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Without cutback and layering

Natural-looking restorations can be fabricated easily and efficiently with pressable lithium disilicate ceramic.

Fabricating veneers with IPS e.max® Press Impulse G. Franklin Shull, DMD, and Matt Roberts, AAACD, Lexington, South Carolina/USA

Natural-looking restorations can be fabricated easily and efficiently with pressable lithium disilicate ceramic.

The fabrication of veneers requires an adaptable material to accommodate the need for appropriate reduction that will enable the necessary change in tooth colour, mask the discoloured dentition and provide adequate strength. IPS e.max lithium disilicate glass-ceramic (LS2), particularly the IPS e.max Impulse Opal ingot that can be pressed to full contour, can provide clinicians with a strong, esthetic material for anterior veneer cases without cutback and layering. When treating patients with a high risk of incisal chipping, lithium disilicate is the material of choice due to its enhanced strength. Lithium disilicate affords the ease and versatility that allows dentists to provide patients with minimal preparations while simultaneously addressing esthetic issues. In terms of esthetics, clinicians and their laboratory ceramists can deliver restorations that demonstrate the soft progression of chroma gradient and non-dynamic incisal effects that are frequently seen in natural teeth.

The IPS e.max all-ceramic product line represents a universal system that includes pressable fabrication techniques for satisfying an assortment of case demands. Ideal for cases requiring inlays, onlays, partial crowns, telescope crowns, anterior and posterior crowns, veneers and thin veneers, IPS e.max Press provides the fit and function of traditional pressable ceramics, with outstanding strength [1-4].With its controlled size, shape and density, the unique structural characteristics of IPS e.max ensure greater strength and durability than conventional ceramics [1-6]. Manufactured with needle-like crystals in a glassy matrix and possessing a

Fig. 1 A preoperative full face view helps harmonize dental esthetics with facial esthetics.

Fig. 2 The preoperative photograph indicates the relation of the teeth to the lip line.

Fig. 3 Shade tabs (Chromascop) were previewed.

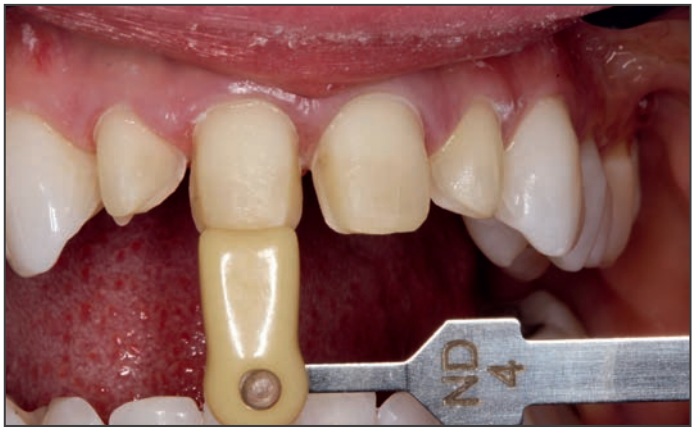

Fig. 4 The preparation shade was determined using the IPS Natural Die shade guide.


Fig. 5 Photographs of the provisionals were taken.

flexural strength of 400 MPa, IPS e.max Press lithium disilicate ensures predictable and long-lasting restorations and is suitable for complex cases [7-9].

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Case presentation

A 32-year-old woman presented with feldspathic veneers in teeth 12 to 22 that had been placed approximately 15 years ago. Although satisfied with the overall length and shape, the patient had concerns regarding discolorations at the margins and the overall colour of the restorations (Figs 1 and 2). Once the patient had agreed to the recommended treatment plan of replacing the veneers, night guard vital bleaching was used to improve the patient's natural teeth to an 030 Chromascop shade (Fig. 3). Maxillary and mandibular study models, facebow, bite registration, stick bite and a complete set of photographs and radiographs were obtained.

Material selection

Pressable lithium disilicate (IPS e.max Press) was the material of choice. Ideal for esthetically challenging cases, lithium disilicate demonstrates life-like translucency due to a relatively lower refractive index and superior optical properties compared to traditional all-ceramic materials [7-10]. A variety of translucencies and opacities, including high translucency (HT), low translucency (LT), medium opacity (MO) and high opacity (HO) are available. Different brightness effects can be reproduced with the availability of three brightness values and two opalescent shades (Value, Opal). As IPS e.max Press requires a minimum thickness of only 0.3 mm, minimally invasive preparation procedures can be performed that are gentle to the tooth structure [12]. Moreover, press technology guarantees a high accuracy of fit.

Fig. 6 A sectioned working model was created. Data from the provisional stone model was transferred to the working model.

Fig. 7 An enhanced wax-up indicates contour refinements and detailed surface texture.

Clinical preparation protocol

The patient was anaesthesized and the old porcelain was removed. The existing preparations were moderately aggressive and had exposed dentin in multiple areas. Changes to the preparations included breaking the contacts and placing interproximal margins slightly subgingivally to allow proper emergence of the restorations. In order not to leave the final shade of the restoration to chance, determining the shade of the preparation using the IPS® Natural Die shade guide was essential.

> The shade of the preparation has a substantial influence on the final shade of the restoration.

Next, an impression was taken. Preparation photographs with shade tabs were obtained (Fig. 4). BIS-acryl provisionals were fabricated from a pre-preparation model, making only slight modifications to improve esthetics.

The provisionals were evaluated four days later (Fig. 5), at which time the patient was happy with the colour and esthetics. Occlusal stops remained in the enamel, therefore only the incisal edge position needed to be evaluated for esthetics, speech and function. Once confirmed, a series of photographs and a stone model of the provisionals, as a starting point for shape and form, were taken and forwarded to the laboratory to duplicate the incisal edge position.

Laboratory protocol

A master model was created and a SilTech® matrix of the provisional models was placed over the master model (Fig. 6). Data from the provisionals, complete with incisal edge and form, was transferred to the master model using wax injection (Fig. 7). The contour of the wax injection was then refined and final shaping of embrasure form and incisal position was undertaken on the master model to create the planned esthetic result.

Surface morphology was established mimicking the natural anatomy of anterior teeth. A combination of carving and additive waxing was employed to create shape and form that fit the patient's needs. In this case her provisional restorations seemed a bit wide, so the mesial and distal embrasure form was opened up to minimize the perceived visible width of the individual teeth, thus improving the apparent length-to-width ratio. Her smile line was also a little flat, so centrals were lengthened slightly to give positive curvature to the smile. Due to the hardness of the ceramic, it is more efficient to perform surface texture and detailed waxing – two crucial steps, especially when using a monolithic lithium disilicate material – than to grind the restorations.

The restorations were sprued and invested in the traditional manner for pressed ceramics, and a fast burn-out technique was administered. The press procedure was conducted in a Programat® EP 5000 furnace. After they had been pressed using the IPS e.max Press Impulse Opal 1 ingot, the restorations were divested and the sprues ground down using a lithium disilicate and zirconia grinder (Fig. 8). Next, a carbide bur was utilized to create surface morphology between the teeth, delineating the tooth as individual in relation to the adjacent tooth. Positioning the contact and controlling the light into the embrasure form is critical to achieve superior esthetics. A medium grit, lithium disilicate grinder was used to clean up the lingual area close to the margins, making it possible to get right up against the margin without chipping.

At this time the restorations were ready for staining.

Fig. 8 Finished restorations on the stone model

Fig. 9 View of restorations before seating

Fig. 10 Retracted view of the seated restorations

Fig. 11 Postoperative close-up of the final restorations

Fig 12 Close-ups of the final restorations

Fig 13 Close-ups of the final restorations

One of the advantages of the Opal ingot is that staining is sufficient to achieve a life-like appearance of the restoration. The surface was dampened with a small amount of stain liquid. It is important that stain liquid be applied underneath and between the restoration and the composite die. This step determines the amount of stump shade show-through that will be present in the mouth and gives the technician a chance to apply shading in a way that harmonizes with the underlying colour.

The combination of underlying colour and restorative thickness plays an important role in ingot selection and subsequently in attaining the natural colour of the dentition. For instance, 1.2 mm of Opal 1 will have quite a different effect than 0.4 mm facial thickness. Viewed side by side, the thicker appear brighter than the thinner restorations. Coordinating the preparation depth appropriate for the patient's underlying tooth colour and ingot selection by the technician to achieve the desired final shade is critical to the success of bonded all-ceramic cases, especially with more translucent ceramic materials. At this point, stain was applied from gingival to incisal to achieve a colour gradient effect. Stain was blended to achieve natural colour gradation and applied to all restorations in this manner. Although the Opal ingot is already translucent, a small amount of Incisal blue was added for enhancement. After the stains were fired, a glaze layer was applied. Finally, a small amount of white stain was added to the glaze to attain a white halo effect.

Although requiring a fairly thick restoration, simply by choosing the appropriate ingot, an Opal 1 in this case, the optical qualities of the natural tooth enamel were well matched, eliminating the need for cutback and layering (Fig. 9).

Final seating

After the patient was anaesthesized, the provisionals were removed by sectioning with a very thin carbide bur at high speed, but with very light pressure. The preparations were cleaned with 2% chlorhexidine gluconate and each unit was tried-in separately for marginal fit. Next, all four veneers were tried-in together with a small amount of Variolink® Veneer try-in paste to confirm contacts and esthetics. The porcelain was cleaned, then prepared with silane (Monobond® Plus).

The teeth were cleaned and treated

with a total etch, single bottle adhesive system (ExiTE® F DSC) prior to seating with a light-cure-only veneer resin cement (Variolink Veneer). Occlusion was refined and the margins polished (Figs 10 to 13).

Conclusion

Lithium disilicate restorations (IPS e.max Press) enable dentists to offer patients a conservative alternative while transforming the appearance of their smiles [4,11]. With lithium disilicate, achieving translucent incisal effects, such as detailed dentin lobe structure and dynamic translucency, often requires cutback and layering. However, the availability of Opal lithium disilicate ingots enable stained and glazed restorations to be fabricated that blend in seamlessly with the remaining dentition. In the presented case, the patient was happy with the need for only minimal tooth reduction and more than pleased with the function and esthetics of the IPS e.max Press restorations using the Impulse Opal 1 ingot.

A literature list is available from the editors on request.

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Contact details:

G. Franklin Shull, DMD
Palmetto Dental Associates
216 Palmetto Park Blvd, Suite 204
Lexington, SC 29072, USA
fshull@windstream.net
Matt Roberts, AAACD

Palmetto Dental Associates

216 Palmetto Park Blvd, Suite 204
Lexington, SC 29072, USA

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Q1. The IPS e.max Impulse Opal ingot that can be pressed to full contour is ideal for what type of restoration ?

Q2. The IPS e.max all-ceramic product line is a universal system that includes pressable fabrication techniques; ideal which type of restorations ?

Q3. IPS e.max Press lithium disilicate is manufactured with needle like crystals in a glassy matrix achieving what flexural strength ?

Q4. The case presentation of a 32 year old woman with 15 year old feldspatic veneers necessitated what type of diagnostic procedures ?

Q5. During the clinical preparations how is the proper emergence of the restoration achieved?

Q6. How was the surface morphology established to fit the patients' needs and mimic the natural anatomy of the anterior teeth?

Q7. Which ingot was selected for the press procedure?

Q8. What should be coordinated to achieve the desired final shade?

Q9. By choosing the appropriate Opal 1 ingot for this case, which laboratory technique was eliminated?

Q10. What laboratory protocol should be implemented to improve esthetics in cases with flat smile line?

Name:

GDC Number:

Address:

Postcode:

Telephone no: (in case of any queries)

Signed:

Date:

British Institute of Dental & Surgical Technologists

British Institute
of Dental & Surgical
Technologists

British Institute of Dental & Surgical Technologists

44-46 Wollaton Road,
Beeston,
Nottingham
NG9 2NR

Telephone: +44(0)115 968 3181
Fax: +44(0)115 925 4800
Website: www.bidst.org
Email: secretary@bidst.org