

Expansion and Nasal Airway Resistance

The effect of rapid maxillary expansion on nasal airway resistance.

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The purpose of this investigation was to provide quantitative data describing the effects of rapid palatal expansion on nasal airway resistance. Rapid palatal expansion is an orthodontic procedure which is commonly used to widen the maxilla to correct maxillary narrowing resulting in the orthodontic abnormality of crossbite and to provide more space for alignment of crowded teeth. Recordings of nasal airway resistance were taken prior to expansion, immediately after expansion (approximately one month), after a retention period of approximately 4 months and approximately one year after initiation of treatment. Findings indicate an average reduction in nasal airway resistance of 48.7 per cent which was statistically significant at the 0.005 level. The reduction also appeared stable throughout the post treatment observation period (maximum one year) as each series of readings was statistically significantly lower than the initial reading, but not significantly different from each other. Reduction of nasal airway resistance was highly correlated to the initial nasal resistance level prior to rapid maxillary expansion. Those individuals with the greater initial resistance tended to have greater reductions in airway resistance following the expansion.

Changes in nasal airway resistance associated with rapid maxillary expansion.

Hershey HG, Stewart BL, Warren DW

Am J Orthod 1976 Mar;69(3):274-84

Records consisting of nasal resistance measurements, postero-anterior radiographs, and dental casts were obtained on seventeen patients before they underwent rapid maxillary expansion. These records were retaken after maximum expansion of the appliance and after 3 months of retention. Measurements of nasal resistance, binasal cavity width, and maxillary first molar width were made for each subject at each stage of treatment. The following conclusions were derived: 1. Rapid maxillary expansion produced a significant reduction in nasal resistance measured at both 0.50 L. per second and 0.25 L. per second air flow. The reduction of nasal resistance by maxillary expansion was stable through a 3-month period of retention. 2. There was very low correlation between the amount of maxillary first molar expansion and change in nasal resistance. Also, changes in nasal resistance showed low correlation with the amount of nasal cavity widening which occurred during the expansion procedure. 3. Changes in nasal cavity width was not closely related to the amount of maxillary first molar expansion. 4. The patient's subjective opinion of changes in his ability to breathe through the nose was not closely related to the amount his nasal resistance was reduced. 5. The change in nasal resistance of subjects who noticed an improvement in their ability to breathe through the nose was not significantly different from nasal resistance change in children who did not notice any change in their breathing. 6. When subjects treated with an all-wire expansion appliance were compared to subjects treated with a wire-and-acrylic appliance, the two groups were not significantly different with respect to maxillary first molar expansion, nasal cavity widening, or changes in nasal resistance. Differences in amount of molar tipping or alveolar bending were not investigated. 7. Patients requiring rapid maxillary expansion treatment for constricted maxillary arches have significantly higher nasal resistance than other orthodontic patients and non-orthodontic subjects. The rapid maxillary expansion procedure reduced the nasal resistance of those treated to a level which was not significantly different from that of subjects with maxillary arches of normal dimensions. 8. The reduction in nasal resistance achieved with the expansion procedure was not lost after 3 months of retention. 9. Where indicated, rapid maxillary expansion is not only an effective method for increasing the width of narrow maxillary arches but also reduces nasal resistance from levels associated with mouth breathing to levels compatible with normal nasal respiration.