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Tissue response to space closure in monkeys: a comparison of orthodontic magnets and superelastic coil springs

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ABSTRACT

Interest in using magnets for generating orthodontic forces started with the widespread availability of rate earth magnetic alloys. In vivo studies have indicated that a static magnetic field and/or corrosion products from the magnetic materials may induce biological effects when in close contact with cells or tissues. In the clinical situation, orthodontic magnets are often situated some distance away for the gingiva and bone. Consequently, the previously observed biological effects may not be found in an experimental situation mimicking the clinical setting. Thus, the present experimental study was undertaken to test this hypothesis using commercially available cobalt-samarium magnets for orthodontic treatment in comparison to treatment with Sentalloy closed coil springs with respect to possible side effects on alveolar bone growth, gingival epithelial thickness as well as rate of space closure. Corrosion of the uncovered areas of the magnets was already evident after 6 weeks. No statistical differences were found between the magnet and coil spring specimens with respect to rate of space closure, bone formation or epithelial thickness. The only two variables that differed significantly between magnet and coil spring specimens was that there were more resorption and more tetracycline labelled osteocyte lacunae under the magnets. In conclusion, although some marginal statistical differences were found between the magnet and coil spring specimens with respect to cell and tissue reactions, the near lack of cell and tissue effects of the magnets in the present clinical experimental situation compared to previous studies in which the magnets were positioned in close contact with the tissue under study, indicate limited adverse clinical effects.

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