

Lasers in Periodontology and Implantology

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SUMMARY

While the treatment of periodontitis is frequently used to prolong the function, if not the aesthetics of teeth, when periodontal tissue loss is inevitable, implantology is one of the most innovative applications in dentistry that comes to the rescue. The possibilities to save healthy tooth structure without grinding away neighbouring teeth for prosthetic bridge treatments, or to restore the ability to chew to a patient who has missing or even no teeth is almost miraculous.

Using lasers for an even a more innovative approach improve results in both areas of application. It is possible to achieve better aesthetics with a non-surgical periodontal treatment, and less post-operative discomfort with a surgical approach, with extended lifespan of the teeth expected in both modalities. With implant interventions, the laser secures the disinfection of the site for immediate implantation after extraction of an infected tooth, as well as the implant surface itself if things go wrong in the long run and peri-implantitis occurs. There are more indications where lasers can be beneficial, which will also be discussed.

The main cause of periodontal disease is of course the microbial attack. When this is on a susceptible host, the immune response causes loss of soft and hard tissue. Lasers are best known for their antimicrobial effect, which is also locally applicable. The combination of two wavelengths (Er:YAG & Nd:YAG), both for a surgical and non-surgical approach, provides deeper disinfection and biomodulation (Nd:YAG) and superficial removal of calcified deposits, endotoxins and lipopolysaccharide from the hard tissue wall of a periodontal pocket, while both help with deepithelisation of the soft-tissue wall. The cleansing of the root surface by Er:YAG also offers better attachment for fibroblasts. Implants are placed surgically, which may have some drawbacks during the initial phase. Possible complications include pain, swelling and infection. There are many roles that dental lasers can play in helping to alleviate these issues. A combination of Er:YAG and Nd:YAG lasers is an excellent solution to increase the success rate and reduce post-operative complications.

Usually extraction is indicated because of a large infection either at the apical part (endodontic) or coronal (periodontal) part of the tooth. This involves

defects of bone and granulation tissue filling these defects. The Er:YAG laser is the perfect tool to remove the granulation tissue neighbouring the bone because it does not cause mechanical or thermal trauma to the bone while disinfecting the surface it is acting upon. Any present infection is a problem for osseointegration, and even more so if bone augmentation is planned. A Nd:YAG laser can be used for deep disinfection of the bone, also having a biomodulation effect on deeper layers.

The Er:YAG laser can also be used to level the bone around the implant bed, reshape the alveolar crest if sharp edges are present (which may cause problems for the overlying flap), cut the bone to gather bone block grafts, split the crest for expanding the volume, or even to open a bony window for sinus lift. Another use for the Er:YAG laser is for the uncovering of an implant in a two stage surgery. With the use of Er:YAG, no anaesthesia is needed for this procedure. The impression can be made during the same session, as the tissue is not heated and will not retract later. As the ablation is "cold for the tissue" there is no risk of damaging the bone surrounding the implant or the implant itself.

A very successful indication for the Er:YAG and Nd:YAG laser is the treatment of peri-implantitis. As microorganisms are present in the micro-porous surface of the implant in a case of peri-implant infection, the photons of a laser have a suitable antimicrobial effect. After removing the granulation tissue around the implant and disinfecting both the bone and implant surfaces with Er:YAG, bony walls are perforated to induce bleeding for better augmentation success without any negative side effects. The Nd:YAG laser is also used for deep disinfection and biomodulation.

In addition to these methods which take advantage of the beneficial effects of lasers, other revolutionary techniques such as the use of digitally controlled handpieces, which will be successfully used in the field of implantology, add to the growing excitement about the future of lasers in dentistry.

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