CASE REPORT

Minimally invasive treatment on a stable basis

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In the case of restorations in the sensitive anterior region, in addition to direct and indirect ceramic solutions, minimally invasive options for realising direct and highly durable restorations using composites have also been long established. However, one particular challenge which remains is the treatment of dental traumas and tooth gaps. In such cases a stable and reliable basis for the artificial tooth is required. This article describes the use of the material GrandTEC (VOCO) as an ideal medium for creating direct and natural-looking restorations using composites. GrandTEC is a glass fibre strand consisting of multiple, densely packed, parallel running glass fibres that are impregnated with a light-curing resin. This results in the glass fibres binding closely with the flowable composite during polymerisation, whereby the latter is used to embed and fix the strand on the natural dental hard tissue. The glass fibre strand embedded in the flowable composite forms the basis for the restoration with packable composites using the modelling and layering techniques. Thanks to this high-strength glass fibre/composite combination, the masticatory forces which occur are distributed evenly over the restoration and the abutment teeth. This, in turn, increases the flexural strength and fracture resistance of the restoration which, in terms of both its appearance and functionality, cannot be distinguished from a natural tooth.

Clinical case

An 11-year-old female patient presented at our clinic with an anterior tooth trauma. Tooth 11 had a complex crown fracture (Figure 1). Following a physical and radiographical examination, we decided to remove the broken clinical crown. As the root canal was not infected, we were able to immediately place a permanent root-canal filling. Another argument for preserving the root was to ensure favourable conditions for a subsequent surgical and prosthetic restoration with an implant. Following the root filling, the next step involved temporary treatment of the gap with a composite build-up using a minimally invasive approach. For this, a stable basis was first created using GrandTEC. Only minimal preparation was required for this. A wax wire inserted in the plaster cast helped to determine the length and design of a template made from bite registration silicone (Registrado Clear, VOCO) for the arch-shaped positioning of the glass fibre strand in the gap

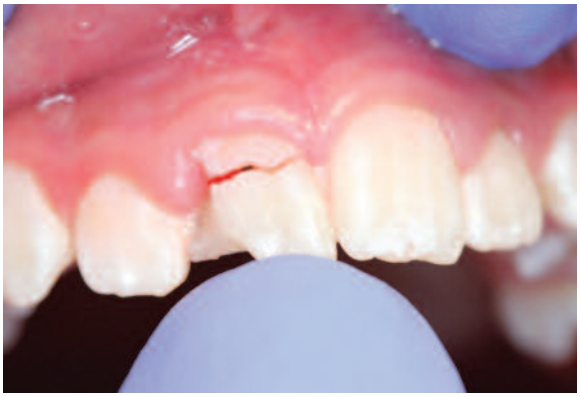

Figure 1: Fracture on tooth 11 in the cervical region from mesial to distal.

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Figure 2: A wax wire in the maxilla impression is used to produce a template made from bite registration silicone in order to position the glass fibre strand between tooth 12 and tooth 21.

Figure 3: The working field following removal of the fracture fragment and completion of endodontic treatment.

Figure 4: Customisation of the template made from bite registration silicone.

Figure 5: Teeth 12 and 21 are etched palatally using 35% phosphoric acid.

between tooth 12 and tooth 21. Following isolation of the working field using a rubber dam, as well as cleaning and drying of the tooth surfaces, teeth 12 and 21 were etched palatally using 35% phosphoric acid (Vococid, VOCO) with an exposure time of 20 seconds. The teeth were rinsed thoroughly with water, all excess material was suctioned away and then dried briefly. A light-curing one-component adhesive (Futurabond M, VOCO) was then applied to and rubbed into the conditioned tooth surfaces. After drying briefly, the adhesive was light cured for 20 seconds. A thin layer of a flowable composite (GrandioSO Heavy Flow, VOCO), shade A2, was subsequently applied to the areas covered with adhesive in order to fix the glass fibre strand in place. This was cut to the required length using fine-tip scissors and then removed from the protective film. Resting facially on the silicone template, the glass fibre strand was then positioned from the palatal direction between tooth 12 and tooth 21 and placed on the areas coated with flowable composite. After light curing the bond sites for 20 seconds, the glass fibre strand was completely embedded in shade A2 flowable composite and light cured uniformly for 20 seconds. The basis for incrementally building up the tooth with the composite was then ready.

We used the highly aesthetic restorative material Amaris (VOCO) to reconstruct the traumatically damaged anterior tooth. With the two-layer technique, the restoration can be created using just one opaque and one translucent shade. For this, the core is built up using an opaque base shade to which a layer of a translucent enamel shade is applied. The final shade of the tooth is thus developed during layering,

Figure 6: After conditioning the tooth surfaces, adhesive (Futurabond M, VOCO) is rubbed in and light cured.

Figure 7: The glass fibre strand located on the silicone template (GrandTEC, VOCO) is positioned between tooth 12 and tooth 21 and placed on the palatal surfaces coated with flowable composite.

Figure 8: The tooth build-up modelled on the basis of a glass fibre strand and flowable composite (GrandioSO Heavy Flow, VOCO) using the highly aesthetic composite (Amaris, VOCO) closes the gap between tooth 12 and 21.

Figure 9: The vestibular view shows the harmonious proportions vis-à-vis tooth 21 and the natural-looking design of the incisal edge.

Figure 10a and 10b: The finished restoration has a natural-looking appearance and cannot be distinguished from the original tooth. This is due in part to the modelled mamelon structures and white spots.

accents and especially fine structures can be achieved using the individual shades. In this case, after shade matching using the Amaris shade guide, the dentine core was first modelled with the help of the silicone index using opaque material in shade O2. When modelling the opaque material in the incisal third, care had to be taken to gradually

decrease its thickness towards the incisal edge in order to be able to subsequently apply a correspondingly thicker layer of translucent material. After light curing the opaque material for 40 seconds, thin layers of the flowable individual shade, Amaris Flow High Opaque (HO), were applied in a finger-shaped pattern in corono-apical direction to recreate the pronounced mamelon structures seen in the teeth of most young people. In addition, the restoration was accentuated with "white spots" to help recreate the original character of the tooth. 40 seconds of light curing again followed application of the individual shade. Finally, the overall restoration was lightened slightly with the layer of translucent material Light (TL) which was applied last. This layer had to be applied from incisial to cervical direction, decreasing in thickness from 1.0 mm to 0.5 mm, and was subsequently light cured for 10 seconds. A one-step diamond polisher (Dimanto, VOCO) was used for finishing and polishing, working with a small tip on the vestibular face and a small cup on the palatal face. The finished restoration is a natural-looking result which cannot be distinguished from the original tooth and blends in exceptionally well with the dental hard tissue of this young patient. In conclusion: Good stability, functionality and morphological features have all been combined in this restoration.