

Original Article

**Does the flattening of the curve of
spee affect the chewing force
distribution in the mandible? (3D finite
element study)**

Abstract:

OBJECTIVE: To search the effects of Curve of Spee (COS) flattening on the stresses and displacement on the different mandible landmarks and lower teeth during posterior teeth loading using three-dimensional (3D) finite element analysis.

MATERIALS AND METHODS: Three-dimensional hemi mandibular model was created from real selected mandible. The lower teeth were aligned originally in a curved form with 2.4 mm depth at the cusp tip of the second premolar. Another replica with flat aligned teeth was formed to confirm the analysis by up-righting premolars and molars. A load was applied at mesio-buccal cusp of the lower first molar on both models, and the resultant stresses and displacements on the mandibular landmarks and the lower teeth were tested.

RESULTS: Von Mises over the mandible was higher in flat than in curve model. The highest stress levels were detected at the mesio-buccal cusp tip of first molar for flat and curved simulation (5053, 3304) Mpa respectively. Mesio-distally, the teeth displacement was higher in curve model than in flat one. The maximum distal displacement, in flat model, was seen in central and lateral incisors. While, in curve model, the maximum distal displacement was grasped within first and second premolars.

CONCLUSIONS: Flattening the COS magnifies the stresses over whole mandible and reduces lower teeth displacement mesio-distally. We speculated that the readjustment of the COS after orthodontic treatment could reduce the stress and displacements on the lower anterior teeth and decrease the lower anterior teeth crowding relapse.