Ultra-thin veneers in clinical practice

Aesthetic dental restorations with lithium disilicate materials

With the advent of new materials such as lithium disilicate, the fabrication of very thin veneers that require only minimal removal of natural tooth structure has become a clinically realistic possibility. The IPS e.max all-ceramic system from Ivoclar Vivadent, for example, covers all current all-ceramic indications and is suitable for use with the CAD/CAM and press techniques.

The IPS e.max Press product range comprises ingots in four levels of translucency (HT, LT, MO and HO) and Impulse ingots in three different values (Value 1, 2 and 3) and two opal shades (Opal 1 and 2). These materials are particularly useful for fabricating single-tooth restorations in cases of damaged or stained dental enamel, as described in detail in the following case report.

A 59-year-old female patient consulted our clinic to improve the appearance of her anterior teeth (Figs. 1 & 2). Apart from slight periodontal problems, which were confirmed by a radiographic examination, we diagnosed proximal caries in the first incisors, as well as Class III dental and skeletal malocclusion with an open bite (Fig. 2). Moreover, we found peri-apical infections around teeth 31 and 32.

Based on these findings, a two-stage treatment plan was developed to eliminate caries and the infection by periodontal curtailage and planning of root surfaces to control the underlying disease. The malocclusion was corrected with orthodontic treatment. The second stage of the plan focused on aesthetic dental treatment. The light-body impression material was subsequently cured from the die and then invested. The models had hardened. IPS e.max Press Impulse Opal 2 were placed along the gingival margin to protect the gingiva during the preparation procedure.

After the teeth had been thoroughly analysed, a wax-up was fabricated, which was subsequently used in creating a mock-up. A 2 mm-thick perforated tray (Fig. 3) and two silicone matrices were produced to check the vertical dimension of occlusion during preparation (Fig. 4) and to fabricate the chairside temporary. A retraction cord was placed along the gingival margin to ensure proper reduction of the proximal fit was checked by the gingiva during the preparation procedure.

A depth marker was used to ensure proper reduction of the vestibular tooth surface. This bur cut orientation grooves with a depth of 0.5 mm. The incisal edge was reduced with a diamond bur (0.6 mm), which was also used to remove the ridges between the grooves and completely level out the surface. The proximal and gingival areas were prepared with the same bur. The marginal and proximal areas were prepared and then polished. The entire preparation surface was completely smoothed with a polishing disc and a medium-grit polishing paste to eliminate all grooves and edges. The silicone matrix was then inserted to check the correct dimensions of the prepared teeth (Fig. 7). In a final step, the retraction cord was removed.

Using the double-cord retraction technique, the first retraction cord (size 000) was placed along the sulcus of each prepared tooth and a second continuous retraction cord (size 00) was placed on top. With this method, the gingiva is completely displaced from the prepared dental hard tissue or any blood and saliva, which could adversely affect the precision of the impression. The heavy/light dual-phase impression was taken with a customised tray coated with an adhesive to increase the adhesion of the impression material to the tray. The heavy/light dual-phase impression technique makes use of impression materials with different viscosities. Accordingly, a heavy-body material was loaded into the tray, while a light-body material was syringed around the prepared teeth (Fig. 8).

The precision of the impression was checked and temporary restorations were produced chairside by mixing and syringing two-component composite resin into the previously fabricated silicone matrix. Once the composite resin was of the ideal consistency, the matrix was placed in the patient’s mouth. The provisional material was subsequently cured and the matrix was removed. Excess composite was removed with rotary instruments. The temporary restorations were characterised with staining and glazing materials.

In the laboratory, a cast was made from the disinfected impression using Glass IV plaster. After the models had hardened, the preparation margins were defined (Fig. 9). The veneers were waxed up, removed from the die and then invested. They were subsequently reproduced with IPS e.max using the press technique, then divested (Fig. 10). The veneers were tried in with a trial kit (Figs. 11 & 14). The completed veneers were waxed up, removed and polished (Figs. 15 & 16). The broad and satisfied smile of the patient at the conclusion of treatment.
In addition to its elegant and stylish design, its ease-of-use, its high image resolution and its reliability, the I-Max Touch 3D offers the ideal field of view (FOV) for use in dental imaging. With SimPlant® software pre-loaded, the I-Max Touch 3D is a MUST-HAVE for your implant planning procedure.
A rubber dam was placed with a retentive clip for each preparation. The veneers were tried in with the Variolink Try-In pastes, rinsed with a water jet and dried with oil-free air. For optimal cleaning results, Ivoclean (Ivoclar Vivadent) was applied for 20 seconds and then removed with a water jet.

The ceramic surface, which has to be kept free from contamination, was treated with 5 per cent hydrofluoric acid (IPS Ceramic Etching Gel, Ivoclar Vivadent) for 20 seconds. The restorations were cleaned with a water jet and immersed in an ultrasonic bath for 5 minutes. The veneers were then dried and conditioned with the silane-coupling agent Monobond Plus (Ivoclar Vivadent) for 30 seconds. The excess was dispersed with a strong stream of air. The prepared teeth were then cleaned with brushes and fluoride-free prophylactic pastes. The enamel was etched with the 37 per cent orthophosphoric acid Total Etch (Ivoclar Vivadent) for 30 seconds and then cleaned with a water jet and uncontaminated oil-free air.

Shortly before the veneers were placed, ExciTE F adhesive (Ivoclar Vivadent) was applied thickly to enamel and dentine, and carefully brushed in for at least 10 seconds. The excess was dispersed to a thin layer with a weak stream of air.

In the process, it is very important to avoid pooling. A shiny surface showed that the tooth was completely sealed. The adhesive was cured for 10 seconds with a light intensity of above 500 mW/cm² and Variolink Veneer was applied directly to the preparation.

In the final luting phase, the veneers were placed on the prepared teeth with consistent pressure and then polymerised for 2 seconds (Fig. 13). As the luting material had not yet completely cured, it was easy to remove the excess with a probe. The margins were previously isolated with Liquid Strip glycerine gel (Ivoclar Vivadent), which prevents the formation of an oxygen-inhibited layer during polymerisation and enables the luting material to cure properly. Finally, the restorations were cured for 90 seconds from all sides.

The excess was removed with a scalpel. Fine-grit burs and silicone polishers were used at the palatal margin. The rubber dam was then removed and the occlusion inspected (Fig. 14). After the treatment, the patient received instructions on maintaining her restorations and she was scheduled for a recall examination one month later (Figs. 15 and 16).

Conclusion
The topic of aesthetics continues to grow in importance in dentistry and the development of innovative materials such as IPS e.max Press Impulse allows dental professionals to use new techniques for non-invasive preparation of teeth. In addition, such materials provide aesthetic benefits and eliminate the need for dental prostheses and the layering techniques.

Specialist knowledge of the adhesive cementation of lithium disilicate restorations gives dentists the professional edge needed to address the challenges associated with this type of treatment. The treatment protocol is firmly established today. It is of utmost importance for dentists and dental technicians to perform their work with great precision. In order to jointly have a positive impact on the results, both parties must be familiar with the entire procedure. Teamwork and a meticulous approach during the individual treatment phases are required to achieve aesthetic outcomes.

Acknowledgement
I would like to thank Roberto Portas Moura for the excellent dental laboratory work, and the patient for her confidence and patience during the treatment.

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