

Surgical Maxillary Disjunction in Adult Patient: Results after 12 Months of Clinical-Radiographic Follow-up

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Abstract

Transverse maxillary deficiency or maxillary atresia is a dentofacial deformity characterized by the presence of unilateral or bilateral posterior crossbite, ogival palate, dental crowding, nasal breathing difficulty, zygomatic hypoplasia, narrow nasal base and deep nasolabial sulcus. Treatment is based on maxillary expansion by orthodontic treatment in adult patients, performing osteotomies to weaken the areas of bone resistance to disjunction. The purpose of this article is to present the case of an adult patient who underwent surgical maxillary disjunction associated with a Hyrax-type orthodontic appliance. The patient has been under follow-up for 12 months and showed significant improvement in dental occlusion due to the regularization of the apical bases with the transverse correction procedure.

Keywords: maxilla; dentofacial deformity; osteotomy.

Introduction

Maxillary transverse deficiency is defined as a facial skeletal dysplasia and is commonly experienced in clinical practice¹⁻⁵. It is clinically characterized by posterior crossbite (unilateral or bilateral), ogival palate, crowding and dental rotation, and is often associated with difficulties in nasal breathing¹⁻⁶.

It has a multifactorial etiology, possibly related to congenital, traumatic and iatrogenic development factors, and may be of genetic and/or environmental origin^{1,4,5,7}.

For adult individuals with this atresia who have completed the maturation process of the intermaxillary suture, an orthodontic approach associated with the surgical protocol is recommended. The surgical technique becomes necessary because it promotes the weakening of the areas of bone resistance contrary to the disjunction, to allow its subsequent separation with an orthodontic device^{1,4,5,8}.

Among the orthodontic appliances used to perform the maxillary expansion technique, there are mucodontulous (Haas type) and dentulous (Hyrax type) appliances. The choice of appliance depends on the needs of the patient and the experience of the professional^{1,4,5,9-12}.

The purpose of this article is to present the case of an adult patient who underwent surgical maxillary disjunction associated with Hyrax-type orthodontic appliance.

Case Report

A Caucasian male patient, 24-year-old, attended a private clinic for orthodontic treatment.

The extraoral physical evaluation revealed maxillary atresia, elongated facial pattern, low implantation of the ears, mouth breathing, dark under-eye circles and a class III pattern, characterizing the dolichofacial profile (Figure 1).

Clinically, maxillary atresia, poor buccal corridor, skeletal crossbite, dental midline deviation, class III molar relationship, enlarged WALA ridge, tooth rotation, diastema and absence tooth of the lower left canine were observed (Figure 2). The patient reported to us being dissatisfied with his dental aesthetics and revealed mild nasal breathing difficulty.

Radiographically, malposition, tooth rotation and impacted teeth (elements 18, 38 and 43) were observed. No bone loss was observed indicating the presence of periodontal disease. The dental absence of the lower left canine revealed dental inclusion (Figure 3). Model analyses were also considered for the final diagnosis of the transverse problem in order to quantify the maxillary atresia by measuring the inter-premolar distance and the inter-molar distance (Pont analysis).

In view of the clinical features presented, the planning for orthodontic-surgical combined treatment was considered, with the aim of promoting surgically assisted maxillary expansion.

Orthodontic treatment was initiated using the Straightwire MBT prescription technique. After 2 months, a Hyrax-type dental appliance was installed in order to perform surgical maxillary disjunction. The surgery was performed in a hospital under general anesthesia, resulting in the separation of the intermaxillary suture.

The expander was then activated in one complete turn, corresponding to 1 mm of expansion. At the end of surgery, the patient was instructed to activate the expander one turn in the morning and one turn at night for a fortnight. At the one-month postoperative visit significant inter-incisive diastema was observed compared to the pre-surgical condition, as well as radiographically. At the three-month follow-up an improvement in inter-canine and inter-molar distance was noted.



Fig.1: Extraoral physical photography presenting the facial features of the dolichofacial profile.

Frontal view (A); Lateral View (B).



Fig.2: Initial clinical intraoral features of the patient with maxillary atresia. Right lateral view (A); frontal view (B); left lateral view (C).



Fig.3: Initial radiographic features of the patient with maxillary atresia.

After one year there was a significant improvement in the condition of the maxillary arch, where the expected goal of surgical disjunction was achieved. The patient is currently under orthodontic follow-up for the treatment of malocclusion and crowding of the mandibular arch (Figures 4 and 5).

The control panoramic radiograph revealed better relationship of alignment and leveling of the teeth (angulations) and control in relation to the appearance of root resorption. The use of the palatal bar device for anchorage and maintenance of the transverse gain that occurred during the disjunction mechanics can be noted on the control radiograph (Figure 6).



Fig.4: Extraoral physical photography after 12 months of the maxillary disjunction.



Fig.5: Clinical intraoral features after 12 months of the maxillary disjunction. Right lateral view (A); frontal view (B); left lateral view (C).



Fig.6: Radiographic features of the patient after 12 months of the maxillary disjunction.

Discussion

The patient with transverse deficiency of the maxilla must undergo a careful clinical analysis to obtain an accurate diagnosis. Once the diagnosis is established, an appropriate treatment plan is drawn up by the orthodontist and the oral and maxillofacial surgeon. The correct relationship between these professionals allows for the successful correction of maxillary dysplasia and patient satisfaction^{1,4,5,13}.

The proposal of surgical intervention to the patient aims to reestablish a balanced relationship between the dental arches and to facilitate the action of the expansion appliance. Maxillary expansion is obtained by the application of lateral forces in the region of the maxillary molars, by the expansion appliance, resulting in the disruption of the palatal suture^{1,4,5}.

The choice of the ideal disjunction appliance is a difficult task, since dentomucosupported and mucosupported appliances present similar orthopedic results^{4,5,10}. The Hyrax type disjunction appliance may present a higher degree of relapse when compared to the Haas type disjunction appliance^{4,9}. The latter produces a lower dentoalveolar inclination than Hyrax appliances, increasing the interdental distance between canines. The acrylic cover of the Haas appliance directs the force vector to the centre of resistance of the maxilla, increasing the transverse dimension and not affecting the sagittal dimension^{5,11,14}. However, despite the greater recommendation of the Haas appliance, it should be used with caution because of possible injury to the palatal mucosa.

Additionally, the dentomucosupported appliances present greater difficulty in their hygienization and can cause edema and palatal lesions^{4,5,10-12}. In the case in question we opted for the installation of the Hyrax appliance, obtaining favorable orthopedic results.

Post-surgical complications arising from the maxillary expansion surgical procedure may occur. Among them are infection, sinusitis, periodontal bone loss, devitalization or tooth loss, ulceration of the palatal mucosa, relapsed asymmetric expansion, and more serious problems including aseptic necrosis and orbital complications^{3-5,7}. In the present report, no postoperative complication was observed.

The patient presented satisfactory expansion of the maxillary arch without the need for overcorrection surgery. He remains under follow-up due to the need to correct the occlusion associated with the mandibular arch.

Conclusions

Surgically assisted maxillary disjunction contributes to the correction of transverse deficiency of the maxilla or maxillary atresia, provided that it is well planned and indicated. The choice of orthopedic-orthodontic appliance is a key factor as it contributes to better orthodontic-surgical planning and results in appropriate treatment. This orthopedic-surgical treatment brings great functional benefits: posterior crossbite uncrossing, widening and improved nasal breathing capacity.

Conflict of Interest

The authors declare no conflict of interest.

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