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COMPARISON OF THE SKELETAL AND DENTAL CHANGES OF TOOTH-BORNE VS. BONE-BORNE EXPANSION DEVICES IN SURGICALLY-ASSISTED RAPID PALATAL EXPANSION: A FINITE ELEMENT STUDY

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Background: The aim of this study was to compare the skeletal and dental changes of a tooth-borne (Hyrax) and a bone-borne (Smile distractor) expansion devices using three-dimensional model of an adult human skull.

Materials and Methods: A finite element model of human skull was generated using data from 3-DCT scans of an 11-year-old female child. Then a Hyrax expander (tooth-borne appliance) and Smile distractor (bone-borne appliance) in three different positions were adapted to the finite element model and expanded for 0.5 mm simulating the clinical situation. The 3-D pattern of displacement and stress distribution was then analyzed.

Results: The results of this study showed that screw position affects the stress and displacement pattern within the Nasomaxillary complex and maxillary dental arch.

Conclusion: Closer teeth feel more stress and undergo more displacement than the farther ones. Moreover, skeletal effects of the Smile distractor were greater than of Hyrax in all different positions.

Keywords: Dental, expansion device, finite element method, skeletal