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Metal-free restorations have become well established in aesthetic restorative dentistry. New clinical applications and possibilities provide users with a vast array of treatment options. Minimally invasive and in some cases even preparation-free restorations have become feasible owing to new materials and recent advances in adhesive techniques. It is recommended, however, that the indication at hand be carefully assessed to achieve a restoration that meets the given aesthetic and functional requirements optimally.

A 31-year-old male patient presented to us with a request for the aesthetic improvement of the anterior region (Fig. 1). A clinical examination showed us a large anterior diastema. His medical history did not reveal any symptoms or complaints related to the occlusion or temporomandibular joint dysfunction.

A few years ago, metal-ceramic restorations would have been the treatment of choice for a case like this. Nowadays, clinicians are increasingly rejecting this option, as it requires not only numerous treatment steps but also the removal of large parts of healthy tooth structure. Metal-free crowns however may present an alternative treatment option. This may not always sufficiently prevent the loss of healthy tooth structure because closing the gap with conventional ceramic veneers necessitates an invasive preparation method.

If this treatment option is selected, the tooth is provided with a small cervical shoulder on the basis of a diagnostic wax-up. Additionally, approximately 2 mm of tooth structure is removed in the incisal region and the vestibular area is slightly reduced.

Whilst, without doubt, this presents a suitable treatment option, some dentists feel that this preparation method is not adequately conservative. The issues concerning the removal of healthy tooth structure can be avoided by using non-preparation ceramic veneers, which do not require any reduction of tooth structure.

Conservative though it may be, it entails some limitations mainly related to aesthetics and the working procedure in the dental laboratory.

Although correcting a diastema seems to be a straightforward procedure initially, a deeper look makes it clear that several treatment possibilities are available. It also raises questions concerning whether it will be possible to close the gap between the teeth completely and whether an appropriate emergence profile will be achieved in the interproximal region. Other issues include whether “black holes” will remain visible in the interdental space or whether the interdental papillae will be present at the end of the treatment.

When selecting a treatment option, we should always aim for the best possible aesthetic outcome that requires the removal

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Fig. 1: Initial situation.—Fig. 2: Mock-up made of Systemp.c&b II in shade A1.—Fig. 3: The incisal reduction is checked with a silicone key.—Fig. 4: Preparation of the vestibular surface. The ridge that developed in the course of reducing the proximal surface is smoothed out.—Fig. 5a & b: Checking the vestibular reduction and the space available in the proximal and incisal area using the silicone key (a).—Fig. 6: Impression taking with an addition-reaction silicone using the double-cord technique.—Fig. 7: Customisation (careful veneering) using the layering technique.
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of the least possible amount of tooth structure. In other words, we aim to achieve the best possible solution. With this in mind, we decided to use ceramic veneers and apply a preparation technique that, from our point of view, was suited to achieve that goal by not preparing a cervical shoulder and by reducing the incisal, vestibular and proximal surfaces only minimally. It served to provide appropriate guide surfaces for the veneers and to achieve ideal conditions for the dental technician to create true-to-nature restorations.

Taking an initial impression using an addition-reaction silicone (Virtual, Ivoclar Vivadent) is indispensable for accurate treatment planning, the fabrication of a diagnostic wax-up and the implementation of preliminary treatment steps. A diagnostic wax-up was made by the dental laboratory and then used as the basis for the mock-up (Systemc.eb II) with the help of a silicone key. The result and the proportions of the teeth, contoured in wax, in the oral cavity could thus be accurately visualised. It was found that the size and shape created a harmonious and natural-looking overall impression (Fig. 2).

The silicone key for the diagnostic wax-up was also useful as a reference in the preparation. First, the incisal surface was reduced by approximately 1 mm. The silicone key demonstrated that some portions of the incisal area only needed to be smoothed out, as they already offered enough space (Fig. 3). Next, the proximal areas were slightly reduced in order to create a guide surface for the veneers. This reduction should cause the proximal margins to be positioned slightly towards the vestibular. The vestibular preparation involved only the reduction of the ridge between the proximal and vestibular surfaces (Fig. 4) and the reduction of the vestibular area to allow for the contouring of the veneer (Fig. 3a).

Finally, the preparation was finished with grinding discs at reduced rotational speed. The result was then checked with the silicone key to ensure that a sufficient amount of tooth structure had been removed for the design of the veneers (Fig. 3b). For the working procedure in the laboratory, an impression was taken using (virtual) and the double-cord technique (Fig. 4).

Thin ceramic veneers were fabricated with the IPS e.max System (Ivoclar Vivadent) using the press technique and carefully individuated with the layering technique. The technician’s extensive technical expertise and skills were very important in achieving this task, particularly considering the limited amount of space available (Figs. 7 & 8). During the try-in, the accuracy of fit, shape and shade were checked and the design was evaluated to ensure that it adapted well. Try-in and shade determination were performed using the Variolink N Try-In paint (Ivoclar Vivadent) in various shades. We opted for the transparent shade from the Variolink N range of adhesive luting composites.

Prior to cementation, the tooth surface was conditioned with 57 % phosphoric acid for 30 seconds, followed by rinsing with water, drying with air and application of ExciTE F adhesive (Ivoclar Vivadent; Figs. 9 & 10). The adhesive was spread to a thin layer and light cured. Meanwhile, the veneers were pretreated with 5 % hydrofluoric acid for 20 seconds, rinsed with water, dried and silanised with Monobond N (Ivoclar Vivadent). For cementation, Variolink N was used.

The veneers were placed in situ one by one (Fig. 11) and cured with a bluephase 20 curing light (Ivoclar Vivadent)—restoration margins should be covered with a glycerine gel or Air Block Liquid Strip (Ivoclar Vivadent) to avoid the formation of an oxygen inhibition layer. Finally, excess composite material and the retraction cord were removed (Figs. 12 & 13). The occlusion and articulation were adjusted, and the restorations were finished using OptimaLine ceramic polishers (Ivoclar Vivadent).

Conclusion
Correcting a diastema with minimal removal of healthy tooth structure was a successful approach in this case (Fig. 14). In conclusion, advanced metal-free ceramic systems could be said to be the best choice for aesthetic dental treatments, as they offer ideal results, functionality and durability.