

Title: Efficacy of Palatal Expansion Utilizing Two Different Appliances

Objective: To compare the efficacy of the Haas and Hyrax® expanders in achieving skeletal maxillary expansion.

Methods: Twenty growing patients were randomly assigned to receive either a Haas or Hyrax® expander for maxillary expansion. Lateral and posteroanterior cephalograms and impressions for study casts were taken at the beginning of treatment and three months after expansion was complete, at the time of appliance removal. Expansion was carried out at the rate of two turns per day until it was judged complete by the practitioner.

The posteroanterior cephalograms were traced and measured to evaluate the increase in width of the maxilla and nasal cavity. The mandibular plane angle, lower facial height, and protrusion of the maxilla and mandible were measured on tracings of the lateral cephalogram. The study casts were evaluated for changes in intercanine width, interpremolar width, intermolar width, and palatal depth. The amount of dental tipping was also measured at the molars and premolars. Efficacy of the expansion was determined by dividing the amount of skeletal expansion (measured at either the nasal cavity or the maxilla) by the amount of dental expansion.

For each variable, differences in mean values between the two expander groups were examined for statistical significance using a two-tailed t test. Regression analysis was carried out to determine the contribution of appliance, amount of dental expansion, and source of patient to the efficacy of the expansion.

Results: Analysis of the study casts showed no significant difference in the efficacy of the expansion between the appliances or between the genders. The ratio of bodily movement to total expansion, or amount of tipping, was significantly correlated with the amount of expansion for both the molars and premolars. The depth of the palate did not show significant increase following maxillary expansion.

Comparison of posteroanterior cephalogram data showed a significant difference in the amount of dental expansion for each appliance, with the Hyrax® group expanded a mean of 6.30 mm and the Haas group expanded a mean of 8.87 mm. ( $p = 0.014$ ) All other PA measurements were not significantly different. Analysis of lateral headfilm data showed no significant differences between the groups regarding changes in the protrusion of the maxilla, protrusion of the mandible, mandibular plane angle, and total facial height. Changes in lower facial height were statistically significant, with the Hyrax® group increasing .78 mm and the Haas group increasing 1.87 mm ( $p = 0.013$ ). When the patients were divided by age into young and old groups, no significant differences were found in cephalometric measurements.

No significant difference was found in the efficacy of skeletal expansion between the two appliances, whether skeletal expansion was measured at the nasal cavity ( $p = .587$ ) or the maxilla ( $p = .351$ ). Regression analysis showed that the amount of dental expansion did

not contribute significantly to the ratio of skeletal: dental expansion (efficacy of expansion), regardless whether skeletal expansion was measured at the maxilla ( $p = .160$ ) or the nasal cavity ( $p = .662$ ). Likewise, the source of the patient and the type of expander appliance did not contribute significantly to the efficacy of skeletal expansion.

**Discussion:** This study confirms findings of a larger study at UCLA, which contributed some patients to our group. Increasing the sample size would contribute greatly to the significance of this study. Indeed, the changes in lower facial height are in contradiction to the lack of change in both the mandibular plane angle and the total facial height, and can only be attributed to the small sample size. It was noted that maxillary width was difficult to evaluate with developing second molars, so that there was only moderate correlation between the nasal cavity and maxillary expansion. Restricting the study to patients with erupted second molars would alleviate this.

In general, however, it can be concluded that there are few skeletal changes concurrent with maxillary expansion. In addition, neither the Hyrax® nor Haas expander was judged to be more effective in bringing about skeletal expansion.