

Modified Hyrax Expander for Correction of Upper Midline Deviation

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In a mixed-dentition patient with maxillary transverse deficiency, when a deciduous canine is lost prematurely, the permanent incisors may migrate toward the affected side, reducing or closing the space available for eruption of the permanent canine. Lateral displacement of the incisors also results in maxillary asymmetry and significant midline deviation. These problems can be corrected by adding a buccal arm to a Hyrax* rapid palatal expander.

The present article describes the use of such a modified Hyrax appliance.

Case Report

An 8-year-old female presented with a Class I malocclusion, a maxillary transverse deficiency, and a midline discrepancy due to the premature loss of the maxillary left deciduous canine (Fig. 1). Rapid

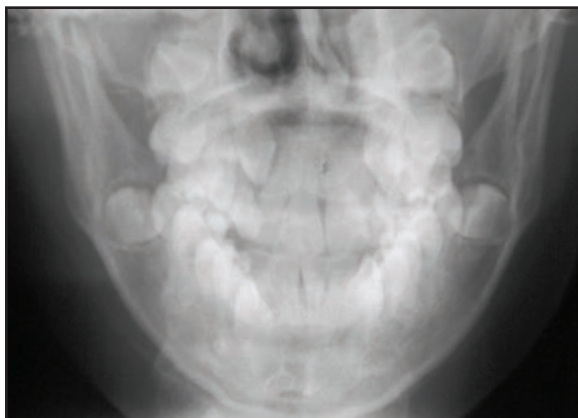


Fig. 1 8-year-old female patient with Class I malocclusion, maxillary transverse deficiency, and midline discrepancy due to premature loss of deciduous left canine before treatment.

palatal expansion was planned to increase the maxillary arch dimensions and correct the midline asymmetry. Molar bands were placed in the mouth, and an alginate impression was taken. The impression and molar bands were then sent to the laboratory for assembly of a modified Hyrax appliance.

The appliance was fabricated with the following components: a stainless steel frame, the two molar bands, two palatal arms welded to the bands and extending to the mesial surfaces of the canines, a 9mm central jackscrew, and a buccal arm with a terminal loop extending from the molar band to the labial surface of the central incisor on the side opposite the maxillary midline deviation (Fig. 2).

The finished appliance was delivered as follows (Fig. 3):

1. Separators were placed three days before appliance insertion.
2. The appliance was tested in the mouth for proper fit.
3. The labial surface of the incisor to be bonded

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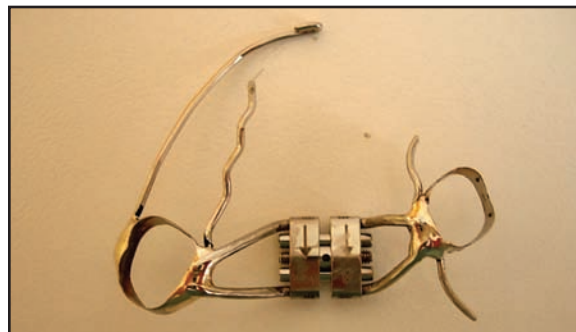


Fig. 2 Modified Hyrax* expander with buccal arm.

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to the buccal arm of the appliance was etched and primed.

4. The appliance was cemented in place.
5. The terminal loop of the buccal arm was bonded to the incisor with composite.
6. The palatal and buccal arms of the appliance were correctly positioned and inclined.

The appliance was activated with a quarter-turn twice a day for 15 days. This generated about 2-3kg of force, producing .5mm of expansion per day. Thus, the total amount of expansion was about 7.5mm. The patient was seen once a week for two

weeks (Fig. 4). After the palatal expansion was complete, a stainless steel ligature wire was tied in to deactivate the appliance. The expander was left passively in place to allow the results to stabilize and the contralateral incisors to drift into the space that had been opened (Fig. 5), a process that was expected to last four to six months (Fig. 6). The patient was scheduled for bonding of full fixed appliances to complete treatment.

Discussion

The midline discrepancy created by lateral displacement of maxillary incisors after premature loss of a deciduous canine may cause anterior crowding, which can lead to secondary crowding in the mandibular arch. In addition, maxillary deficiency may restrict mandibular development in the sagittal or transverse dimension. Arch constriction should be treated as early as possible to promote normal function and proper tongue position; a narrow palate is associated with a low tongue position, which often leads to mouthbreathing.^{1,2} Symmetry of the dental arches is critical to achieve maximum intercuspation, a functional occlusion, and stability, and to reduce the likelihood of TMJ dysfunction.

The modified Hyrax expander described here



Fig. 3 Example of appliance insertion before activation (different patient).



Fig. 4 Patient during palatal expansion phase.



Fig. 5 Drifting of incisors into opened spaces after five months of passive retention.

can facilitate the correction of these problems without the need for extractions.³⁻¹¹ Increasing the arch length and improving the archform create extra space that can be concentrated in the canine area. The consolidation of the half-arch contralateral to the maxillary midline deviation allows optimal distribution of the space produced by the palatal expansion, permitting the displaced incisors to move into the available space and, in turn, allowing proper eruption of the permanent canine. Such a procedure can gain 7-9mm of space, enough to avoid problems with canine eruption that would require more complex treatment procedures. Moreover, a midline deviation of as much as 5-6mm can be resolved.

Use of the modified Hyrax expander with a buccal arm is an effective intervention that can reduce the duration of treatment with fixed appliances. The protocol can be adapted for each individual case. For patients allergic to nickel, the appliance can be fabricated with a pure titanium frame.

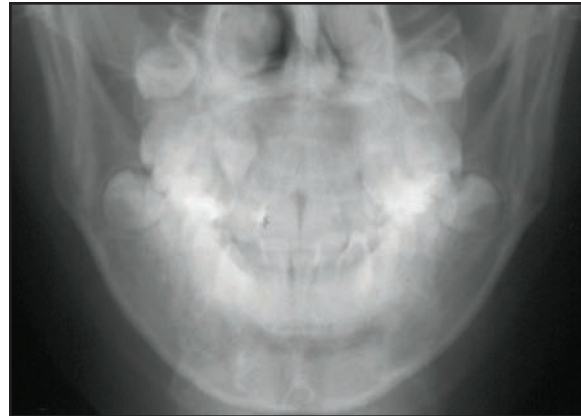


Fig. 6 Patient after appliance removal.

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