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Stress distributions in the maxillary complex from orthopedic headgear forces

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ABSTRACT

The present study was conducted to investigate stress distributions in the maxillary complex from headgear forces by means of three-dimensional finite element analysis. A posteriorly-directed force of 1.0 Kgf was applied to the maxillary first molars in the directions parallel and 30 degrees inferior to the occlusal plane.

In the lower regions resisting posterior displacement of the complex, large normal and shear stresses were observed. Meanwhile, the regions resisting upward displacement experienced larger than normal stresses. A downward force produced slightly larger stresses than a parallel force and varied the nature of stresses from compressive to tensile or vice versa in the temporozygomatic suture. Thus, the stress distributions in the sutures varied according to their anatomic locations relative to force directions.

The maxillary complex exhibits postero-inferior displacement with clockwise rotation from the horizontal headgear force. This becomes more prominent as the direction of force becomes more inferior.

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