Laser restoration of maxillary incisors

Author: Dr Marta Roszkiewicz, Poland

In the conservative treatment of teeth in the anterior segment, especially in the case of Class IV cavities, we constantly run into the dilemma of how to combine the mechanical requirements for restoration with the aesthetics of the work, while minimising the reduction of the tooth's healthy tissue. We are often forced to reduce healthy tissue in order to increase retention. This retention depends not only on the size, but also on the surface quality. Preparation of the surface by means of an Er:YAG laser avoids the production of a smear layer, keeping the dentinal tubules open. The prepared tissue surface also allows for greater retention and marginal seal without macroscopic reduction of healthy tissue. Similar preparation of the enamel surface outside the cavity margins makes it easy to mask the preparation margin, significantly facilitating achievement of an aesthetic restoration.

Another benefit resulting from the replacement of rotary tools with the Er:YAG laser is the elimination of vibrations accompanying the preparation.

Fig. 1

Fig. 1: The cavity before the first visit. Delicate translucency of the pulp through the thin layer of dentine in the projection of the pulp horn.

Case study

A 15-year-old patient presented to our clinic because he had damaged his mandibular incisors while playing football. Despite greater sensitivity of the teeth when consuming cold beverages, the patient did not report alignments. In the clinical examination, a partial loss of crown #21 was found, covering the distal wall, distal incisal angle and two-thirds of the incisal edge, as well as a part of crown #22, covering the medial wall towards the gingival level and the incisal angle, and two-thirds of the incisal edge (Figs. 1).

There was a delicate pulp translucency visible in the pulp horns on the surface of the exposed dentine; however, there was no pulp exposure. The damage corresponded to an Ellis Class II fracture. No excessive palpation sensitivity was found with teeth #21 and 22; therefore, they were suited for conservative composite restoration. In order to minimise the scope of the necessary intervention and improve the marginal seal and integrity of the restoration, it was decided that, instead of rotary tools, the Er:YAG laser should be applied for preparation of the cavity (LightWalker, Fotona, 2,940 nm).

In order to carry out the treatment, the H14 contact contra-angle with a cylindrical tip (Ø 1.3 mm) was used. The laser parameters used are shown in Figure 2. There was no need to anaesthetise the patient for the surgery, since the patient had not reported any pain accompanying the preparation of the tissue, even in the pulp horn of tooth #22. The treatment consisted of cleaning and laser preparation of the enamel and dentine surfaces (Fig. 3). The tip end was guided at some distance from it (about 1 mm from the tissue surface).

The prepared surface was matt white, appearing almost frozen—which is not a sign of chemical etching, but the reflection of light on the prepared surface of the tissue (Fig. 4). The projection of a pulp horn in

Fig. 2

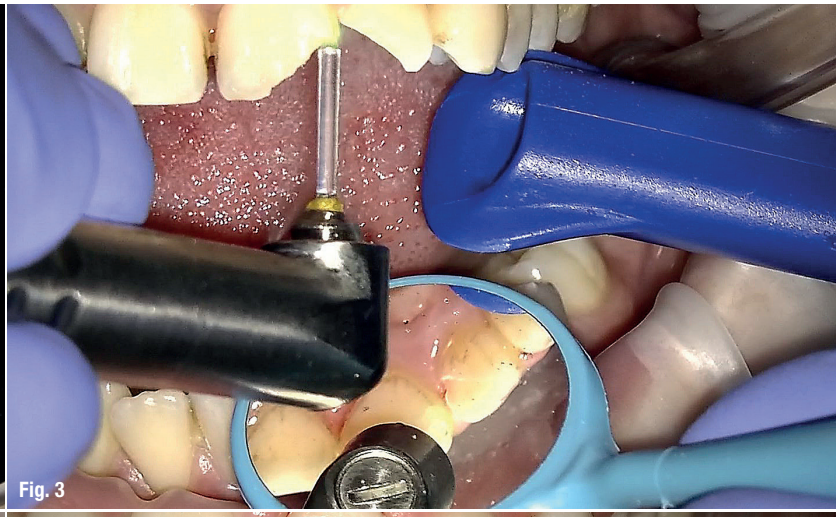
Fig. 3


Fig. 4


Fig. 5

tooth #22 was secured with a liner (Ultra-Blend, Ultradent). Then, using Adhese Universal adhesive and IPS Empress Direct composite (Ivoclar Vivadent), the restoration was performed (Fig. 5).

Conclusion

The Er:YAG laser allows for effective and safe preparation of cavities. Minimally invasive tissue preparation goes hand in hand with a very good retentive structure of the surface and the resulting high-quality bonding. Reduced vibrations and pain, which normally accompany the preparation of the tissue, are further benefits that improve the patient's comfort._

contact

Dr Marta Roszkiewicz
Brzozowa 41
05-080 Laski
Poland
Tel.: +48 609 416012
marta.roszkiewicz.plus@gmail.com

Fig. 2: Laser parameters used during the procedure.
Fig. 3: Guiding the contact contra-angle during the procedure; a small space between the laser tip and prepared surface is visible.
Fig. 4: The matt white surface of the tissue after laser preparation.
Fig. 5: After the final restoration.

Kurz & bündig

Bei der Restauration von Schneidezähnen müssen die mechanischen Anforderungen mit einem ästhetischen Ergebnis verbunden werden bei gleichzeitig weitgehender Erhaltung von gesundem Gewebe. Zur Erhöhung der Retention muss der Behandler jedoch oftmals gesundes Gewebe abnehmen. Hier bietet sich der Laser als eine minimalinvasive Lösung an. Die Autorin beschreibt den Fall eines 15 Jahre alten Patienten, dem beim Sport ein Teil der Krone an Zahn 21 und 22 abgebrochen war. Der Schaden entsprach einer Ellis Klasse II-Fraktur, d. h. Zahnschmelz- und Dentinfraktur ohne freigelegte Pulpa. Da keine übermäßige Pulpasensitivität festgestellt werden konnte, wurde eine konservative Kompositrestauration durchgeführt. Statt rotierender Instrumente wurde der Er:YAG-Laser für die Präparation der Kavität verwendet. Hierdurch konnte der Umfang der nötigen Interventionen minimiert und Randdichte sowie Integrität der Restauration verbessert werden. Die Therapie beinhaltete die Reinigung und Behandlung von Zahnschmelz und Dentinoberfläche mittels Er:YAG-Laser. Bei der Behandlung war keine Narkose notwendig.