

Aerosol and Splatter from Coronal Polishing with Four Different Handpieces

University of California Irvine, 2021

Study Description

Objective

Overall goal of this *in vitro* study was to map and quantify the aerosol and splatter generated by 4 different dental hygiene handpieces during coronal polishing. The distribution of aerosol and splatter was measured at determined time based intervals. Data was recorded of the effects of two variables, handpiece speed and use of high-volume evacuation, on the volume and distance of the aerosol distribution. This study was reviewed by the University of California, Irvine's Institutional Review Board and granted exempt status.

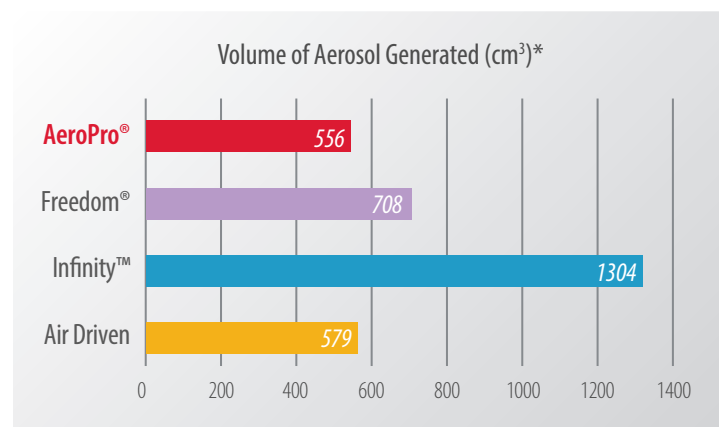
Study Design

Five licensed hygienists completed all 16 arms of the study using 4 handpieces at low and high speed, with and without high-volume evacuation (HVE). All the hygienists had >11 years of clinical experience, the age range was 38-54 years of age, the median age was 47 years. The study was performed on Kilgore typodonts with cheeks and lips. During each study arm, testers polished the upper and lower anterior teeth in the typodont for a total of 20s (10s upper teeth, 10s lower teeth), using a disposable prophylaxis angle and prophylaxis paste. A standard pressure of 150-200g was applied during polishing, as confirmed during the course of instrumentation using a tensional dynamometer. Amount of aerosol and splatter generated and distance traveled were recorded during and after polishing using high resolution photography and video. Data was quantified using digital analysis techniques (<https://imagej.nih.gov/ij/>). The air intake and output vents in the room were turned off 30 mins before study begin to prevent any interference from air traveling into or out of the vents. Room temperature and humidity were maintained constant and recorded throughout the study.

Results

Effect of Handpiece and HVE on Volume of Aerosol Generated by High Speed Polishing

A significantly greater volume of aerosol was produced from polishing with the Infinity handpiece at high speed than from the other handpieces ($p<0.05$) when no suction was used. Under HVE at high polishing speed, the AeroPro and the air-driven handpiece generated significantly less aerosol than the other handpieces ($p<0.05$). At high speed, without suction, the AeroPro, Freedom, and air-driven handpiece all generated significantly less volume of aerosol than the Young Infinity handpiece ($p<0.05$).



*Effect of Handpiece and Polishing Speed on Volume of Aerosol Generated and Distance of Aerosol Spread Using No Suction. Based on a University of California Irvine study, 2021. / Freedom and Infinity are not trademarks of Premier.

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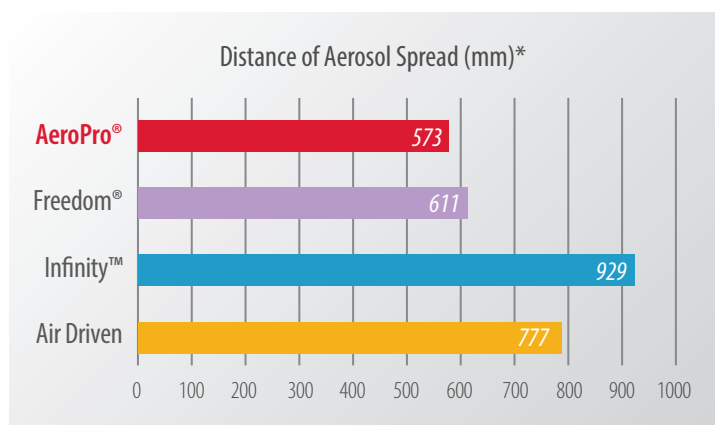
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Results (continued)

Effect of Handpiece and Polishing Speed on Distance of Aerosol Spread using No Suction and HVE

Without suction, the distance of aerosol spread at high speed was significantly less using the AeroPro and the Freedom than using the Young Infinity handpiece ($p < 0.05$). Using the HVE and at comparable handpiece speed settings (low vs high), while the AeroPro generated less aerosol spread than the other handpieces, there were no statistically significant differences in the distance of aerosol spread between handpieces. Aerosol spread from the AeroPro and the Freedom during high speed polishing without suction was significantly less than from the Infinity handpiece ($p < 0.05$).



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