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Biomechanical and clinical changes of the craniofacial complex from orthopedic maxillary protraction

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ABSTRACT

The present study was designed to investigate biomechanical and clinical changes in the craniofacial complex resulting from orthopedic maxillary protraction by means of finite element and cephalometric analyses, respectively. An analytical model developed from a young human dry skull was used for finite element analysis. Three principal stresses were determined in the complex and its sutures. For evaluating morphological changes of patients, lateral cephalograms taken before and after maxillary protraction therapy were analyzed.

Tensile stresses were produced in the maxillary and zygomatic bones in an anterior direction with corresponding compressive stresses in a perpendicular direction. In the sutural systems, compressive stresses were induced by counter-clockwise rotation of the complex. Cephalometric investigation demonstrated that significant improvement of the maxillo-mandibular relationship was obtained by maxillary protraction, however, maxillary growth and repositioning were not as great when compared to mean growth in the control group.

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