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A Finite Element Analysis of Biomechanics in Distraction Osteogenesis of Ascending Ramus Lengthening between Males and Females—A Comparative Study

Article *in* Journal of Orofacial Sciences · January 2020

DOI: 10.4103/jofs.jofs_97_19

Abstract

Introduction: The asymmetry of mandibular ascending ramus leads to serious orthodontic problems in the dentofacial complex. This study was aimed to assess the effects of gender bone properties difference on biomechanics of distraction osteogenesis that used for ascending ramus lengthening with different forces. **Materials and Methods:** A 3D mandibular model was constructed and an oblique osteotomy line was made. The force was applied perpendicular to the osteotomy line in a bidirectional manner with three different distraction rates (5 mm, 10mm and 15 mm). **Results:** Male and female models showed the same maximum Von Mises stress value and the same distribution with the same force, the maximum stress value for 5mm, 10mm and 15mm rates were greater than the ultimate tensile stress for the human bone. The displacement within the three rates in X, Y and Z directions was higher for male than female. The displacements in all three directions were more prominent in the mandibular chin area. **Conclusion:** No gender difference in stress values and distribution with more anterior displacement in male than female. This site of distraction results in forward and anti-clockwise rotation of the mandible resulting in reducing anterior facial height.