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The effects of a four-fold increased orthodontic force magnitude on tooth movement and root resorptions. An intra-individual study in adolescents

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ABSTRACT

This clinical and histological study was designed as an intra-individual study to investigate the effect on tooth movements and adverse tissue reactions (root resorption) when a fixed orthodontic appliance was activated with a controlled, continuous force of 50 cN ([approx]50 g) or with a four-fold larger force (200 cN[approx]200 g). The first premolar on both sides of the maxilla in eight individuals, six boys and two girls (mean age 13.0 years), was moved buccally during 7 weeks with 50 cN and 200 cN alternately on the right or left side. During the first week a force reduction of 18 and 28 per cent (on average) was registered in the 50 cN and 200 cN group respectively. Tooth movements were studied by means of dental casts using a coordinate measuring machine. The magnitude of the mean horizontal crown movement increased 50 per cent when a force of 200 cN was applied compared with a 50 cN force (3.4-5.1 mm on average) and the difference was significant. Root resorptions were registered in histological sections of the extracted test teeth with no significant difference in frequency or severity between the two forces used. Individual variations were large regarding both tooth movement and root resorption. Possible reasons to explain the results as well as the clinical implications of the findings are discussed.

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