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Finite Element Analysis of the Influence of the Orthodontic Appliance Design on the Maxillary Expansion

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In present paper the results of the stress-strain state finite element analysis of the human maxillary complex after activating orthodontic appliance are performed. Skull and abutment teeth models are obtained on the basis of the tomographic data of the dry intact adult skull. Orthodontic appliance designs are differ in the arrangement of rods and screws relative to the sky. The equivalent stresses and displacements of the maxillary bones and supporting the teeth are evaluated. It is shown that the horizontal location of orthodontic appliance screw and rods in the skull bones having the highest stresses, but there tipping teeth and upward movement of the maxillary bones are observed. For orthodontic appliance activating with a screw located near the palate, there are decreased stresses on the maxillary bone complex, and bones and supporting teeth are moved down. The positions screw orthodontic appliance to translation the upper jaw bones are assessed.

Key words: rapid maxillary expansion, orthodontic device HYRAX, finite-element analysis, stress-strain state, craniofacial complex.

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