

THREE DIMENSIONAL ARCH CONTROL WITH  
A UBIQUITOUS DEVICE- HYGIENIC RAPID EXPANDER

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## ABSTRACT

Hyrax appliance was primarily invented with the goal of expanding narrow maxilla and correcting posterior crossbites, thereby correcting malocclusions in transverse plane. With the passage of time, innovations and ideas have led the orthodontists capable enough to use this appliance for correction of malocclusion in not just transverse but vertical and anteroposterior planes as well.

Usage of specific appliances for a particular malocclusion not only increases inventory and cost factor but also creates dilemma in the mind of the orthodontist. How comforting would it be to have one appliance which answers to various questions that glares in an orthodontist's face. Hyrax is our closest bet for such an appliance. For it can be used in conventional orthodontics for expansion and molar distalisation, growth modulation therapy in patients with face mask and surgical orthodontics as an alveolar transport device and a distractor as well. This paper would throw light upon, how a standard hyrax appliance could be used to correct malocclusions in all three planes of space.

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## INTRODUCTION

HYRAX also known as hygienic rapid expander is an orthodontic appliance that was introduced to expand the maxillary arch. Rapid maxillary expansion was first proposed by Angle in the 19th century which led to introduction of a series of expansion appliances during which hyrax was developed with the main advantage of being completely acrylic free<sup>1</sup>.

Hyrax appliance comprises of a screw having mesial and distal extensions; the distal extensions are soldered to the first molar bands, and the mesial extensions are snugly contoured and soldered to first bicuspids<sup>2</sup>. The appliance is

anchored in the patient's mouth and the screw is turned by the patient. The activation protocol varies according to the age of the patient. For a young growing patient two turns each day for the first 4-5 days, one turn each day for the remainder of RME treatment. For adults (non-growing) patients because of increased skeletal resistance, two turns each day for the first 2 days, one turn each day for the next 5-7 days and one turn every other day for the remainder of RME treatment. The force from the jack screw is transferred through the framework, to the molars and subsequently the maxillary suture. The more frequently the screw is torque the greater the force.



Figure 1a  
Profile View



Figure 1b  
Intraoral right buccal view



Figure 1c  
Maxillary occlusal view after correction



Figure 2a  
Overjet



Figure 2b  
Maxillary occlusal view after correction



Figure 3a  
Intraoral frontal view



Figure 3b  
Maxillary occlusal with appliance

The spectrum of hyrax as a treatment modality has been widened off late with its usage in correction of anteroposterior and vertical plane as well. Apart from being a palatal expander it can also be used as an alveolar bone transport device distractor<sup>3,4,5</sup>, a distractor<sup>6,7</sup>, a molar distalizer, and in growth modulation with a facemask therapy.

Following are the various case reports which highlight the ubiquitous usage of the hyrax appliance.

#### Case Report 1-

A 14 year old male came with a chief complaint of inability to close his teeth properly. He had a history of hypothyroidism and had been on medication for 2 years. On examination he had a straight profile with retruded maxilla and an edge to edge bite. Maxillary arch was constricted in the canine-premolar region which had brought his upper premolars into crossbite [figure 1(a,b)].

The treatment objective was to improve his profile and to correct the crossbite as well as to achieve enough space to relieve crowding in the maxillary arch. Hyrax was chosen upon as the appliance to bring about arch expansion in the transverse plane of space. Appliance was delivered and activated according to the previously mentioned norms.

Positive results were noted in a span of 2 months with an adequate increase in inter canine and intermolar widths (figure 1c). Crossbites were relieved in the premolar region.

#### Case Report 2-

A 21 year old male presented with the chief complaint of backwardly placed upper jaw with a history of repaired

unilateral cleft lip and palate. Facial analysis showed a concave profile with an evident scar in the repaired cleft region. Intraoral examination showed a retruded maxilla, class III malocclusion with a negative overjet and anterior crossbite (figure 2a).

The treatment objective in this patient was to improve his profile by forward positioning of the maxilla, correction of the anterior crossbite so as to obtain optimal overjet and overbite. Hyrax was taken up as the appliance of choice but with a change in its orientation. It was placed anteroposteriorly with its arms being soldered to bands on first premolar and first molar bilaterally. The change in direction of the hyrax screw was done to move the anterior segment of the maxillary complex in a forward position. This modified hyrax appliance was cemented in the patients maxillary arch and thereafter patient was referred to a maxillofacial surgeon for carrying out vertical and horizontal osteotomy cuts in premolar-molar region. It was followed by a period of appliance activation.

After the treatment there was a remarkable improvement in patient's profile, with the correction of overjet and anterior crossbite (figure 2b).

#### Case Report 3-

A 13 year old male reported with a chief complaint of reverse closure of his upper front teeth during biting. On examination he had a concave profile with an anteriorly divergent face, a reverse overjet and crowding in upper anterior region with buccally placed canine (figure 3a). He was a vertical grower which was noted clinically and then confirmed cephalometrically.

To correct the transverse malocclusion hyrax was again our appliance of choice. But the vertical proportions had to be controlled. Therefore, a bonded hyrax (figure 3b) was given in this case which has an advantage of keeping a check on the facial height. In addition to it, palatal expansion is conjoined with a relative intrusion of maxillary molars which is followed by a forward and upward rotation of mandible thereby reducing the facial height<sup>8</sup>.

Again, satisfying results were obtained with correction of overjet and crossbite and keeping a check on the facial height as well.

#### CONCLUSION

Hyrax has been a leading treatment modality to correct transverse discrepancies. With the advent of new innovations it has now become a leader in correcting sagittal abnormalities along with controlling the vertical component. The usage of hyrax is multidimensional with newer techniques adding more luster to its treatment repertoire.

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