

OP16 CORTICOTOMY OF THE BUCCAL AND LINGUAL ALVEOLAR WALLS AND ITS INFLUENCE ON ORTHODONTIC TOOTH DISPLACEMENT USING A FINITE ELEMENT ANALYSIS

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AIM: Corticotomies are considered to accelerate orthodontic tooth movement. Whether the induced local trauma affects the load transfer from orthodontic appliance on the alveolar wall is not yet known. This study assessed the amount and type of tooth displacement of a human central and lower lateral incisor while simulating corticotomy of either the buccal or lingual alveolar wall.

MATERIALS AND METHOD: A finite element model based on a microcomputed tomographic scan of a human lower jaw segment, containing a central and lateral incisor, was developed. Corticotomy was simulated by decreasing the bone density values either on the buccal or lingual alveolar walls of either the central or lateral incisor. A control model with no corticotomy was generated. Different moment-to-force (M/F) ratios were analysed in the bucco-lingual direction in order to achieve various tooth movements: controlled and uncontrolled tipping, translation and root torque. The location of the centres of rotation and their associated types of tooth displacement in the aforementioned five simulations were analysed.

RESULTS: All analyses showed larger tooth displacements in the corticotomized models compared to the control model. The M/F ratio associated with translation increased in the corticotomized models. Finally, the presence of a corticotomy at either the buccal or lingual alveolar wall of a given tooth did not influence the load transfer and type of tooth displacement of its neighbouring teeth.

CONCLUSIONS: Following corticotomy the expected tooth movement changes were compared to the untreated situation and, in particular, not only the amount, but also the type of tooth movement changes. Therefore, the classical displacement of the centre of rotation described by Burstone and Pryputniewicz cannot be expected under circumstances where bone density is locally decreased, as after corticotomies. Clinicians applying corticotomies should thus be aware of these changes.