

## Comparison with Mechanical Behaviors of Mastication in Teeth Movement Cases

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**Abstract :** Purpose: This study aims at investigating the mechanical behaviors of mastication, according to various teeth movement. There are three masticatory cases which are general case and 2 cases of teeth movement. General case includes the common arrange of all teeth and 2 cases of teeth movement are that one is the half movement location case of molar teeth in no. 14 tooth seat after extraction of no. 14 tooth and the other is no. 14 tooth seat location case of molar teeth after extraction in the same case before. Materials and Methods: In order to analyze these cases, 3 dimensional finite element (FE) model of the skull were generated based on computed tomography images, 964 dicom files of 38 year old male having normal occlusion status. An FE model in general occlusal case was used to develop CAE procedure. This procedure was applied to FE models in other occlusal cases. The displacement controls according to loading condition were applied effectively to simulate occlusal behaviors in all cases. From the FE analyses, von Mises stress distribution of skull and teeth was observed. The von Mises stress, effective stress, had been widely used to determine the absolute stress value, regardless of stress direction and yield characteristics of materials. Results: High stress was distributed over the periodontal area of mandible under molar teeth when the mandible was transmitted to the coronal-apical direction in the general occlusal case. According to the stress propagation from teeth to cranium, stress distribution decreased as the distribution propagated from molar teeth to infratemporal crest of the greater wing of the sphenoid bone and lateral pterygoid plate in general case. In 2 cases of teeth movement, there were observed that high stresses were distributed over the periodontal area of mandible under teeth where they are located under the moved molar teeth in cranium. Conclusion: The predictions of the mechanical behaviors of general case and 2 cases of teeth movement during the masticatory process were investigated including qualitative validation. The displacement controls as the loading condition were applied effectively to simulate occlusal behaviors in 2 cases of teeth movement of molar teeth.

**Keywords :** cranium, finite element analysis, mandible, masticatory action, occlusal force

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