014", 0.016" Nitinol and 0.018" stainless steel archwires. At this stage, it began using intraoral Class II elastic on the left side and Class III on the right side, accompanied by the esthetic adjustments as remodeling of the right maxillary canine, the use of interdigitation elastics and finalization bends (Figure 7).

Figure 7. Installation of fixed appliance

After the period of 30 months from start of treatment with a satisfactory result and goal achieved, the fixed appliance was removed and installed the Hawley plate maxillary retainer and 3x3 bonded mandibular retainer (Figure 8).

Figure 8. Final treatment images: extra and intraoral.

Figure 9. Final lateral cephalogram.

Even with three years of follow-up treatment, the case remains stable, showing a harmonious profile, the presence of passive lip closure, occlusion denotes a better teeth accommodation, stable and balanced, did not change on the final conformation achieved in the maxillary arch (Figures 9 and 10).

Figure 10. Extra and intraoral photographs, 36 months after treatment.

3. DISCUSSION

The orthodontists need to know the type, size and magnitude of the posterior crossbite, because its severity

and resolution are directly related to the present change[16].

To generate an accurate diagnosis and outline the appropriate treatment plan the clinician should make use of diagnostic tools, such as dynamic model analysis[12,16], radiographic and cephalometric evaluation, to determine the transversal discrepancies[5,6,11,12,16]. The patient described here presents posterior crossbite with tooth absence on the same side. It has been speculated that the lack of this tooth has led to posterior occlusal disharmony, considering that this malocclusion is a clinical variation of normal growth of multifactorial origin. The clinical findings compatible with this disability as: high arched palate, upright posterior teeth and loss of conformation elliptical arch, beyond the wide buccal corridor, are confirmed with those described by other authors[17,19].

Early correction of this transversal deficiency advantages the largest bone elasticity and promotes a better relationship between the apical bases by means of orthopedic braces[5]. RME is a permanent and efficient technique in an attempt to compensate for the deficient maxillomandibular relationships[1,10].

However, there is controversy about the ideal age[2] to produce a favorable maxillary expansion, matched against the authors that agree that RME reach your goals when applied to patients still in the growth stage[15], as well as jeopardize the integrity of the supporting structures such as injuries the periodontium, excessive teeth inclination, resorption of cortical alveolar bone in case of a patient with advanced skeletal maturation[9.17].

Thus considering that the patient treated in this report has bone maturation and presents an absolute maxillary atresia[3], it was decided in this case to perform SARME which consists in expanding transversally the maxilla using bone fragility through osteotomies, generating more stable results[11,16].

The failures occurred on an attempt of a rapid maxillary expansion in adults can be attributed to the stiffness of the joints of the zygomatic complex in the maxilla that tends to be the point of greatest resistance to expansion, thus being one of the facts that explain the high rate of failure in the maxillary expansion in adults[13].

At the end of the treatment of this clinical case, it was noticed that the patient had no damage to the stomatognathic system and allowed stable, facial and occlusal satisfactory results[2,11].

4. CONCLUSION

After diagnosis and planning of the case, it was concluded that:

• The SARME gave the patient the correction of the posterior crossbite with alignment and leveling of the teeth, improving occlusion without causing damage to anatomical and biological structures.

• The ortho-surgical intervention may be considered part of the treatment plan to correct transverse deficiencies in adults with advanced skeletal maturation.

• This procedure allowed favorable and stable results.

REFERENCES

[1] Angel EH. Treatment of irregularity of permanent or adult teeth. Dental Cosmos. 1860; 1:541-4.

[2] Azenha MR, Marzola C, Pereira LC, Pastori CM, Toledo Filho JL. Expansão Rápida da Maxila Cirurgicamente Assistida. Revisão da Literatura, Técnica Cirúrgica e Relato de Caso. Rev Port Estomatol Med Dent Cir Maxilofacial. 2008; 49(1):25-30.

[3] Bays RA, Greco JM. Surgically assisted rapid palatal expansion: an outpatient technique with long-term stability. J Oral Maxillofac Surg. 1992; 50(2):110-13; discussion 114-15.

[4] Bell WH, Epker BN. Surgical-orthodontic expansion of the maxilla. Am J Orthod. 1976; 70(5):517-28.

[5] Betts NJ, Vanarsdall RL, Barber HD, Higgins-Barber K, Fonseca RJ. Diagnosis and treatment of transverse maxillary deficiency. Int J Adult Orthodon Orthognath Surg. 1995; 10(2):75-96.

[6] Bishara SE, Burkey PS, Kharouf JG. Dental and facial asymmetries: a review. Angle Orthod. 1994; 64(2):89-98.

[7] Epker BN, Fish L. Surgical-orthodontic correction of open-bite deformity. Am J Orthod. 1977; 71(3):278-99.

[8] Fonseca RJ. Oral and Maxillofac Surgery. Philadelphia: WB Saunders, 2000.

[9] Garib DG, Henriques JFC, Janson G Coelho RA. Avaliação da expansão rápida da maxila por meio da tomografia computadorizada: relato de um caso. Rev Dental Press Ortodon Ortop Facial. 2005; 10(4):34-46.

[10]Haas AJ. Long-term posttreatment evaluation of rapid palatal expansion. Angle Orthod. 1980; 50(3):189-217.

[11]Jacobs JD, Bell WH, Williams CE, Kennedy JW. 3RD. Control of the transverse dimension with surgery and orthodontics. Am J Orthod. 1980; 77(3):284-306.

[12]Leal RC, Gouveia SAS, Carmadella EG. Análises de modelos: uma revisão da literatura. R Clin Ortodon Dental Press. 2006; 5(1):64-76.

[13]Lines PA. Adult rapid maxillary expansion with corticotomy. Am J Orthod. 1975; 67(1):44-56.

[14]Proffit WR, Phillips C, Dann CT. Who seeks surgical-orthodontic treatment? Int J Adult Orthodon Orthognath Surg. 1990; 5(3):153-60.

[15]Rabelo L, Bastos E, Germano A, Passeri L. Expansão de maxila cirurgicamente assistida sob anestesia local. R Clin Ortodon Dental Press. 2002; 7:73-9.

[16]Rocha NS, Oliveira DM, Laureano Filho JR, Vasconcellos JH, Caubi AF. Discrepância transversal da maxila: tratamento ortodôntico-cirúrgico. Rev Cir Traumatol Buco-Maxilo-Fac. 2005; 5(2):55-60.

[17]Rossi RRP, Araújo MTD, Bolognese AM. Expansão maxilar em adultos e adolescentes com maturação esquelética avançada. Rev Dental Press Ortodon Ortop Facial. 2009; 14:43-52.

[18]Sanches LJM, Santos-Pinto A, Martins JCR, Raveli DB, Gandini LG. Tratamento da mordida cruzada anterior com

plano inclinado de acrílico. Rev Bras Odontol. 1993; 50(2):14-18.
[19]Sant'ana E, Janson M, Kuriki ÉU, Yaedú RYF. Expansão cirúrgica da maxila. Rev Dental Press Ortodon Ortop Facial. 2009; 14:92-100.
[20]Scattaregi PL, Siqueira DF. Avaliação cefalométrica da estabilidade pós-expansão rápida da maxila assistida cirurgicamente. RRev Dental Press Ortodon Ortop Facial. 14: 69-81.
[21]Vasconcelos BCDE, Caubi AF, Dias E, Lago CA, Porto GG. Expansão rápida da maxila cirurgicamente assistida: estudo preliminar. Rev Bras Otorrinolaringol. 2006; 72:457-61.
[22]Wolford LM, Rieche-Fischel O, Mehra P. Soft tissue healing after parasagittal palatal incisions in segmental maxillary surgery: a review of 311 patients. J Oral Maxillofac Surg. 2002; 60(1):20-5.