Veneer restorations layered onto pressed ceramic substrates

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Introduction

In the case below the author describes two methods of creating an anterior restoration: a conventional method where the veneers are layered and fired on an investment die and an unconventional method involving layered veneers on a pressed ceramic substrate.

Initial situation

Teeth 11 and 21 should be esthetically corrected in this discerning male patient. He was particularly concerned about the palatal position of the teeth and the discoloured composite restorations (Figure 1). The aim was to find a treatment option that would involve as little loss of healthy tooth structure as possible in line with the principles of conservative dentistry.

An analytical evaluation of the diagnostic model showed that a minimally invasive esthetic modification could only be achieved with ceramic veneers (Figure 2). At this stage, we were still considering the possibility of using a totally non-invasive treatment option. The palatal position of the upper two central incisors afforded enough space to accommodate a layered non-prep veneer. Already at this stage we decided to use two different methods and compare them with each other: one of them conventional and the other one still relatively unknown in our market.

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Figure 1: Initial situation: The patient is unhappy about the discoloured composite restorations and the uneven alignment of the teeth.

Figure 2: A model of the initial situation shows the palatal deviation of the central incisors.

Figure 3: Deep Dentin is applied in layers to achieve an appropriate masking effect.

Figures 4: Transpa and Opal materials complete the layering procedure.

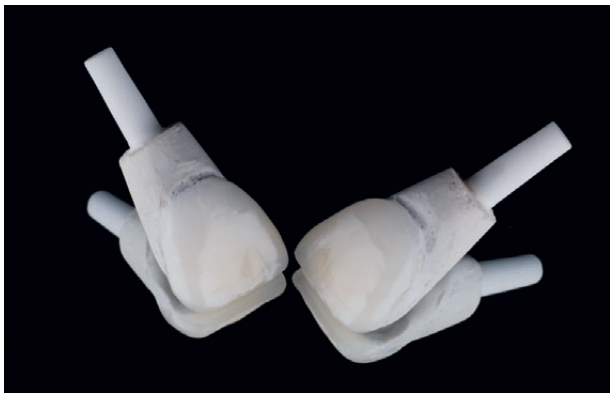

Figure 5: Veneers layered on investment dies.

Figure 6: Veneers after divesting.

Figure 7: When the veneers were tried in …

Figure 8: … neither the patient nor the treatment team were satisfied with the outcome.

Conventional method

For the conventional method we opted for a metalceramic system (IPS d.SIGN®), which involves firing of the veneers in an investment ring. The veneers were modelled on investment dies (GC Orbit Vest) that had been prepared beforehand (Figures 3 to 6). When applying the layers, I masked the areas of the composite restoration with Deep Dentin to prevent it from shining through the ceramic layers. I generally use a translucent material for the cervical region, unless the underlying tooth structure is completely discoloured. For the present case, I applied Transpa Neutral and Opal Effect 1 materials. The advantageous translucent

Figure 9: The incisal was too bright and the veneers appeared slightly oversized.

Figure 10: The pressed veneers were ground down to a thin material thickness and were used as a substrate for the subsequent application of ceramic layers.

Figure 11: Try-in of the pressed veneers before the layering procedure.

properties of Transpa Neutral and the incisor-like opalescence of Opal Effect 1 provide a suitable combination for this region. In my experience, this technique has proved to be successful, allowing the transition in the cervical region to be effectively camouflaged.

It is essential to work in small steps when working with an investment die. The mechanical and chemical bond between the investment material and ceramic material is not as strong as the bond between the opaquer and ceramic material when a conventional layering technique on a framework is used. It is imperative to bear this in mind since it is very difficult to mend the restoration if ceramic material has detached itself from the investment die because it was applied in too thick a layer. For the present case, a comparatively thin layer of dentin material was sufficient because this restoration did not involve a metal framework masked with opaquer. Consequently, more space was available for the enamel materials.

Upon completion of the firing process, the investment dies were removed and the veneers were tried in. An optimal result was achieved in the cervical region. The use of a matching try-in paste (Variolink® Veneer Try- In) was helpful in this respect. The shade of the incisal area also appeared to be successful; the tooth's inherent shade was shining through the translucent layers of the incisal area. However, things often turn out to be different than expected: Upon close examination, we spotted the shortcoming that was unacceptable to our esthetically discerning patient: The incisal was slightly brighter than that of the neighbouring teeth, as can be seen in pictures 7 to 9. In addition, the veneers were oversized and failed to integrate harmoniously into the surrounding dentition.

An innovative method

I had to find a treatment option which would enable me to provide the patient with a satisfactory result. In response to this situation, I opted for a technique that was based on a similar approach as the one above but involved different materials: The range of IPS e.max® press ceramics includes highly translucent HT ingots. Strictly speaking, these materials were developed for full-contour inlays, onlays, veneers and crowns. Given their high viscosity and high flexural strength (400 MPa), they are, however, also suited for ultra thin (0.3 mm) veneers.

For the present case, the veneers were pressed from HT A2 ingots and then ground down to a thickness of 0.3 mm (Figure 10). A try-in on the patient showed that this material

Figure 12: Evaluation of the shade effect after the first firing.

Figure 13: The veneers layered onto a substrate made of IPS e.max press ceramic.

was capable of closely imitating the natural tooth shade (Figure 11).

When I applied the layering ceramic, I again had to take the existing composite restorations into account. I used the try-in pastes to simulate the shade effect and to check if the composite restorations were sufficiently camouflaged. Enough space was available to design the incisal, which meant that I was able to control the translucency in this area appropriately. To mask the discoloured areas in the proximal regions of the restorations, I used opaque materials. The IPS e.max® range offers two choices to achieve this: Deep Dentin and Mamelon materials – both of them are characterized by comparatively strong masking capabilities. However, the Mamelon materials should be used only sparingly for application in this area. Except for the "light" shade, these materials demonstrate fairly distinct shading characteristics and may therefore have a visible effect on the restoration. Subsequently, the Dentin and Transpa materials were applied in layers in the customary manner. The restoration in progress could be directly checked in the oral cavity between the individual firing cycles and the materials could be selected accordingly, which presented a decisive advantage (Figure 12).

As aforementioned, the veneers which I designed first were not satisfactory because of their shape. I therefore created a slightly narrower incisal this time and, consequently, was satisfied with the result (Figure 13). The patient also approved of the shape and I therefore proceeded to incorporate the veneers (Figure 14).

Incorporation

The use of two different ceramic materials provides a convenient opportunity to point out the differences in etching techniques. Etching the ceramic veneers with hydrofluoric acid (IPS® Ceramic Etching Gel) presents an essential and critical stage of the adhesive technique. The etching time depends on the ceramic material. In the present case, the reaction times for the individual ceramic materials were different from one another. The manufacturer recommends an etching time of 60 seconds for the IPS d.SIGN fluorapatite ceramic, whilst the recommended etching time for the IPS e.max Press lithium disilicate ceramic is 20 seconds. Users should not deviate from these recommendations.

After the etchant has been allowed to react, the surfaces should be thoroughly rinsed with water. I usually use an ultrasonic device to optimally clean the surfaces. Whilst etching of the veneer can be deferred to the dental technician, it is absolutely essential to be aware of the fact that the surfaces that are already etched have to be cleaned again after the try-in in the oral cavity, before the veneer is silanized (Monobond Plus). Study results have shown that contaminations from salivary fluids remain on the surface and adversely affect the bond strength, particularly if glycerine-based try-in pastes are used.

Figure 14: The veneers in situ. Both the patient and treatment team are satisfied with the outcome. Sometimes it takes more than one attempt …

Conclusion

Veneers made of IPS d.SIGN ceramic materials have been used to design restorations that provide exceptional esthetic results for several years. However, today's range of products includes various other materials and methods that enable you to achieve equally pleasing or even better results in certain cases. The IPS e.max system is a case in point. It is worthwhile considering new routes of fabricating a restoration, depending on the requirements of the individual patient case, and allowing some scope for creativity. In the process, however, the specific properties and possible restrictions of the material used should never be ignored.

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