The effect of various ultrasonic and hand instruments on the root surfaces of human single rooted teeth: A Planimetric and Profilometric study

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Abstract

Background:

The purpose of this study was to compare the effectiveness of different ultrasonic scalers and a periodontal curette on the root surfaces for calculus removal and root surface roughness.

Materials and Methods:

40 single rooted teeth with subgingival calculus destined for extraction were assigned to one of three experimental groups (n = 10, in each group) and one control group (untreated, n = 10). Experimental groups were: Group 1: Piezoelectric ultrasonic group; Group 2: Magnetostrictive ultrasonic group; Group 3: Hand instrumentation group (Curette). After instrumentation, the teeth were extracted and the presence of residual deposits and root surface roughness were analyzed using Planimetric analyzing tool (Tool that measures the area of a plane figure as a mechanically coupled pointer traversing the perimeter of figure) and Surface Profilometer (Instrument used for profiling of an object). Root surface characteristics were evaluated qualitatively using SEM. Standardization of force, angulations and adaptation of instrument couldn’t be achieved in our study due to in vivo study design rather than in vitro design in previous studies where procedure was done on the extracted teeth samples.

Results:

The results of the study showed that residual deposits were similar in all experimental groups. With respect to roughness parameters, Rq (Root mean square roughness) and Rt (Total roughness) a significant difference was observed (P < 0.001) among hand instrumentation and ultrasonic devices. SEM analysis revealed a similar root surface pattern for the ultrasonic devices, but curette showed many instrument scratches, gouges, and removal of large amount of cementum.
Conclusions:

Curette produced the rougher root surfaces than two ultrasonic devices used in the study and caused more root surface removal. Piezoelectric devices produced minimum root surface roughness but caused more root substance removal and more cracks than Magnetostrictive ultrasonic devices.