Laser-assisted gingival modification of an edentulous site

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Introduction

Despite the increasing availability of dental implants, many patients still choose to replace their missing teeth with fixed partial prostheses. In order to have a positive outcome and prolong the lifespan of the fixed prosthesis, the treatment plan must be designed carefully. The edentulous site and the pontic's shape can be decisive factors for the treatment success. There are several pontic designs, including saddle, modified ridge lap, hygienic, conical and ovate. The type of pontic selected depends on the case and should meet some basic requirements. The pontic should restore function, prevent food impaction, have a cleanable shape, maintain the healthy tissue of the edentulous ridge and have good aesthetics, especially if used in the aesthetic zone.


Fig. 1


Fig. 2

Fig. 1: The edentulous ridge at the area of the maxillary right canine. The gingival tissue was excessive and movable. **Fig. 2:** The edentulous ridge immediately after the laser recontouring.

The dentist should examine the edentulous ridge carefully before the final dental impressions are taken. If the edentulous ridge has irregularities, then the soft tissue and sometimes even the hard tissue may be modified surgically to facilitate the pontic design and achieve better aesthetics. Nowadays, with the help of laser technology, modern dentistry can be less invasive and more patient-friendly. The Er:YAG laser with a wavelength of 2,940 nm can perform a wide range of hard- and soft-tissue procedures with high therapeutic effectiveness and accuracy.

Case presentation

A 57-year-old male patient was referred by his general dentist and presented with excessive, movable gingival tissue in the edentulous ridge in the area of the maxillary right canine (Fig. 1). The patient had started dental treatment, in which his 15-year-old three-unit fixed partial prosthesis with abutments on the maxillary right lateral incisor and the first premolar and with a pontic in the position of the maxillary right canine would be replaced. He had opted for a new fixed partial prosthesis instead of implant placement. After removal of the old prosthesis, the edentulous site appeared to be swollen and irregular. This gingival enlargement was induced by inflammation due to chronic plaque accumulation. When asked whether discomfort was experienced in the edentulous area, the response was negative but occasional odour exuded from the prosthesis.

The dental and medical history revealed that the patient was healthy and had no systemic diseases, did not take any regular medication and had numerous old dental restorations that needed to be replaced. His oral hygiene was average. After the clinical examination, it was concluded that the edentulous ridge did not have a good contour and regardless of the pontic design, the enlarged gingiva would entrap food and it would be challenging for the patient to keep it clean. Also, the excessive gingival tissue would cause an aesthetic issue, since it would be difficult for the technician to fabricate a suitable pontic that would be both functional and appear natural. Therefore, it was decided that the edentulous ridge needed to be recontoured. The new prosthesis was considered to be in the aesthetic zone; thus, the pontic design could


Fig. 3


Fig. 4

Fig. 3: Two days after laser treatment. **Fig. 4:** One week after laser treatment.

be either modified ridge lap or ovate. The technician requested a modified ridge lap, since it was the design that he most often used.

The edentulous site could be modified conventionally, such as surgical removal using a scalpel, or using a dental laser. In this case, the gingival recontouring was performed with a 2,940 nm Er:YAG laser (LightWalker, Fotona) with the following settings: energy of 120 mJ, frequency of 10 Hz, pulse duration of 1,000 µs (VLP), and power of 1.2 W, with water and air spray. A R14 handpiece and a cylindrical sapphire tip (1.3 mm in diameter and 8.0 mm in length) were used. The procedure was completed without the use of local infiltration anaesthesia; only a topical anaesthetic gel (20 % benzocaine; HurriCaine, Beutlich Pharmaceuticals) was applied to the area. The tip was placed 1–2 mm from the tissue surface at an angle of 30°. During the laser irradiation, the tip was kept in continuous slow motion. The excess tissue was ablated with precision, layer by layer (Fig. 2). Minimal bleeding was observed, as was expected owing to highly inflamed tissue and the use of water spray. Haemostasis with the Er:YAG laser was adequate, so there was no need to achieve complete coagulation. The treatment lasted only a few minutes, and during the procedure, the patient did not feel any pain or discomfort. He was released and was redirected to his general dentist to resume dental treatment.

The patient returned for a follow-up after two days (Fig. 3) and one week (Fig. 4). After two days, excellent tissue healing was observed. The tissue appeared healthy and had a pale pink colour and a firm texture. The surface of the attached gingiva was smooth and regular. No signs of swelling or other postoperative complications could be seen. The patient reported that he did not have any discomfort after the procedure; painkillers were thus not a necessity. After one week, it was observed that the edentulous ridge was ideally shaped. Before releasing the patient, he was instructed on how to properly clean a fixed partial dental prosthesis in order to maintain a healthy, plaque-free edentulous ridge. The general dentist was informed that he could start the procedures for the definitive fixed partial prosthesis.

Conclusion

Sculpting of the gingival edentulous site with the Er:YAG laser is highly advantageous. It is a simple and fast procedure for the clinician. The alteration of the tissue can be done with a predictable outcome, which is especially crucial if the aesthetic zone is being treated. The duration of the procedure was shortened, as the step of local infiltration anaesthesia was excluded in this case. Owing to the antibacterial activity of dental lasers, less postoperative swelling and minimal healing time can be observed; hence, other dental procedures, such as placement of a fixed or removable dental prosthesis, can start earlier. Lastly, the patient benefits from the laser treatment. Dental lasers are well accepted by patients, since little to no anaesthesia is needed compared with conventional surgery and there is minimal discomfort to them during or after the therapy.

about the author



Dr Foteini Papanastasopoulou DMD, M.Sc. obtained her dental degree from the Semmelweis University, Budapest in 2009. In 2010 she was certified as a Laser Safety Officer (LSO) and in 2011 she completed the “Laser therapy in Dentistry” course at the RWTH Aachen University, Germany. In 2013 she obtained her Master of Science degree in “Master of Oral Laser Applications” from the same University. Since 2009, she practices laser therapies at her private office “Alimos Laser Dental Clinic” in Alimos, Greece.

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