



Laser application in dental surgery: CO₂ laser for soft tissues

For some years now, laser devices have been facilitating dental treatment procedures—ensuring a quick, precise and almost bleeding-free intervention. Nevertheless, there are still some questions every practitioner is faced with. Which laser is suitable for which treatment? Is a laser a valuable investment in the dental practice? Where is a laser therapy superior to conventional treatment methods? In the present interview, laser addressed some questions to Prof. Dr Michael Bornstein from the University of Bern, who is working in the Department of Oral Surgery and Stomatology and thus is an expert in the field of laser surgery.



Prof. Dr Michael Bornstein

Prof. Dr Bornstein, which type of laser would you recommend for surgical treatment and for which reasons?

First, we need to define the type of surgery. Surgical interventions in hard tissues such as bone are quite different from procedures in the oral mucosa. In our oral medicine service, the CO₂ laser is the laser we use most often. Only rarely, we use diode or Er:YAG lasers, usually for research purposes. The CO₂ laser is ideal for incisional and excisional biopsies of the oral mucosa since it offers good hemostasis and thus an optimal visibility of the surgical field, which is critical for many interventions. Nevertheless, the thermal damage to the excised tissues is limited, and can even be reduced further by choosing the optimal mode of the laser. This is also a crucial issue, as the physical side effects should be kept to a minimum when excising suspicious or precancerous soft tissue lesions for optimal histopathological evaluation.

Where do you see the advantages of the CO₂ laser application?

In dental medicine, the CO₂ laser is by far the laser that has been tested and studied the most. By choosing this laser for soft tissue applications, it is certainly a safe choice and based on solid evidence. Nevertheless, when I am speaking about advantages over the scalpel, these have not been tested in randomised controlled trials (RCTs) to date. Therefore, advantages such as better wound healing properties, less pain during or after interventions and faster duration of surgical procedures remain hypothetical. This



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Why is the use of laser in the field of soft tissue treatment superior to conventional forms of therapy?

As I have already mentioned above, although the CO₂ laser is a very safe and well documented device, we still need further data for the direct comparison between conventional surgical techniques (e.g. scalpel) and the CO₂ laser. From RCTs only, we can learn about evidence-based advantages and clear benefits which arise from the use of laser in oral soft tissue applications. Until then, many reported advantages of the CO₂ laser still remain expert opinions or hypotheses.

Can you describe a recent case example of your practice in which the CO₂ laser has been used?

The CO₂ laser is used almost on a daily basis. The last two interventions were an excisional biopsy of a suspicious mass in the left buccal plane, which turned out to be a mucocele, and a vestibuloplasty with excision of various fibrous hyperplasias in an edentulous patient with an ill-fitting upper denture.

Why is the CO₂ laser not yet used more often in dental surgery?

Again, we are in urgent need for good clinical research that will convince dental practitioners to use the laser more often for evidence-based indications. It is time to move on from expert opinions about the potential benefits and applications to well-designed investigations that analyse the potentials and limitations of lasers in all aspects of dental medicine. In this regard, laser dentistry is still in the stages that oral implantology was about three decades ago. Only with the introduction of evidence-based concepts, oral implantology has become so successful, and is now an integral part of everyday dental care. We should make sure that oral laser dental medicine will also follow these pathways.

Thank you very much for the interview.

is exactly why we currently run a large clinical trial comparing different laser types, including the CO₂ laser, for excisional biopsies to the scalpel.

Where does the CO₂ laser reach its limits?

The CO₂ laser has limitations for lesions that are located in deeper areas of the tissues. There, we sometimes combine scalpel and laser use for an optimal surgical approach. Also, the hemostatic effect of the laser has its limits. Therefore, we often combine the laser with a bipolar for more extended interventions and in case of an arterial bleeding. Last but not least, also pain experience is very subjective. Some patients complain about substantial discomfort due to the extended wound surfaces after excisional biopsies of for example oral leukoplakia.

Fig. 1 Patient with suspected oral leukoplakia before excisional biopsies.

Fig. 2 Situation after excisional biopsies with CO₂ laser.



Fig. 1



Fig. 2