Non-surgical palatal expansion in adult patient: a clinical case report

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Abstract

Aim: The objective of the present study was to report a case of non-surgical palatal expansion in an adult patient.

Report of case: A Hyrax-type expander was mounted onto the six upper teeth of the patient who was instructed to activate the orthodontic appliance twice a day at 12 h intervals.

Results: After 15 days, suture separation was observed, which was confirmed by the presence of midline diastema and widening of the radiolucent image of the suture on occlusal radiograph. Based on this observation, the appliance was further activated for 7 days, thus totalising 21 days of activation and expander screw opening of 10.5 mm.

Conclusion: One can conclude that in specific cases, it is possible to obtain an opening of the midpalatal suture in adult patients, thus avoiding surgical procedures.

Key words: Hyrax expander, orthodontics, palatal expansion, young adults

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Accepted: 2 August 2010

doi:10.1111/j.1752-248X.2010.01097.x

Introduction

Posterior crossbite is one of the most frequent malocclusions in orthodontics1. Possible aetiologies include prolonged retention or premature loss of deciduous teeth, crowding, palatal cleft, genetic factors, arch deficiencies, abnormalities in tooth anatomy or eruption sequence, orodigital habits, mouth breathing during critical growth periods and a dysfunction of the temporomandibular joint2,3.

To determine the treatment plan for cases involving posterior crossbite, it must be decided whether the posterior crossbite is attributed to a true skeletal origin or dentoalveolar in origin. Bets et al.4 stated that the posterior crossbite does not confine itself to dental dysplasias but is more often related to an underlying skeletal problem.

The correction of transverse maxillary deficiencies proceeds through opening of the midpalatal suture. Maxillary expansion was described by Angell5 and the clinical protocol was established by Haas in 19616.

Rapid maxillary expansion is extremely advantageous for the treatment of class III cases of real and relative maxillary deficiency and of cases of inadequate nasal capacity exhibiting chronic nasal respiratory problems7–9.

The procedure has been used effectively in children and adolescents to obtain more stability related to the amount of bone expansion and avoidance of tooth tipping. In adults, it is frequently associated with failure. This may be attributed in part to the anatomy of the maturing face; the midpalatal suture and adjacent circummaxillary articulations become more rigid and begin to calcify in the mid-20s. In order to overcome the resistance of the adult sutures to expansion, ‘surgically assisted’ rapid maxillary expansion has been advocated10,11.

Therefore, the objective of this article was to describe a clinical case of palatal expansion in adult patient in which the opening of the midpalatal suture was performed without needing surgical intervention.

Clinical case

A Caucasian female patient aged 28 years old sought orthodontic treatment complaining of ‘narrow arch and tilted teeth’. The patient’s medical history was checked. With regard to her general heath status, the
The patient presented with a class III malocclusion on a skeletal III base (ANB –2°C) with bilateral posterior crossbites and missing teeth lost to caries (16 and 26) (Figs 1 and 2).

Initially, the treatment planning was to achieve a palatal expansion surgically in association with conventional orthodontic treatment for balancing the occlusal relationship. First, the patient was referred to an oral maxillofacial surgeon so that she could be informed about the surgical procedure to be performed. On the return visit, the patient reported that she would be inclined to accept the surgery. However, the patient was told that initially a non-surgical intervention would be tried in order to expand her arch, and in the case of unbearable discomfort during the first week and enhanced horizontal movement of the teeth, appliance activation would be stopped and then she referred to surgery soon after.

A modified Hyrax-type expander was used for such a procedure. These modifications were obtained by using teeth 17 and 27 instead of teeth 16 and 26 (missing ones) and inclusion of teeth 15 and 25 in conjunction with teeth 14 and 24.
After cementation of the appliance (Fig. 3), the patient’s caregiver was instructed to activate the appliance twice a day for 7 days at 12 h intervals. After this period of time, the patient returned and complained of no discomfort or pain, and molar and premolar teeth maintained their position as well. Because of these results, the appliance was kept activated for additional 7 days. On the 15th day, a palatal suture opening was observed, which was confirmed by the presence of midline diastema and widening of the radiolucent image of the suture on occlusal radiograph (Fig. 4).

Based on these observations, the appliance was further activated for 7 days, thus totalising 21 days of activation and expander screw opening of 10.5 mm. On the 22nd day, the patient returned for stabilisation of expander appliance with Transbond light-curing composite (3M Unitek, Monrovia, CA) for a 6 month period (Fig. 5).

**Discussion**

In adults, the Haas expander has the ability to expand the posterior dentition with its alveolar housing, perhaps by bending the alveolus with bone remodeling\(^\text{11,12}\). This outcome is also expected when a Hyrax-type appliance is used. Handelman\(^\text{13}\) suggested that after the age of 18, it is often impossible to open the midpalatal suture. However, increased anchorage by bands in the second premolars favours an increase in the orthopaedic effect\(^\text{10}\). This appliance can increase the possibility of opening the midpalatal suture, and by keeping this idea in mind, we have tried to open the midpalatal suture with no surgical intervention.

During the stabilisation period, the lower fixed orthodontic appliance was mounted according to the edgewise technique in order to accelerate the treatment.
Ribeiro et al.\textsuperscript{10} have achieved palatal expansion with no surgical intervention by using a modified Hass-type appliance in which all premolars and first upper molars were banded, and the second molars were incorporated by bonding a wire segment extending from the appliance’s acrylic base to their palatal surfaces.

However, in our case, the Hyrax-type appliance was chosen because of the possibility of surgery if no suture opening can be achieved and ease of oral hygiene maintenance. The Hyrax-type expander is the best option when there is a possibility of surgical intervention.

In order to increase the support for optimal distribution of the screw forces, six upper teeth were banded instead of using four teeth as usual. This increased anchorage allows forces to be better distributed, thus avoiding overload on these teeth and possible fracture of the buccal bone plate and gingival retractions.

One fundamental point regarding the use of non-surgical midpalatal expander in adult patients is that they should be informed that the outcome is not guaranteed, and in the event of failure, surgical-assisted expansion is the only option to perform the expansion. With this in mind, the patient was initially told that the only way of achieving a successful correction would be through surgery. Therefore, the patient was prepared for a surgical intervention. The patient was referred to an oral maxillofacial surgeon who explained the details of the procedure as well as post-operative complications and side effects.

The decision for a non-surgical intervention was based on the fact that the supporting teeth were free of gingival recessions and had good bony support and free of disease. Thus, if the suture was not opened despite dental tipping, the roots would not be exposed.

This kind of procedure requires increased clinical attention, and in our case, the patient attended the clinic every week and the orthodontist called her every day to find out if there was any discomfort. This care is important to detect and prevent possible undesirable and irreversible effects from occurring.

After achieving the midpalatal suture opening, the expander screw was stabilised in order to keep its positioning. Stabilisation lasted 6 months, which was enough to allow bone maturation in the area of recently expanded midpalatal suture.

The use of a modified Hyrax appliance with increased anchorage was thus shown to be effective for correcting maxillary deficiency in patients with suture maturation. These findings suggest that some precautions must be taken, including knowing the skeletal age and the patient’s level of cooperation. If these factors are taken into account, satisfactory results can likely be reached, with improved function and aesthetics and a minimal morbidity.

**Conclusion**

According to the findings described in this clinical report, one can conclude that non-surgical intervention in adult patients can be performed if judiciously indicated, thus favouring a transverse correction of the maxilla without the drawbacks of the orthognathic surgery.

**References**

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