IPS e.max — Two clinical cases

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

Preoperative situation

The endodontically treated teeth 21 and 22 had been reconstructed with post and core build-ups and had to be replaced by new bridge restorations. The post and core build-ups had been removed, the enamel was ground to an anatomical model of the restoration, which is selectively reduced. Preoperative state did not give any cause for concern (Fig. 2).

Planning

Before abutment, teeth 21 and 22 were restored. The restorations were treated with adhesive and opaque materials. The restorations were inserted after retraction cords were applied to the temporary luting cement. The temporary crowns were fabricated using a prefabricated wax-up. The crowns made of Systemp.c&b plus, which were fabricated directly on the ceramic furnace in use. 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 to avoid the 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).

Temporary restorations were provided in the form of resin crowns made ofSys temp.c&b plus, which were fabricated directly on the patient. The temporary crowns were fabricated using a polyethylene vacuum formed foil after the wax-up was prepared. The crowns were inserted with the eugenol-free temporary luting cement Sys temp.cem (Fig. 6).

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 entailed a thorough display of the preparation margins by means of the double cord technique. An electrosurgical extension of the sulcus was not required. Iron-III-sulphate was used as an astringent.

Fabrication of the restoration

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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 Etching Gel for 20 seconds. This etching procedure is conducted both with adhesive and conventional cementation.

Figures 11A and B show the completed crowns after the second firing.
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firing with incisal and transpa materials on the model from a labial and palatal view.

**Placement**

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 frameworks that were veneered with IPS e.max Ceram harmoniously blend in (Figs. 12A–C).

Six-month recalls 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 zirconium 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 zirconium 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 zirconium oxide framework. On the one hand, this allows the complex 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 LT 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 preparation with a pronounced chamfer on tooth 15 and an MIO 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, facebow registration, and registration of the horizontal and vertical jaw relation to the intercusption 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 the framework was fired (Fig. 16).

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

** Wax-up and preparation for the press procedure**

A modelling was that burns 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 low-luster 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 basal 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 incisal and palatal areas 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 bridge framework exhibits 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 electroerosive sulcus management, iron-III-sulphate application, and the placement of retraction cords (Utrupak, 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 slanised (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 3- to 4-unit bridges in the 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.

Dental laboratory work was done by Franz Perkon and Annyza Mezan.

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