

Thermal Effects from Modified Endodontic Laser Tips Used in the Apical Third of Root Canals with Erbium-Doped Yttrium Aluminium Garnet and Erbium, Chromium–Doped Yttrium Scandium Gallium Garnet Lasers

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Abstract

Objective: To evaluate the temperature changes occurring on the apical third of root surfaces when erbium-doped yttrium aluminium garnet (Er:YAG) and erbium, chromium–doped yttrium scandium gallium garnet (Er,Cr:YSGG) laser energy was delivered with a tube etched, laterally emitting conical tip and a conventional bare design optical fiber tip. **Background Data:** Thermal effects of root canal laser treatments on periodontal ligament cells and alveolar bone are of concern in terms of safety. **Materials and Methods:** A total of 64 single-rooted extracted teeth were prepared 1 mm short of the working length using rotary nickel–titanium Pro-Taper files to an apical size corresponding to a F5 Pro-Taper instrument. A thermocouple located 2 mm from the apex was used to record temperature changes arising from delivery of laser energy through laterally emitting conical tips or plain tips, using an Er:YAG or Er,Cr:YSGG laser. **Results:** For the Er:YAG and Er,Cr:YSGG systems, conical fibers showed greater lateral emissions (452 μ 69% and 443 μ 64%) and corresponding lower forward emissions (48 μ 5% and 49 μ 5%) than conventional plain-fiber tips. All four combinations of laser system and fiber design elicited temperature increases less than 2.58C during lasing. The use of water irrigation attenuated completely the thermal effects of individual lasing cycles. **Conclusions:** Laterally emitting conical fiber tips can be used safely under defined conditions for intracanal irradiation without harmful thermal effects on the periodontal apparatus.