



Lasers in Conservative Dentistry

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Among many other indications for the use of lasers in dentistry, there is a field of application, where the laser has brought major proceedings and specific advantages: The cavity preparation with lasers.

Using the Er,Cr:YSGG laser, enamel and dentin can be ablated without thermal side effects due to the photo ablative impact of this wavelength: The laser light is absorbed by water within the hydroxyapatite; the water is heated and evaporates instantly. Thus, particles of the dental hard substance are thrown out and a cavity is created. The whole procedure is almost painless and therefore well accepted by the patients. Composite restorations can be placed without acid etching because of the retentive surface delivered by the laser. To find the right power settings and the optimal handling of the laser fiber, a comprehensive SEM study has been performed. In addition, the influence of different bonding systems with regards to an optimal quality of bonding have been evaluated. The investigations showed that through the optimisation of different influence factors results can be achieved which are far superior to those achieved by the use of traditional preparation techniques.

Another favourable indication for the use of lasers in dentistry is their application as a tool for endodontic treatment.

Different lasers (first of all the Nd:YAG and the diode lasers with wavelengths of 1064 and 810 respectively) are being used in root canal preparation, cleaning of the canal walls, disinfection of canals and surrounding dentinal tubules, removal of the smear layer and debris and sealing of tubules. Thus the lasers are effective in eliminating bacterial infection and preventing its recurrence, and when used in conjunction with traditional techniques, will significantly ensure the long term success of endodontic treatment.

Numerous studies demonstrated the disinfecting potential of those wavelengths on the root canal system from an overall quantitative and morphological viewpoint. It was shown that the laser irradiation still had a bactericidal effect, even after passing through a dentine layer of 1 mm.

One further advantage of the mentioned wavelengths is that bacteria within clinical, but radiologically not verified side canals, especially the area of apical delta can be reached by the penetration ability of the mentioned wavelengths.

Even at far distances (i.e. 1 mm) the Nd:YAG- and the diode lasers cause almost total bacterial eradication (3 log-steps) in two different types of bacteria (*E.coli* and *Enterococcus faecalis*) which were used as test germs *in vitro*.

Long-term results presented in cases and statistics should confirm and verify clinically the above mentioned bactericidal effect.

As a future perspective, results of different preliminary studies concerning the biostimulative potential of diode laser irradiation, will be discussed.

The CO₂ laser (10600 nm) is widely used in surgery producing very satisfying results. Another application for this wavelength in conservative dentistry is the treatment of hypersensitive dental necks. The laser is applied at rather low energy settings in conjunction with fluoride gel. In most cases one appointment is sufficient to achieve permanent freedom from pain even in patients who suffer from severe symptoms.



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