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Effects of a doubled orthodontic force magnitude on tooth movement and root resorptions. An inter-individual study in adolescents

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ABSTRACT

The aim of this clinical and histological study was to compare the effects of two controlled, continuous forces of 50 cN (~50 g) and 100 cN (~100 g) on tooth movement and root resorptions. The patients, consisting of 32 individuals, 14 boys and 18 girls (mean age 13.1 years), were divided into four groups of eight individuals. The experimental periods were 4 and 7 weeks. In this investigation, designed as an inter-individual study, only the maxillary first premolar on the right side was utilized. The test tooth was buccally moved by means of a fixed orthodontic appliance. A continuous, weekly controlled force of 50 cN was applied to 16 premolars and a force of 100 cN to the remaining 16 test teeth. The force declined on average 22 per cent during the first week when 50 cN was applied and 27 per cent when 100 cN was applied. Tooth movements were studied on dental casts using a coordinate measuring machine. After 4 and 7 weeks, the tooth movements ranged between 0.5 and 3.4 mm (4 weeks) and 2.7 and 7.1 mm (7 weeks) for 50 cN and between 1.0 and 2.9 mm (4 weeeks) and 2.2 and 8.3 mm (7 weeks) for 100 cN, with no significant difference when the force magnitude was doubled. Root resorptions were registered in histological sections in all experimental teeth, more frequently after application of 50 cN compared with 100 cN after 7 weeks. However, the severity of root resorption (extension and depth of resorbed root contour and size of root area on histological sections) did not differ significantly when the applied force was doubled to 100 cN. Great individual variations were noted regarding both the magnitude of tooth movement and amount of root resorption.

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