IPS e.max — Two clinical cases

Harald Kerschbaumer & Dr Alexander Stiefenhofer
Liechtenstein & Schweiz & Dr Alexander Stiefenhofer

The following two clinical cases were treated with all-ceramic crown and bridge restorations. The first case involved a single tooth restoration with IPS e.max CAD/IPS e.max Ceram crowns. The second case was restored with an inlay/crown-retained bridge made of IPS e.max ZirCAD/IPS e.max ZirPress.

Case 1: 46-year-old patient: single crowns with lithium disilicate glass-ceramic copings in the maxilla

Pre-operative situation
The endodontically treated teeth 21 and 22 had been re-constructed with post and core build-ups and had to be replaced by new postodontic restorations 15 years after insertion due to aesthetic shortcomings. The following aspects were particularly noteworthy: the crown margins were located in the supra-gingival area with the dark root surfaces exposed, and the overall colour of the two crowns was grey compared to the contralateral natural incisors (Fig. 1). The gingiva of teeth 21 and 22 was located symmetrically to the gingiva of the contralateral teeth 11 and 12. The endodontic and periodontal state did not give any cause for concern (Fig. 2).

Planning
Before abutment, teeth 21 and 22 were restored; the existing metal root post with composite build-up material had to be removed first. After fitting and finishing, the post and core build-ups were inserted. The post and core build-ups were made using the light-curing composite Tecric EvoCeram in the incremental layering technique and the glass-fibre-reinforced root post IPS Postec on mounted super hard stone models with detachable segments. The restorations were inserted after retraction cords were applied in a relatively dry operating field. For the adhesive cementation technique, the chemically curing luting composite Multilink was used and the restoration conditioned with the chemically curing Multilink Primer. Subsequently, excess cement was removed prior to polymerisation, using foam jets and brushes. Finally, the teeth were prepared to accommodate the new crowns. The margin was prepared in the intrasulcular area (Figs. 3A & B).

Temporary restorations were provided in the form of resin crowns made of Systemp.c&B plus, which were fabricated directly on the patient. The temporary crowns were fabricated using a polyethyl- ene vacuum formed foil after the wax-up was prepared. The crowns were inserted with the eugenol-free temporary luting cement Systemp.c&B (Fig. 4).

After a non-inflamed gingival situation was achieved after four weeks, the location of the preparation margins in relation to the course of the gingival margin was checked and an impression of the abutment teeth taken. The sulcus management enabled a thorough display of the preparation margins by means of the double contact technique. An electrosurgical extension of the sulcus was not required. Iron-III-sulphate was used as an astringent.

Fabrication of the restoration
The best starting point for the framework design is the fully anatomical model of the restoration, which is selectively reduced for the veneer. It is important that the veneering ceramic does not account for more than 50% of the entire restoration thickness in order to avoid a weakening of the overall restoration. The crown copings were fabricated from lithium disilicate glass-ceramic blocks (IPS e.max CAD MO) in the laboratory using the inLab system (Sirona, Fig. 5).

Figures 11 A and B show the completed crowns after the second firing and characterization. Figs. 12 A and B: Completed crowns 21 and 22 made of IPS e.max CAD/IPS e.max Ceram. Labial view (A). Palatal view (B). — Figs. 13 A–C: Situation after insertion of crowns 21 and 22 using glass ionomer cement. The crowns have been in situ for 6 weeks. Overview (A). Close-up (B). Final X-ray examination (C).

After fitting and finishing, the framework was fired in a ceramic furnace. The use of the stipulated temperature profile had to be achieved and thus the accurate shade and opacity attained. Figure 7 shows the tem- pered crowns. Firing and cementing programmes are available, depending on the ceramic furnace in use.

Before the IPS e.max Ceram materials are applied, the framework is cleaned with steam or in an ultrasonic bath (Fig. 8). The IPS e.max CAD framework must not be blasted with aluminium oxide.

Before dentine and incisal materials are generously layered, a thin wash layer must be applied with any layering material and fired (Fig. 9). Subsequently, the restoration can be completed as usual (Figs. 10 & 11A & B).

The restoration must not be sandblasted with aluminium oxide prior to seating. The inner aspects of the restoration were treated with IPS Ceramic Eluting Gel for 20 seconds. This etching procedure is conducted both with adhesive and conventional cementation.

The way can be stipulated a temperature profile to be achieved and thus the accurate shade and opacity attained.
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For more information please ask your local dental dealer.
The IPS e.max system currently offers ceramic materials for the fabrication of single tooth restorations (crowns, partial crowns, veneers) and 5-to-6-unit bridges using press and CAD/CAM techniques. Dental technicians can work with more efficiently. The IPS e.max Press is suitable to any different framework materials and thus cover virtually all indications in all-ceramics. Dental technicians will appreciate the benefit of having to handle only one veneering ceramic, which will enable them to fabricate predictable restorations more efficiently.

Contact Info

Harald Kerschbaumer can be reached at harald.kerschbaumer@ivoclarvivadent.com

Dr. Alexander Stiefenhofer can be reached at a.stiefenhofer@mac.com

Fig. 18: Attaching the sprues (note the ring-shaped sprue on the pontic).—Fig. 19: Complete and accurate reproduction of details.—Fig. 20: Pressed restoration completely seated on the master model.—Fig. 21: Build-up of the incisal areas.

Figs. 23A–C: Inserted inlay/crown-retained bridge 15–17. Final clinical pictures: occlusal view (A) and buccal view (B & C).

The strength of IPS e.max CAD/IPS e.max Ceram crowns enables conventional cementation with a retentive core preparation. The crowns were seated using the glass ionomer cement Vivaglass CEM PL. The fully veneered crowns on IPS e.max CAD framework were veneered with IPS e.max Ceram harmoniously blend in (Figs. 12A–C).

Six-month recall showed an unchanging result regarding the soft tissue and the quality of the ceramic (Figs. 15A & B).

Case 2: 14-year-old patient: posterior bridge with zircon oxide framework

Pre-operative situation

After successful periodontal treatment, the interdental space between teeth 15 and 17 had to be closed. Both alveolus teeth 15 and 17 were vital. Tooth 15 was crowned; tooth 17 showed a two-surface, mesio-occlusal restoration (Fig. 14).

Planning

The interdental space between 15 and 17 was to be closed with an adhesively luted, all-ceramic inlay/crown-retained bridge with a zircon oxide framework on which the veneering ceramic was to be pressed and layered in some areas. From a technical point of view, the easiest and best solution in this case was to press IPS e.max ZirPress onto the zircon oxide framework. On the one hand, this allows the complete occlusal surface to be designed with a proven wax-up. On the other hand, the inlay in tooth 17 is much easier to fabricate by means of the press technique than the layering method. The translucent LYT ingot was used to ensure ideal adaptation of the restoration to the residual tooth structure.

Preparation and fabrication of the restoration

Abutments 15 and 17 were prepared according to a crown prepation with a pronounced chamfer on tooth 15 and an MO inlay preparation with a proximal shoulder on tooth 17 (Fig. 15). In the occlusal area, 1.5 mm were available for the bridge framework and veneer.

After sulcus management, elastic impression taking, facemask transfer, and registration of the horizontal and vertical jaw relation to the intercuspal position, the super hard stone models were mounted on a semi-adjustable articulator to fabricate the inlay/crown-retained bridge 15–17.

The zirconium oxide bridge framework was milled from an IPS e.max ZirCAD zirconium oxide block using the inLab system. The sintered zirconium oxide was fitted to the master model. Once the framework was finished, a suitable shade of ZirLiner was applied and fixed (Fig. 16).

A transparent pressed ceramic was used to press a circular shoulder to tooth 15 and the side walls of the inlay in tooth 17.

Wax-up and preparation for the press procedure

A moulding was made that burrs out without leaving a residue was used for the wax-up. The teeth were modelled fully anatomically. A small portion of incisal material was applied only in the buccal and lingual areas (Fig. 17).

If the pontics in the posterior region are voluminous, it is recommended that a ring-shaped sprue (Fig. 18) be applied to achieve a less distorted reproduction of the pontic (Fig. 19).

Completion

After the sprues had been removed and the restorations completely fitted on the master model, a little space was provided for the build-up in the incisal area (Fig. 20).

To complete the anatomical form, the incisal area was built up according to the free layering technique with IPS e.max Ceram (Fig. 21).

Finally, the restoration was stained with IPS e.max Ceram Shades and Essence materials and glazed (Figs. 22A–C).

The basilar view shows the central white-opaque IPS e.max ZirCAD zirconium oxide bridge framework, which was covered with the IPS e.max ZirPress veneering ceramic in the occlusal area and in the area of the preparation margins. IPS e.max ZirPress is suitable for the adhesive technique.

An inlay-retained bridge or a combined version, such as an inlay/crown-retained bridge, has to be adhesively seated in order to achieve the clinically required retention and strength of the construction. As the zirconium oxide framework exhibits not only a very low translucency, a chemically or dual-curing adhesive and luting composite have to be used to ensure complete polymerisation. In the present case, the preparations were isolated by means of electrosurgical sulcus management, iron-III-sulphate application, and the placement of retraction cords (Ultrapak, Ultradent). It was not possible to use a rubber dam to establish a completely dry field, therefore, the bridge was inserted under stringent moisture control. The retraction cords had to remain in place in the sulcus as far as possible during placement to avoid sulcus fluid from escaping and to protect the sulcus from penetration of adhesive and luting composite. In the present case, the Multilink luting composite system was used for the adhesive technique. Before the bridge was seated, the restoration was conditioned with 5% hydrofluoric acid gel (IPS Ceramic Etching Gel) in the area of the etchable IPS e.max ZirPress ceramic, and subsequently silanised (Monobond-S). Excess cement was removed with foam pellets, brushes, and dental floss immediately after placement before the restoration was light-cured. At the cementation joint, a brush should be preferred to a foam pellet to prevent the luting composite from being wiped out of the cement margin. Figures 25A to C show occlusal and buccal aspects of the restoration in situ: the fully veneered inlay/crown-retained bridge seamlessly blends in and the surrounding soft tissue looks vital.

Conclusion

The IPS e.max system currently offers ceramic materials for the fabrication of single tooth restorations (crowns, partial crowns, veneers) and 5-to-6-unit bridges using press and CAD/CAM techniques. Dental technicians can work with only one layering ceramic on the different framework materials and thus cover virtually all indications in all-ceramics. Dental technicians will appreciate the benefit of having to handle only one veneering ceramic, which will enable them to fabricate predictable restorations more efficiently.