

Restorative dentistry: digitally created endocrowns

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Using endocrowns to restore deeply damaged teeth that have undergone root canal treatment is a defect-oriented and minimally invasive procedure.

In contrast to full crown preparations, tooth substance preservation is a top priority for endocrowns. However, in these kinds of cases, this requires CAD/CAM materials such as the biomimetic hybrid ceramic material Vita Enamic (Vita Zahnfabrik), that allow for extremely delicate reconstructions with minimum wall thicknesses and material properties that exhibit tooth-like behaviour.

In the following case, the hybrid ceramic was also selected because its high edge stability allows it to be processed precisely with CAM technology, and it ensures a secure adhesive bonding, according to the proven all-ceramic protocol.

In this case study, the aim is to show my step-by-step procedure.

Case report

A 28-year-old male patient visited the clinic after an endodontic treatment and filling therapy on the UR4, due to consistent food remnants in the distal proximal space that were difficult to remove and often led to local inflammation.

The clinical evaluation found that the filling restoration (OD) was insufficient. The X-ray check showed nothing out of the ordinary. The patient opted for a new, time-efficient CAD/CAM-supported fabrication of the restoration.

The polychrome Vita Enamic Multicolor was selected for the reconstruction. This CAD/CAM blank has an integrated shade and translucency gradient, and a natural play of colours and light that can be conveniently reproduced at the push of a button.

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Figure 1: Insufficient composite filling on the UR4 (OD) had led to inflammations in the interdental space



Figure 2: After removal of the old composite filling, an inflammatory bleeding of the gingiva appeared on the proximal box



Figure 3: A distal gingivectomy was performed and a retraction cord was inserted

Clinical steps

Before the preparation, the tooth shade 2M2 was determined using the Vita Toothguide 3D-Master (Vita Zahnfabrik), and the appropriate blank in the shade 2M2 was selected. Local anaesthesia was applied and the composite filling was then removed.

After full adhesive conditioning, all undercuts were evened out with a low-viscosity composite. The remaining cavity walls were only reduced with a shoulder preparation.

This was followed by the insertion of a retraction cord, as well as a gingivectomy of the enlarged and inflamed gum areas on the distal box so that an optical scan could be used to detect all relevant areas.

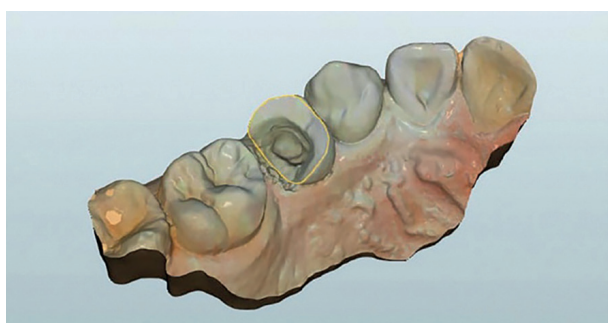


Figure 4: Based on the intraoral scan, a virtual model was created for the construction

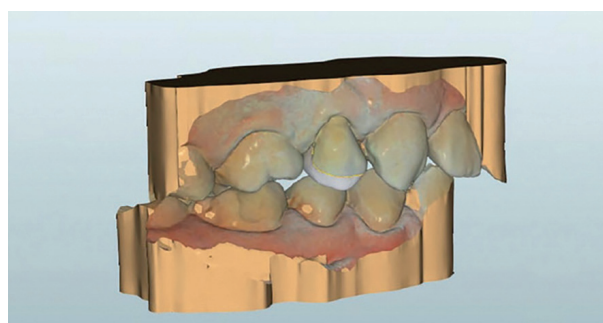


Figure 5: The finished virtual design of the endocrown restoration in the vestibular view

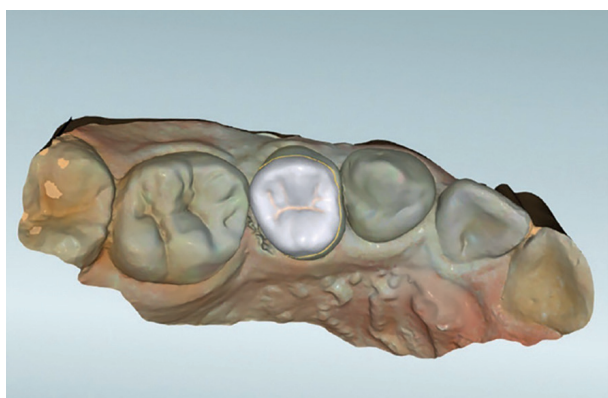


Figure 6: The virtual design in occlusal view before nesting in the virtual block

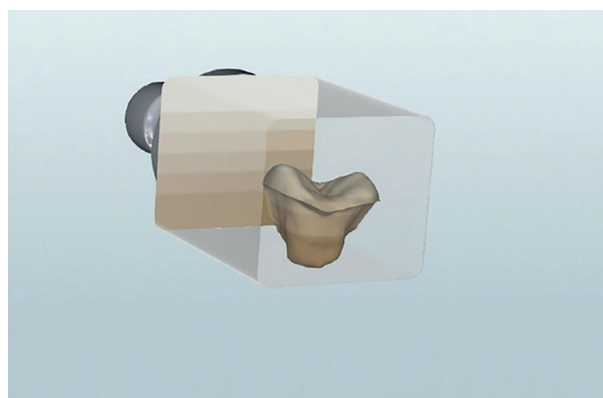


Figure 7: Thanks to six finely nuanced layers, the shade and translucency gradient of the restoration could be controlled with the positioning



Figure 8: The highly translucent, hybrid ceramic block in shade 2M2 positioned in the grinding machine



Figure 9: The CAD/CAM-supported fabricated restoration after the preparation at the clinical try-in

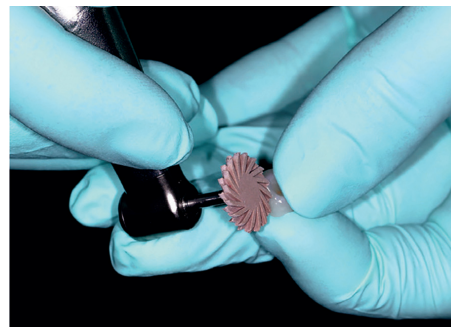


Figure 10: The finished hybrid ceramic crown was then polished to a high gloss



Figure 11: Under rubber dam, the fully adhesive seating began with phosphoric acid etching of the cavity



Figure 12: Condition immediately after full adhesive seating, before removal of the cement residues

CAD construction and CAM fabrication

After the CAD design was complete, the restoration could be positioned in the virtual Vita Enamic Multicolor blank with its six finely nuanced layers, so that the translucency and shade

gradient corresponded to the clinical situation. This was followed by fabrication using the Mycrown Mill grinding unit (Fona Dental).

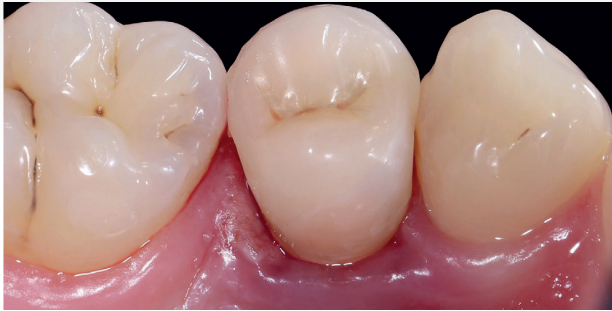


Figure 13: Immediately after the final seating, the gingiva was still irritated and inflamed



Figure 14: Three-month follow-up – healthy gingival conditions



Figure 15: Final result

After the restoration was finished with fine diamonds, the fissures were conditioned with hydrofluoric acid (5%) and silane in order to characterise them with light-curing composite stains. The final step was the high-gloss polish.

Full adhesive seating and final result

A rubber dam was placed for the fully adhesive seating in order to prevent contamination and to ensure absolute dryness and a sustainable bond. The adhesive surfaces of the restoration were conditioned using hydrofluoric acid (5%) and silane. In order to create a retentive etching pattern on the enamel areas and to prepare the dentine for the adhesive bond, the cavity was etched with phosphoric acid and then an adhesive was applied.

For luting, composite from Micerium in the shade HRI was heated to give it a lower viscosity for insertion. Light curing and removal of the composite residues followed. As a result, the polychrome hybrid ceramic restoration was integrated harmoniously into the natural tooth structure, producing a very aesthetic result. The follow-up appointment three months later showed a healed and inflammation-free gingiva around the restoration.

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