Treatment of a patient with multiple myeloma

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Introduction

Patients with cancer are generally considered high-risk patients. When treating these patients, dentists should always be aware of a variety of factors that might pose the risk of adverse health effects. For one thing, they should be aware of possible neutropenic sepsis in patients with dental infections who are currently undergoing chemotherapy or who have received chemotherapy in the recent past. Dentists should never provide emergency dental treatment or elective invasive dental treatment to patients currently undergoing cancer treatment in the form of radiotherapy or chemotherapy to the area of the head or neck, or who received these kinds of treatment in the recent past, without contacting the patient's oncology team first to assess whether the intended dental procedures can be carried out in a safe manner. Primary care should also only be carried out after obtaining advice from the patient's oncology team and only if it is considered as minimally invasive as possible for the patient. In this regard, laser-assisted treatment can be an effective alternative to the more conservative and invasive treatment modalities. In the following, a case will be described in which a cancer patient was treated by means of a laser over the course of one year.

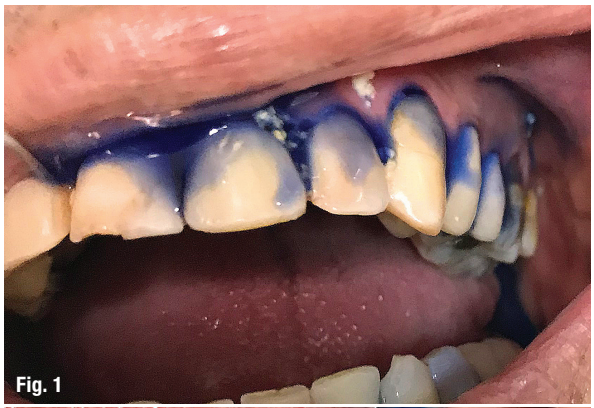

Fig. 1


Fig. 2

Figs. 1 & 2: A photosensitiser solution was injected into all the periodontal pockets of the teeth.

Initial clinical situation

A 56-year-old patient was referred to our dental clinic for laser-assisted photodynamic therapy. He complained about severe gingival bleeding when brushing his teeth. The patient, who was a practising physician, had a medical history of blood cancer. He suffered from multiple myeloma and, at the time of the appointment, was regularly receiving cancer treatment in the form of chemotherapy. Owing to this medical history, his periodontist refused to carry out any intervention and immediately referred him to our dental clinic. Furthermore, the patient, being a medical expert himself, knew about the benefits of laser-assisted dental treatment, which is why he specifically asked for such a treatment.

During and after treatment

As a first step of the treatment, thorough scaling and root planing were carried out. Thereafter, a photosensitiser solution (Hager & Werken) was injected into the gingival pockets and rinsed out after a duration of 2 minutes (Figs. 1 & 2). A dental laser (PDT Laser, Hager & Werken) designed for photodynamic therapy was then used to treat the periodontal areas that had shown bleeding (Figs. 3 & 4). The red laser operated at a wavelength of 660 nm, which is the wavelength that is most commonly used for photodynamic therapy. Moreover, the laser was set to an energy/power of 100 mW. Each periodontal pocket was irradiated for a duration of 30 seconds with a 400 µm fibre and an energy density of 3 J/cm^2. This treatment was repeated twice a week over three weeks in order to reduce the amount of harmful bacteria in the periodontal pockets (Fig. 5). In a subsequent step,

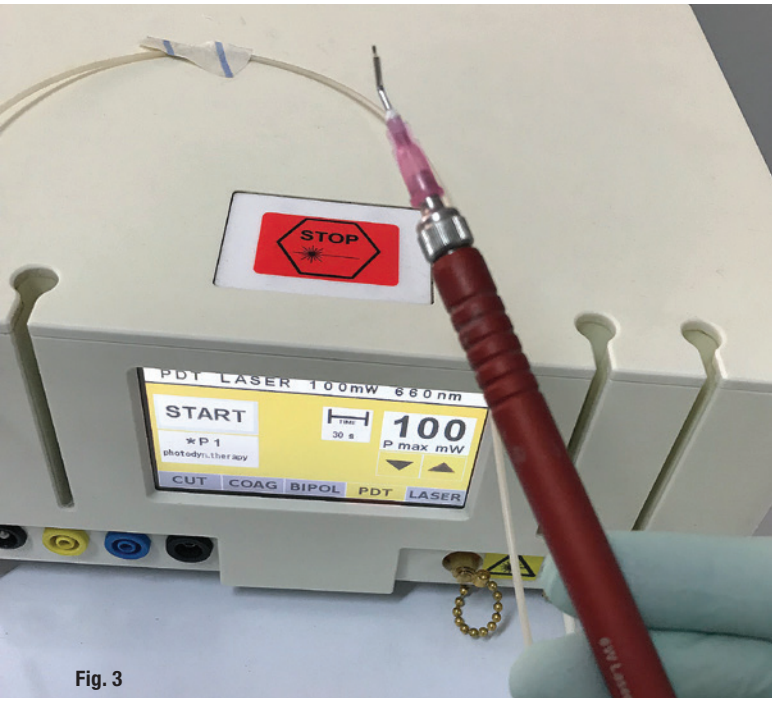


Fig. 3



Fig. 4

Figs. 3 & 4: A dental laser at a wavelength of 660 nm was used to treat all the periodontal pockets.

pocket debridement was carried out regularly over the course of one year. During this time, the patient was very cooperative and comfortable. He did not voice any concerns about physical discomfort, owing to the pain-relieving and biostimulating effects of the laser that was being used.

After one year, the patient had successfully completed chemotherapy and was then selected for subsequent bone marrow transplant therapy. As part of this new treatment protocol, his own blood was to be drawn, and the helper T cells therein were to be multiplied and subsequently injected back into his body. However, in the context of planning this medical treatment and assessing its long-term success, the roots of two broken molars that were still present in the mouth of the patient at that time were considered a risk that could potentially jeopardise the new cancer treatment protocol. As a result, the two remaining roots were extracted by means of a laser-assisted tooth extraction protocol. The roots were very infected however, for which reason laser-assisted photodynamic therapy was performed again before and after extraction around the surgical site (Fig. 6). After the surgery, the patient said that he had had maximum physical comfort throughout the extraction procedure (Fig. 7).

Discussion

In case of doubt, or if dental infections do not respond to initial treatment, cancer patients should always be


Fig. 5


Fig. 6

Fig. 5: Photodynamic therapy was carried out to reduce the amount of harmful periodontal bacteria. **Fig. 6:** The roots that were about to be extracted were infected, and thus the surgical site needed to be treated with laser-assisted photodynamic therapy before and after extraction.



Fig. 7: The patient was very happy and satisfied after the treatment.

referred to a specialist clinic for further treatment, as was done in this case. Laser-assisted photodynamic therapy is a highly useful and effective approach to treating high-risk patients such as cancer patients who are undergoing radiotherapy or chemotherapy. Laser-assisted treatment can often be safely used for treating cancer patients owing to the minimal invasiveness of the treatment. Apart from that, dental lasers have further clinical benefits in that they have biostimulating and pain-relieving effects. Psychological benefits for the patient are among the advantages of laser-assisted photodynamic therapy. These were reflected in the positive feedback from the patient, who was very comfortable throughout the treatment and did not express any discomfort at any time. Today, we are even adding adjuncts such as chitosan to photosensitisers in order to reduce the number of *Streptococcus mutans* bacteria found in the oral cavity. This bacterium is considered to be the chief contributor to the development of dental caries.

When treating cancer patients, the dentist should always be very insistent with regard to follow-up appointments and should carefully monitor patients for possible adverse health reactions and deterioration. After the treatment, medicine should only be prescribed after having thoroughly discussed it with the patient's oncology team. The possibility that the medicine will have adverse interactions with the patient's cancer treatment must be ruled out. Apart from that, patients suffering from blood cancer, as in the described case, should ideally be in remission before undergoing dental treatment. Lastly, dentists should be aware of the possible risk of osteonecrosis of the jaw, which is an increasing problem caused by bisphosphonates, which are often administered intravenously to cancer patients.

Conclusion

As shown in this case, laser-assisted treatment can be considered an effective modality for treating cancer patients who are receiving chemotherapy or have received chemotherapy in the recent past. However, further and more extensive research in this regard needs to be conducted and the findings need to be made widely available. Case studies such as the one reported here are still quite rare, and it is therefore suggested that multicentre studies are conducted. Scientists and clinicians from all over the world are hereby encouraged to engage in this area of research and contact us for possible scientific collaboration.

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about the author



Dr Maziar Mir (DDS, M.Sc.) is a dentist from Iran. He obtained his DDS in Iran in 2000 and his M.Sc. at RWTH Aachen University in 2006. He completed his postdoctoral fellowship at the University of California, Irvine, in the USA in 2009. In addition, he obtained his PhD from RWTH University in 2012, qualifying for habilitation. He won two prizes for his works on SWEEPS and PIPS. He currently runs a private clinic in Tehran in Iran.

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