Direct composite restoration in a complex patient case—A valuable alternative

Fig. 1: Initial situation after completion of periodontal treatment. — Fig. 2: View from the palatal side: the carious lesions and defective restorations are clearly discernible. — Fig. 3: Removal of various tooth structures. — Fig. 4: Beveling of preparation margins.

Conventional restorative methods help preserve as much healthy tooth structure as possible and slow down the destructive restorative cycle. Nonetheless, direct restorative treatment may offer a valuable alternative, even if it may not be the first choice. Direct composite restorations are particularly useful for patients who are looking for an inexpensive treatment option. Modern direct restorative materials facilitate minimally invasive preparation techniques and provide long-lasting results.

Direct restorative treatment is particularly suited to the reconstruction of anterior teeth in cases in which there is substantial loss of tooth structure. However, appropriate treatment planning and a systematic application of the adhesive technique, particularly if anterior guidance has to be re-established, are prerequisite for achieving a successful result. This report describes the reconstruction of anterior teeth that were severely damaged by dental caries. The treatment involved the use of a fibre-reinforced root-canal post and a build-up restoration with Tetric N-Ceram (nano-optimised composite material; Ivoclar Vivadent). The restorations were customised with Tetric Color (Ivoclar Vivadent).

The patient was referred to us by his periodontist to have his upper incisors reconstructed. The teeth in question showed substantial loss of tooth structure due to multiple medium-sized to large carious lesions and fractures of the existing restorations (Figs. 1 & 2). Upon completion of periodontal treatment, tooth #11 was treated endodontically. Subsequently, the planning stage was commenced. For this purpose, a diagnostic wax-up was created for teeth #12, 11, 21 and 22. This wax pattern fulfilled two functions: it allowed evaluation of the function and morphology of the planned restoration and fabrication of a silicone key, which the dental team used as a guide during the composite build-up.

At the first session, the teeth were first treated prophylactically to remove extrinsic staining. After that, the carious dentine was excavated with a round carbide bur at slow speed (Fig. 3). A completely dry treatment field was established with a rubber dam to ensure appropriate adhesive bonding. The enamel margins were bevelled to enhance the adhesion of the restoration (Fig. 4). This marginal design also created a gentle transition between the natural tooth structure and the restoration.

Next, the fibre-reinforced post was inserted and cemented into the root canal of tooth #11 to compensate for the extensive loss of tooth structure and enable the subsequent placement of the restorative material. Surplus cement was carefully removed from the root-canal entrance. Next, the enamel and dentine were etched with phosphoric acid (enamel for 30 seconds and dentine for 15 seconds; Fig. 5). Then, the adhesive was applied to the substrate, which was still moist, and polymerised until the surface showed an even, glossy appearance. This indicated that the prepared surfaces and dentine tubules had been sealed reliably.

After application of the adhesive, the palatal walls were first built up using Tetric N-Ceram Bleach L (Fig. 6). For this purpose, the silicone key, which was produced based on the wax-up, was employed. In the incisal area in particular, the layer thicknesses should be kept to a minimum to ensure sufficient space for the subsequent application of the effect materials. A curing time of 10 seconds with a blue-light curing unit (>1,200 mW/cm²) is sufficient, owing to the thin thickness of the layers. The dentine core was built up with Tetric N-Ceram A3.5 Dentin.

The mamelons were only slightly accentuated to match the age-specific characteristics of the patient (Fig. 7). It is important to note that layers exceeding 2 mm are not applied at any stage. Furthermore, each layer should be light-cured for 20 seconds using a light output of at least 500 mW/cm². Short curing times of 10 seconds are sufficient with light units that provide an output of >1,200 mW/cm². The composite may be adapted with a brush to avoid entrapment of air bubbles. A thin metal matrix was applied and secured with a wooden wedge to create optimal contact areas (Fig. 8). The aesthetic design may be optimised with characteristicisation materials to meet the individual requirements of the patient (Tetric Color white was used in the present case; Fig. 9). Next, a thin layer of Tetric N-Ceram Bleach L was applied to establish an ideal outline of the mamelons and ideal light reflection angles. Flexible discs and abrasive silicone polishes were used for finishing the restoration.

Final polishing of the restoration was performed during a second appointment. The Astropol silicone polishing system and Astrobrush polishing brushes (both Ivoclar Vivadent) were utilised (Figs. 10 & 11). These auxiliaries ensure both an optimal surface gloss and a fine surface texture (Fig. 12).

Conclusion

As patients’ expectations of dental aesthetics are continuing to rise substantially, restoring anterior teeth constitutes a veritable challenge. Although the direct restorative technique does not necessarily present the method of choice for large reconstructions in the anterior region, as indirect restorations tend to be preferred for this indication, it may nonetheless offer a viable alternative for patients who cannot afford, or do not want to pay, the cost of more expensive treatment.

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