

Editor's Summary and Q&A

Physical properties of root cementum: Part 13. Repair of root resorption 4 and 8 weeks after the application of continuous light and heavy forces for 4 weeks: A microcomputed-tomography study

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Abstract:

Introduction

The reparative process of root absorption begins in the periodontium when orthodontic force is discontinued or reduced below a certain level. Our aim was to evaluate cementum repair at 4 and 8 weeks of retention after 4 weeks of continuous light and heavy orthodontic forces. The effects of age, tooth movement, and fluoride exposure were also investigated.

Methods

Forty patients were recruited and divided into 4 groups of 10. The maxillary first premolars were loaded with either light (25 g) or heavy (225 g) orthodontic force. After 4 weeks of loading, the maxillary left first premolars were extracted as the positive control group, and the maxillary right first premolars were placed in retention for 4 or 8 more weeks before extraction; these were the experimental groups. The extracted teeth were studied with microcomputed tomography. To assess cementum repair, volumetric changes of the resorption craters were measured with specially designed computer software. Tooth movement was also measured on study casts taken before and after the extractions.

Results

Root resorption continued for 4 weeks after orthodontic force ceased. The resorptive activity was more pronounced from heavy forces. Passive retention after 4 weeks of light force had the least root resorption crater volume (cube root scale). The total amount of the cementum repaired did not depend on magnitude of orthodontic force or retention time within our parameters ($P > 0.05$). This might indicate concurrence of resorption and repair during passive retention. Most repair seemed to occur after 4 weeks of passive retention following the 4 weeks of heavy forces. The volume of root resorption craters positively depended on tooth movement ($P = 0.02$) and negatively correlated with chronologic age ($P < 0.01$).

Conclusions

Although there was no significant difference in the amounts of repair between groups, root resorption continued for 4 weeks after orthodontic force stopped. Resorptive activity was more pronounced after the heavy forces. The reparative processes were different between the light and heavy forces, with marked individual variations. Repair seemed to become steady after 4 weeks of passive retention following 4 weeks of light force application, whereas most repair occurred after 4 weeks of passive retention following 4 weeks of heavy force application. Root resorption crater volume positively depended on tooth movement and negatively correlated with chronologic age.

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