Direct anterior composite veneer using a universal bulk-fill composite with a simplified shade system: A clinical case report

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Summary:
Today, the highest aesthetic demands can be satisfied with direct composite restorations. In addition to protecting the hard and soft tissues compared to indirect procedures (veneers, crowns), the restoration can be created in one appointment without an impression or temporary restoration at reduced costs.

Keywords
composite, direct restorations, anterior teeth, adhesive technique

Introduction

In dental treatments in the anterior region, the esthetic result plays a dominant role alongside functional concerns. While both aspects are of great importance to the practitioners, many patients concentrate primarily on the perfect appearance of the restorations. Fortunately, a large number of patients today have developed a strong dental awareness and are therefore prepared to make the necessary financial expenditure for an attractive smile.

In recent decades, continuous development in the material science of composites and adhesive systems has resulted in major advances in the material properties and the associated application protocols of adhesive dentistry as well as in treatment safety.[1-3] At the same time, the range of indications for adhesively bonded composite restorations in the anterior and posterior region has been significantly expanded. Particularly in the last 30 years, the intraoral use of composites to patients in the area of the anterior teeth has been perfected through the introduction and continuous improvement of various layering techniques.[4-12] Today, direct composite restorations can be used to cover a wide range of indications - from minimally invasive treatments and cavity-free tooth reshaping procedures to extensive anterior tooth reconstructions, which often replace a large part of the crown volume of a tooth.[13-16]

There is now an almost overwhelming variety of composite materials available for direct patient application. These restorative materials can be divided into classic universal composites, traditional flowable composites, bulk-fill composites (with a flowable and sculptable consistency), thermoviscous composites, and even highly esthetic composites for sophisticated anterior restorations. Of course, almost all composite manufacturers also offer most of these material classes as their own product brands. This often makes it difficult for the practitioner to keep track of which material is best suited for which indication. For some time now, a trend has been emerging towards

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Fig. 1 and 2: Initial situation: The left lateral incisor is clearly palatal in relation to its neighboring teeth. This disturbs the patient, who would like a better visual integration into the dental arch.

Fig. 3: Shade selection on the moist tooth.

Fig. 4: Removal of the old distal composite filling and minor preparation of the labial surface for a direct com-posite veneer.

increasingly favoring composites for universal use. More specifically, these are products with a good chameleon effect, which ultimately allows the entire VITA® spectrum to be covered by using just a few shades. If a dental practice has many demanding patients who also pay the necessary additional costs for esthetically high-quality anterior tooth restorations, then an esthetic composite with different levels of translucency/opacity may also be necessary.

The highly viscous, sculptable universal composite GrandioSO Unlimited (VOCO, Cuxhaven) is offered in a simplified cluster shade system with only five differently colored composite pastes (A1; A2; A3; A3.5; A4). Due to their pronounced chameleon effect, these composite pastes are able to cover the entire spectrum of the VITA® shade space. The excellent shade adaptation of GrandioSO Unlimited makes it universally applicable in the anterior and posterior dentition. GrandioSO Unlimited can be processed in increments of up to 4 mm thickness, making it one of the most popular bulkfill composites. It has an inorganic filler content of 91 wt.% and exhibits a polymerization shrinkage of 1.44 vol.% with low shrinkage stress. GrandioSO Unlimited is extremely radiopaque. With a radiopacity of 900% Al, it provides an extraordinary contrast to the tooth structure and other filling materials.

Clinical Case Presentation

A 60-year-old female patient came to our dental office with the desire to have the left lateral maxillary incisor, which is clearly positioned palatal in relation to the left central incisor, optically better positioned in the dental arch (Fig. 1 and 2). In addition to the position of the tooth, the patient was particularly bothered by the fact that the tooth appeared significantly darker when smiling compared to the left central incisor and the PFM crown on the left cuspid. The tooth reacted sensitively to the cold test without delay and also showed no abnormalities in the percussion test. After being informed about possible treatment alternatives and their costs, the patient opted for a direct veneer using the universal composite GrandioSO Unlimited (VOCO GmbH, Cuxhaven).

Treatment started with thoroughly cleaning the affected tooth of external deposits using a fluoride-free prophylaxis paste and a rubber cup. Subsequently the appropriate composite shade was determined on the still moist tooth (Fig. 3). The selected composite shade was then checked by applying a small button of the composite mass to be used to the tooth that had not been desiccated and had not been pretreated with adhesive.[17] The composite sample must be light-polymerized for the time specified

by the manufacturer in order to obtain a meaningful optical comparison. Only with sufficient light-exposure is the photoinitiator camphorquinone, which is contained in most composites and has an intense yellow color, largely consumed and converted into a colorless reaction product ("photobleach").[18-23] After polymerization of the composite sample applied to the tooth surface, its optical properties are compared with the surrounding tooth substance in terms of shade and degree of translucency. At this point, a correction can easily be made by replacing an optically unsuitable sample with a shade-optimized composite material. This individual verification process, which only takes a very short time, ensures that the optimally matching composite material is used for the subsequent restoration. This means that time-consuming rework or even new restorations due to esthetic complaints from disappointed patients can be avoided in almost all cases.

The superficial enamel of the labial surface of the tooth was lightly instrumented with a fine-grit finishing diamond and a small equigingival chamfer was prepared to create a perfect transition between the direct composite veneer to be made and the cervical tooth contour. In addition, the old insufficient distolabial composite filling was removed (Fig. 4). To expose the cervical preparation margin, the adjacent gingiva was displaced with a retraction cord, resulting in bleeding from the sulcus (Fig. 5). A retraction paste with astringent effect (Retraction Paste, VOCO GmbH, Cuxhaven) was applied from a capsule into the labial sulcus using a very thin, tapered cannula (Fig. 6). After a 2-minute exposure time, the paste was carefully removed completely with air-water-spray using high-vacuum suction (Fig. 7). The area was subsequently dried with compressed air. The local bleeding in the gingival region was easily and effectively stopped by using the retraction paste containing aluminum chloride and kaolin (Fig. 8). Only a clean and dry working area allows for contamination-free work in the further course of treatment. In the next step, both adjacent teeth were protected using Teflon tape (Fig. 9).

The universal adhesive Futurabond M+ (VOCO) was chosen for the adhesive pretreatment of the dental hard tissue. This modern one-bottle adhesive can be used with (etch-and-rinse approach: selective enamel-etch or total-etch of enamel and dentin) or without (self-etch) prior application of phosphoric acid. In this clinical case, the total-etch adhesive pretreatment using phosphoric acid was used. 35% phosphoric acid (Vococid, VOCO GmbH, Cuxhaven) was applied on enamel and dentin (Fig. 10). Subsequently the tooth was washed thoroughly for 20s with

Fig. 5: Displacement of the marginal gingiva with a retraction cord to expose the cervical preparation margin, resulting in bleeding from the sulcus.

Fig. 6: A retraction paste (Retraction Paste, VOCO GmbH, Cuxhaven) with astringent effect was applied into the labial sulcus.

Fig. 7: After a 2-minute exposure time, the paste was carefully removed with the air-water-spray using high-vacuum suction.

Fig. 8: The bleeding was easily and effectively stopped by using the retraction paste.

Fig. 9: Both adjacent teeth were protected using Teflon tape.

Fig. 10: Conditioning enamel and dentin with 35% phosphoric acid gel.

Fig. 11: After thoroughly washing the acid and dissolved precipitates, the tooth is air-dried.

Fig. 12: Application of the bonding agent Futurabond M+ with a microbrush.

Fig. 13: Careful evaporation of the solvent with dry, oil-free compressed air.

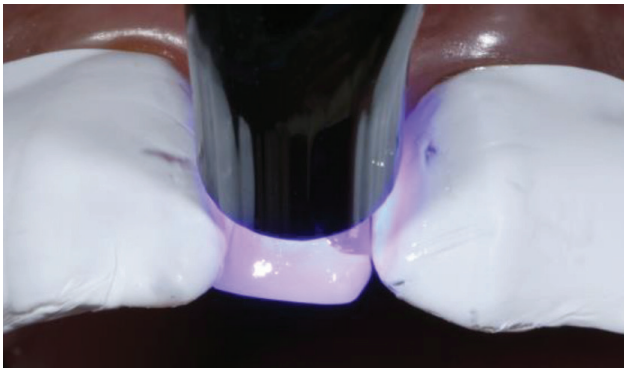

Fig. 14: Light polymerization of the adhesive for 10 s.

Fig. 15: After application of the adhesive, the preparati-on shows a shiny surface.

the air-water-spray to remove the acid and precipitation residues, following by gently drying with compressed air (Fig. 11). Ample amounts of the adhesive Futurabond M+ were applied and distributed on the preconditioned tooth surface using a microbrush (Fig. 12). It must be ensured that all cavity areas are sufficiently covered by the adhesive. After at least 20 seconds of carefully scrubbing the adhesive into the tooth surface, the solvent was carefully evaporated with dry, oil-free compressed air from the bonding agent until a glossy, immobile adhesive film resulted (Fig. 13). Then, the bonding agent was subsequently light-cured for 10 seconds (Fig. 14). The result was a shiny cavity surface, evenly covered with adhesive (Fig. 15). This should be

Fig. 16 and 17: Using the freehand technique and a matrix, the incisal edge of the incisor was lengthened and simultaneously straightened with GrandioSO Unlimited (VOCO, Cuxhaven).

Fig. 18: The distal tooth defect was filled with GrandioSO Unlimited.

Fig. 19: GrandioSO Unlimited was applied to the entire labial surface as a direct veneer to optically reduce the palatal position and thus achieve an improved position in the dental arch.

carefully checked, as any areas of the cavity that appear matte are an indication that insufficient amount of adhesive has been applied to those sites. In the worst case, this could result in reduced bonding of the restoration in these areas. If such areas are found in the visual inspection, additional bonding agent is selectively applied to them to optimize the adhesive layer.

Using the freehand technique and a transparent matrix, the incisal edge of the left lateral incisor was lengthened and simultaneously straightened with the universal composite GrandioSO Unlimited (VOCO, Cuxhaven) (Figs. 16 and 17). After contouring, the composite was cured for 10 seconds with a polymerization light (light intensity > 1200 mW/cm²). In the second step, the distal tooth defect was filled with GrandioSO Unlimited, and the composite was light-cured again (Fig. 18). GrandioSO Unlimited was then applied to the entire labial surface as a direct composite veneer to optically reduce the palatal position of the tooth and thus achieve an improved position in the dental arch (Fig. 19). The proximal contours were shaped using the "matrix pull" technique according to Corky Willhite.[24] Finally, the restorative material was polymerized again for 10 s.

Fig. 20 and 21: Final situation: Finished direct compo-site veneer exhibiting a high luster surface.

The direct composite veneer was carefully finished with rotary instruments and abrasive discs. A smooth and shiny surface of the restoration was then achieved using composite polishers (Diacomp Twist, EVE Ernst Vetter GmbH, Keltern) (Fig. 20). The direct veneer slightly labialized the lateral incisor and thus significantly improved the tooth position in the dental arch (Fig. 21). Finally, fluoride varnish (Bifluorid 10, VOCO GmbH, Cuxhaven) was applied to the tooth using a foam pellet.

Conclusion

The mild rotations presented on the upper teeth were mild enough to allow a fully restorative journey and achieve well-designed anterior/lateral excursive movements should the patient not have the will or time to undergo the movements of teeth.

For the lower teeth, the patient agreed that orthodontics would be beneficial, however limited by the time she planned to be in the UK. This ultimately led to the compromise to focus on the upper teeth with the potential to align the lower teeth thereafter, which the patient understood as the opposite sequence to my clinical recommendation. The clinical impact of this is manageable with the mild crowding and a realistic compromise to accept for both the patient and myself.

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