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The effects of electrical current from a micro-electrical device on tooth movement

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Abstract

Objective

The purpose of this study was to determine whether an exogenous electric current to the alveolar bone surrounding a tooth being orthodontically treated can enhance tooth movement in human and to verify the effect of electric currents on tooth movement in a clinical aspect.

Methods

This study was performed on 7 female orthodontic patients. The electric appliance was set in the maxilla to provide a direct electric current of 20 μA. The maxillary canine on one side was assigned as the experimental side, and the other as control. The experimental canine was provided with orthodontic force and electric current. The control side was given orthodontic force only. Electrical current was applied to experimental canines for 5 hours a day. The amount of canine movement was measured with an electronic caliper every week.

Results

The amount of orthodontic tooth movement in the experimental side during 4 weeks was greater by 30% compared to that of the control side. The amount of increase in tooth movement in the experimental side was statistically significant. The amount of tooth movement in the experimental side during the first two weeks was greater than that in the following two weeks. The amount of weekly tooth movement in the control side was decreased gradually.

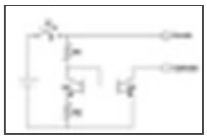
Conclusions

These results suggested that the exogenous electric current from the miniature electric device might accelerate orthodontic tooth movement by one third and have the potential to reduce orthodontic treatment duration.

Keywords: Electric appliance; Tooth movement; Canine retraction

Figures

Figure 1



Schematic diagram of the electric circuit. *S1*, switch; *Q1*, *Q2*, transistor; *R1*, *R2*, resistor.

Figure 2
Fixed type electric appliance was set up on the upper left canine.

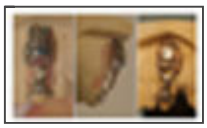


Figure 3
Assemblies, customized bracket and electric elements used in fixed electric devices.

Figure 4
Check the application of the fixed type electric appliance to the study model.

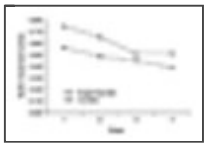


Figure 5
Weekly tooth movement.

Figure 6
Frontal and buccal view. **A,** Experimental side; **B,** frontal view; **C,** control side.

Figure 7
Occlusal view. **A,** Beginning stage at start of experiment; **B,** after 4 weeks.

Tables

Table 1
The mean value and statistical significance of tooth movement measured on a weekly basis (mm)

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