Laser application in dental surgery: CO_2 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 CO_2 laser is the laser we use most often. Only rarely, we use diode or Er:YAG lasers, usually for research purposes. The CO_2 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 CO_2 laser application?

In dental medicine, the CO_2 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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is exactly why we currently run a large clinical trial comparing different laser types, including the CO_2 laser, for excisional biopsies to the scalpel.

_Where does the CO_2 laser reach its limits?

The CO_2 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.

_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 CO_2 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 CO_2 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 CO_2 laser still remain expert opinions or hypotheses.

_Can you describe a recent case example of your practice in which the CO_2 laser has been used?

The CO_2 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 CO_2 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.

Fig. 1_Patient with suspected oral leukoplakia before excisional biopsies.
Fig. 2_Situation after excisional biopsies with CO_2 laser.

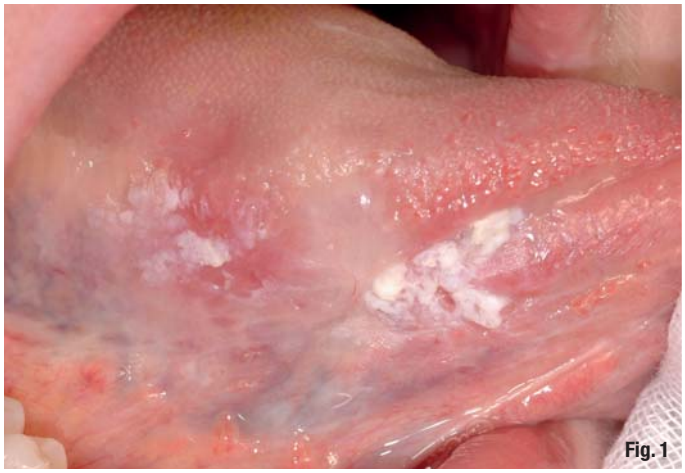
Fig. 1

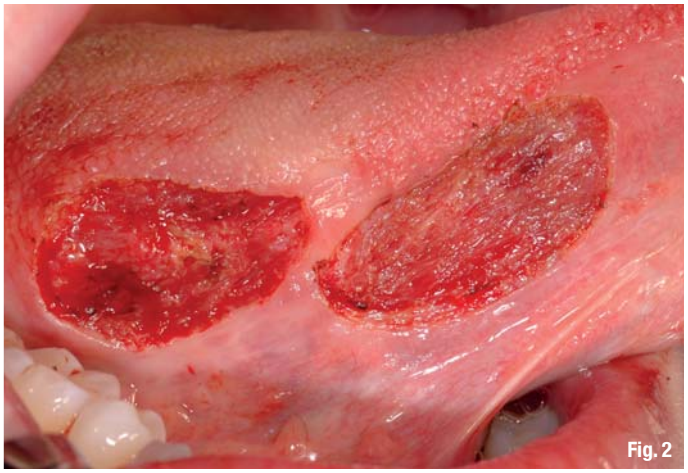
Fig. 2