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Scanning electron microscopy and rx fluorescence of class I cavity preparation with Er:YAG Laser

The erbium laser provides good interaction with hard tissues among the different types of lasers available. The aim of this study was to evaluate the micromorphological aspects of Class I cavities prepared with Er:YAG laser, as well as the alteration of dentin compositions analyzed using RX fluorescence. Forty recently extracted human sound molars were used and divided in four groups of 10 teeth, where three different energy densities of Er:YAG laser irradiation was used: 79.61 J/cm², 89.57 J/cm², 99.52 J/cm², and control group with high-speed drill. The laser beam (wavelength of 2.94 μm) was focused on the occlusal surface of the teeth for cavity preparation. The calcium, phosphorus, and oxygen content was analyzed before and after irradiation using RX fluorescence, in 3 teeth of each group, on the pulpal wall dentin. Scanning Electron Microscopic evaluation was also performed. The RX fluorescence showed that there were almost no changes in the composition of dentin after laser irradiation. Erbium laser irradiation showed to be efficient to ablate dental enamel and dentin that presented irregular cavity margins. The SEM observations showed that the dental enamel presented conditioning like aspect and the dentin had opened dentinal tubules. There was no melting and recrystallization and no micromorphological differences with the three energy densities used in the present study. Cavity preparation with Er:YAG laser provided another pattern of surface preparation for restorative materials, with almost no changes in the mineral content.