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Concentrations of Scattered Dust During Tooth Grinding and the Effect of Extra-oral Vacuum Aspiration on Dust Reduction

—Comparison of Simultaneous Measurements at 4 Locations—

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Abstract: When teeth are ground using an air turbine handpiece, the dust generated may contain various bacteria and viruses. This can cause environmental pollution, and dental staff in dental clinics are exposed to the scattered dust. Therefore, it is important to remove the dust at its origin.

In this study, the concentrations of scattered dust due to tooth grinding were examined at the center of a clinic and at three “chairside” locations: the respiratory orifices of a patient (phantom head), an assistant, and a dentist. We also examined the effect of an extra-oral vacuum aspirator on dust reduction. We measured the scattered dust concentrations by dust particle size using a total of four laser particle counters operating simultaneously.

Our results suggested that the extra-oral vacuum aspirator was an effective method for removing approximately 76% or more of the dust that dentists and patients are exposed to. Sixty-five percent or more of the dust the assistant was exposed to was removed using the intra-oral vacuum aspirator (“vacuum” assistant). Thus, it was confirmed that the position of the extra-oral vacuum aspirator in this study was effective for reducing the dust exposure of patients, assistants, and dentists.

However, the concentration of smaller was higher than that of larger dust particles. The dust removal rate was especially low for dust particles of ϕ 0.3–0.5 μm . Dust of ϕ 5 μm or more was not detected at the assistant’s position.

In the center of the clinic, we did not observe a decrease in the dust concentration due to the use of the extra-oral vacuum aspirator. We found that the tendency of dust scattering was different at the center of the clinic compared to the 3 chairside positions.

The concentrations of the scattered dust and the dust removal rates at chairside positions were slightly different in our present study compared with those of our previous studies. In our previous study, measurements were not taken simultaneously, and we think this caused the differences in the results. In the present study, measurements were taken simultaneously at 4 locations. Thus, our present results more accurately reproduce the state of dust generated by tooth grinding in a clinical setting, and we believe they show high-level reliability.

Key words: Extra-oral vacuum aspirator, Tooth grinding, Scattered dust, Effect of dust reduction, Simultaneous measurements at 4 locations