

Chewing Stress Developed in Upper Anterior Teeth with Root end Resection.

A Finite Element Analysis Study

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Abstract

Aim: Because pulpless teeth have a higher risk of vertical root fracture, the present study investigated the additional effect of root end resection upon their mechanical resistance.

Methods: Finite element analysis (FEA) was used to evaluate the stress and deformations of upper anterior teeth after root end resection while loading them at 100N and 300N.

Results: Loading teeth with root end resection at 100N generates a mild increase of dentin stress. Even though von Mises stress is within the elastic range the whole tooth-bone structure is stressed while chewing. At higher load of 300N the vertical and mesiodistal deformations cannot be any longer neglected. The highest stress occurs in vertical direction and involves the whole labial surface of the tooth crown. It is expressed as a compression stress ($SY = 2.8 \times 10^9 \text{ N/m}^2$) and comes close to the value of dentine Young's modulus.

Conclusion: Loading the upper anterior teeth with root end resection at 100N lowers in a mild manner their mechanical resistance. A load of 300 N induces tooth deformations and a risky stress, mostly focused at tooth cervical area. The stress in the alveolar ridge bone is under the risk threshold of Young's modulus.

Key words: root end resection, finite element analysis, chewing stress, deformations

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