Implant uncovering using the Er:YAG laser

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Implantology, both in Poland and worldwide, is currently a strongly growing field of dentistry. In order to obtain long-term outcomes with the highest possible aesthetics, an implant must be placed as least invasively as possible. Another important factor is the implantation technique and the management of the surrounding soft tissue, both during the implantation procedure and in the prosthetic stage.

Literature

The technique used for flap incision and suturing the mucosa over the implant affects the wound healing time. The next important stage in the two-stage technique is implant uncovering. There are various ways to perform this procedure, for example by an incision according to the conventional technique, then uncovering the implant and attaching the healing cap. This, however, is often associated with suturing, which prolongs the time before impressions can be taken.

If bone grows on to the cover screw, its unscrewing is more difficult. Then, in order to place the healing cap, bone removal or scraping, as well as alveoloplasty, needs to be performed. Many implant companies offer special sets called bone profilers that facilitate the work, but the procedure time and the duration of the prosthetic stage are nonetheless prolonged.

An alternative method of uncovering an implant is with the use of laser. Diode, carbon dioxide, Nd:YAG or Er:YAG lasers can be applied for this purpose. Diode and Nd:YAG lasers can only be used if the bone has not grown on to the cover screw. The advantage of the Nd:YAG laser application is no bleeding during the preparation of the mucosa and after the procedure; however, there is the drawback of thermal effects on the bone surrounding the implant and on the implant itself. The optimal solution is the application of the Er:YAG laser, which works perfectly on the mucosa and bone without negative effects.

Both the first and second stages of implant treatment are associated with discomfort and temporary pain for the patient. In their pilot study, Arnabat-Domínguez et al. proved that the application of Er:YAG lasers in implant uncovering eliminated the necessity for local anaesthesia and minimised postoperative pain, as well as the healing time before the prosthetic stage.[1] In the study, no differences were observed regarding the success of implant treatment. Further advantages of laser application are the antimicrobial effect and the ease of the procedure.

The incision or removal of a mucosal fragment covering the cover screw leads to disruption of the microcirculation in the operation area. Kulakov et al. showed significant

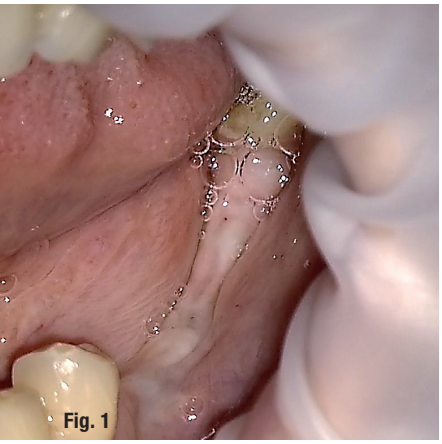






Fig. 1: Determining the location of the implants. **Fig. 2:** Uncovering of the cover screw with Er:YAG laser contra-angle handpiece H14 and a cylindrical tip of 1.3 mm in diameter. **Fig. 3:** Laser parameters used during the procedure.

differences in the critical time for restoring the microcirculation in the operation area.[2] After conventional implant uncovering—by the use of a scalpel—the time needed is 14 days, while with the use of an Er:YAG laser, it is only three days.

Esposito et al. showed that implant uncovering with the use of an Er:YAG laser compared with the classic flap technique led to smaller postoperative side effects.[3] This difference was statistically significant.

Fornaini et al. compared four wavelengths (532; 810; 1,064 and 2,940 nm) for implant uncovering in their study and registered thermal changes with the use of thermal cameras.[4] They concluded that the Er:YAG (2,064 nm) causes the smallest temperature increase in the implant and the surrounding tissue. The *ex vivo* study also showed that, during laser application with the recommended parameters, there is no risk of a dangerous temperature increase in the implant and tissue.

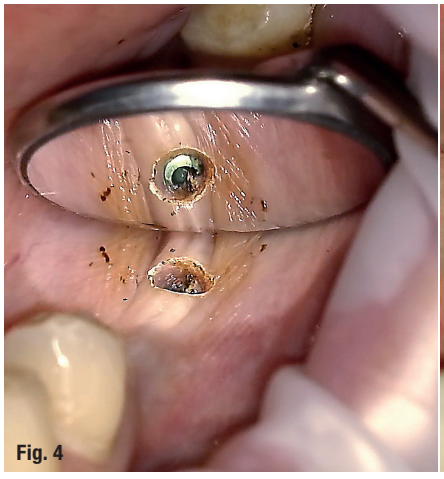
As observed by Maden, the Er:YAG laser works perfectly for contouring the bone surrounding the implant, gingival correction or implant uncovering in a two-stage technique, not causing thermal damage in soft and hard tissue, or in the implant itself.[5–7] Such damage occurs while using standard rotary tools. In accordance with the procedure, during implant uncovering with the use of the Er:YAG laser, there is no need to administer local anaesthesia. Another advantage is the possibility of taking impressions of the implant area in the same visit because the gingiva is not overheated and it will retain its shape and position later on. Owing to the application of the Er:YAG laser and cold ablation, there is no risk of damaging the bone surrounding the implant or the implant itself.

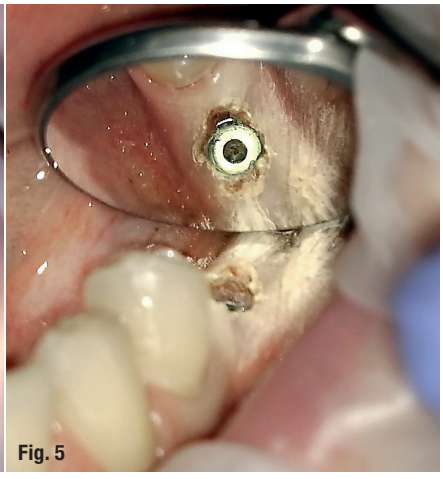
Case presentation

A 37-year-old female patient appeared for the planned procedure of implant uncovering in regions #35–37. TSIII implants (Osstem Implant) had been placed four months earlier by applying the classic flap technique.

In order to minimise the postoperative effects and to shorten the healing time, it was decided to apply an Er:YAG laser (LightWalker, Fotona) in this procedure. By means of a positioner used in the first part of implantation, the approximate location of the implants was established. Under local anaesthesia with articaine, the cover screws were located and their locations marked (Fig. 1).

In the procedure, the H14 contact contra-angle handpiece and a cylindrical tip with a 1.3 mm diameter were used. The tip, despite its name, was kept at 1 mm from the tissue (Fig. 2). The laser parameters used during the procedure are shown in Figure 3. In the final stage of implant uncovering, when the operation area was in the


Fig. 4


Fig. 5

Figs. 4 & 5: Final stage of implant uncovering with adjusted laser parameters to avoid thermal damage.

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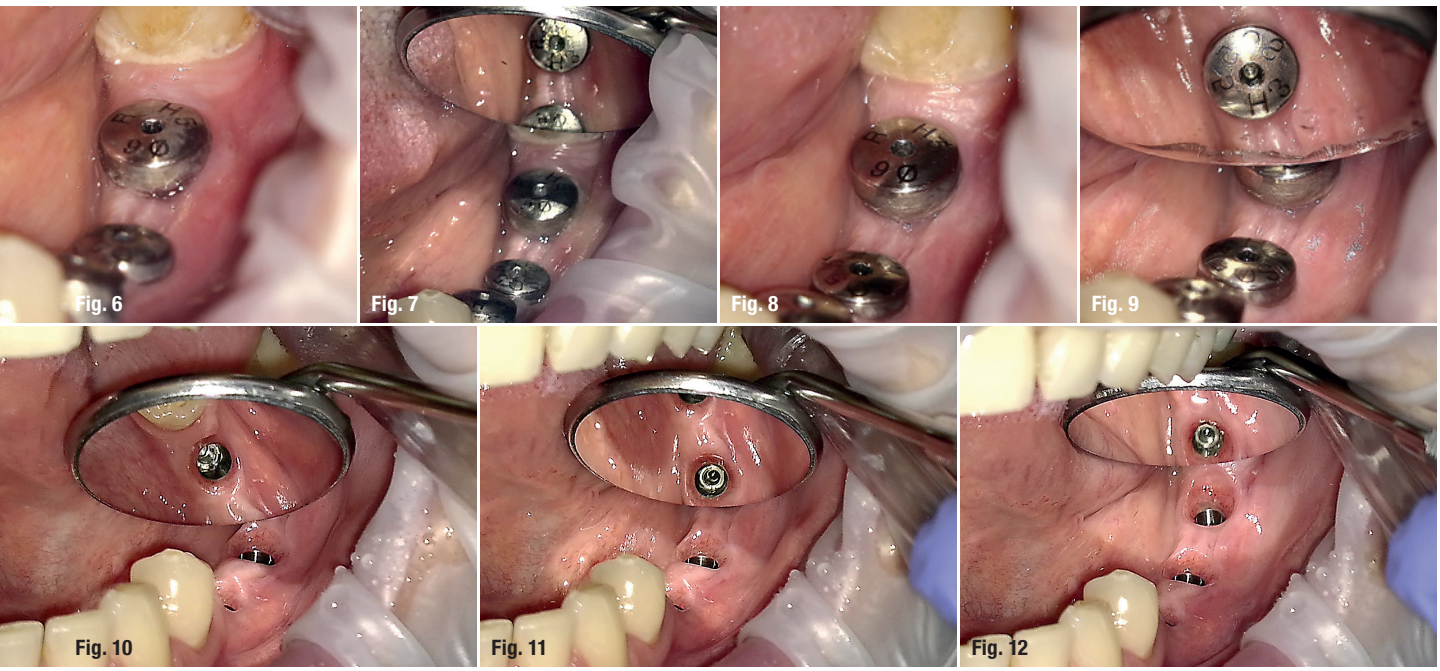
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Figs. 6–9: Healing caps screwed on to the implants. Uneventful healing. **Figs. 10–12:** Properly healing tissue at the time of impression taking.

immediate vicinity of the implant-to-bone border, in order to avoid thermal effects, parameters were modified as follows: water to 2 and air to 4 (Figs. 4 & 5). Other parameters remained unchanged.

The healing caps were then screwed on to the implants. The patient did not complain of any discomfort. No inflammation or any abnormalities were reported during the healing time (Figs. 6–9). At the time of impression taking, properly healing tissue was observed (Figs. 10–12).

Conclusion

Implant uncovering in a two-stage technique using an Er:YAG laser is a faster method and better tolerated by patients than the classical flap technique. Through cold ablation, the Er:YAG laser allows the operator to significantly shorten the treatment time without causing thermal damage to the implant or the tissue surrounding it. It further considerably reduces wound healing time, as well as the risk of infection. Problems experienced by patients are also less significant.

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Kurz & bündig

Das Freilegen von Implantaten mithilfe des Er:YAG-Lasers stellt eine schnellere und besser verträgliche Alternative zur klassischen Zahnfleischöffnung mittels Inzision dar. Hat sich über dem Implantat bereits Knochen gebildet, wird diese konventionelle Behandlung weiter erschwert und die prothetische Phase verlängert. Durch Kaltablation ermöglicht der Er:YAG-Laser es dem Behandler, die Behandlungszeit deutlich zu verringern ohne Hitzeschäden am Implantat oder dem umliegenden Gewebe zu verursachen. Des Weiteren wird die Heilungsdauer beachtlich verkürzt und das Infektionsrisiko reduziert. Der Autor beschreibt dieses Vorgehen am Fallbeispiel einer 37-jährigen Patientin. Die Freilegung der Implantate erfolgte im Anschluss an eine viermonatige Einheilphase in einem zweiphasigen Verfahren. Die je Phase angewendeten Laserparameter zur Implantatfreilegung mithilfe des LightWalker Er:YAG-Lasers von Fotona werden detailliert wiedergegeben. Die Einheilkäppchen konnten im Anschluss problemlos aufgesetzt werden. Die Patientin klagte über keinerlei Beschwerden und die folgende Einheilzeit verlief unauffällig ohne Entzündungen. Nach Verwendung des Lasers zur Freilegung der Implantate ist keinerlei Wundnaht notwendig womit die notwendige Einheildauer vor Abdrucknahme weiter verkürzt werden kann.

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