Anterior tooth restoration— An exciting experience

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Fig. 1_Pre-op view, showing fractured central incisor.
Fig. 2_Considerable loss of dental enamel; fracture line near the pulp.
Fig. 3_Mock-up made of composite resin (A4) for the palatal silicone matrix.
Fig. 4_Preparation of a feather edge under rubber dam isolation.

_A very close inspection of dental enamel reveals its intricate fabric. Reproducing these fine structures and shade nuances seems a daunting task. Owing to the research and development efforts of dental composite manufacturers over the past few years, materials are now available that greatly facilitate the placement of restorations. Nevertheless, the appearance of composite resin restorations is often marred by a greyish shimmer. The following clinical case shows a way to avoid this problem and realise the natural-looking results envisioned by the patient.

Fig. 1

Fig. 2

Fig. 3

Fig. 4

An 11-year-old male patient presented to our surgery with a fractured central incisor (Fig. 1). The clinical examination revealed that the tooth was sensitive to temperature and percussion. A fracture close to the pulp was diagnosed (Fig. 2). Clinical evidence of a periodontal trauma was not found. I recommended that the tooth be reconstructed by layering composite resin using a minimally invasive and conservative restorative technique.

_Shade selection

I determined the shade in daylight at the beginning of the treatment before the teeth were dried. I used the shade guide of the composite resin, which I subsequently used during the restorative procedure (Tetric EvoCeram, Ivoclar Vivadent). In order to check the selected tooth colour, I applied a composite layer to a tooth and polymerised it. For the cervical area, I chose dentine shade A2 and for the incisal area, enamel A1.

_The mock-up

The treatment area was locally anaesthetised and the tooth was reconstructed free-handedly using a composite resin (deviating from the tooth colour), without preparation or the application of an adhesive. I decided to use an easily recognisable shade, in this case A4 (Fig. 3). After polymerisation, the shape and exact position of the margin and the occlusion were refined. Finally, a silicone matrix of the palatal surface and the margin was fabricated with a putty impression material. This matrix would facilitate the subsequent layering procedure. After the fabrication of the silicone matrix, the provisional restoration (mock-up) was removed. Later, a composite resin in the desired tooth colour would be placed.

_The cementation protocol

When the adhesive is applied to the restoration, it is important to ensure that the tooth surface is not too wet. The placement of a rubber dam with ligatures is standard procedure. The rubber dam provides an unobstructed view of the treatment field and increases the safety and comfort of the practitioner and the patient.

The tooth substance was prepared with a feather edge in the labial enamel. This preparation design ensures tight sealing and forms the basis for an unobtrusive transition between the natural tooth structure and the composite resin (Fig. 4). The enamel and dentine were cleaned with a 0.2 % mixture of pumice and pure chlorhexidine (PAROEX, GUM). Next, Telio CS Desensitizer (Ivoclar Vivadent) was applied.

Owing to the wide enamel edge, the Total Etch technique (Ivoclar Vivadent) was used in the present case. That is, the tooth was etched with phosphoric acid before the adhesive was applied. Therefore, the enamel was etched for 30 seconds and the dentine

for 15 seconds with Total Etch. This etching gel contains 37 % phosphoric acid. The surfaces were rinsed for 20 seconds and then carefully dried according to the wet-bonding principle (adhesion to moist surfaces). As a result, the enamel was dry, while the dentine remained somewhat moist. This drying step requires utmost care when this type of adhesive is used. If the moisture content within the dentine tubules is too high or if the collagen fibres collapse owing to excessive drying, the penetration of the adhesive, and therefore the bond strength, will be reduced.

The single-component adhesive ExciTE (Ivoclar Vivadent) was applied to the enamel and dentine and allowed to react for ten seconds. An indirect stream of air was used to evaporate the solvent contained in the adhesive. In the process, the air spray was applied to a mirror in the mouth, which was held at an angle to the prepared tooth surface. As soon as the surface was lustrous, the adhesive was further polymerised for ten seconds (low power mode of the bluephase G2 LED curing light, Ivoclar Vivadent).

_Layering of the composite resin

First, the composite resin was applied to the palatal areas. The enamel material A1 was applied in the silicone matrix. In order to avoid the formation of bubbles, the composite resin was distributed very carefully. The matrix was placed in the patient's mouth and positioned on the palatal surface with light pressure. The composite resin was polymerised for 15 seconds using the soft start mode (Fig. 5). Small lobes of dentine material (A2) were subsequently applied. The position of these lobes was individually determined. The aesthetic results were based on the contralateral teeth, which served as a comparison. In this case, the mamelons were clearly separated. They ended below the incisal edge (Fig. 6). By observing the existing anatomical features, a natural-looking and aesthetic outcome was achieved.

The composite resin was applied in small amounts, which were periodically cured with the bluephase curing light in the soft start mode. The dentine material was then applied and light-cured. Next, the incisal edge of the tooth, that is, the outermost part of the restoration, was reconstructed. Small amounts of the translucent incisal material T were placed between the dentine mamelons. A probe came in useful in these narrow areas. Finally, the entire labial surface was coated with Tetric EvoCeram Bleach 1, ensuring that both the dentine lobes and the incisal edge were completely covered. The Bleach shade made the tooth appear lighter. The dentine material imparted the composite resin restoration with a tooth-like appearance. The Bleach shade was responsible for the tooth's natural-looking brightness.

_Surface finishing

The aesthetic outcome is largely based on the successful recreation of the surface texture. The imitation of the shape and surface details is just as important as that of the fine colour nuances. In the treatment of a child's tooth in particular, it is important to take the micro- and macro-anatomical structure into consideration. The surface was finished with finishing diamonds (first red, then yellow). Spray was not used. Work was done using a surgical microscope. The restoration was finally polished with the Astropol system (using water spray; Ivoclar Vivadent). In contrast to polishing discs, these rubber tips do not harm the surface structure.

_Conclusion

The fabrication of natural-looking, highly aesthetic restorations is a rewarding task with Tetric EvoCeram materials and the increment technique. The Bleach shade on the tooth surface brightens the restoration. This approach is extremely helpful in the restoration of children's teeth. With the help of this adhesive technique, teeth can be restored in a minimally invasive manner (Figs. 7 & 8)._

Fig. 5

Fig. 6

Fig. 7

Fig. 8

Fig. 5_Build-up of the palatal surface with enamel material (A1). The precision of the morphology is already impressive at this stage.
Fig. 6_Lobes are created with dentine material (A2). The translucent material is placed between these mamelons.
Fig. 7_A comparison: before ...
Fig. 8_... and after: the Bleach shade on the surface of the restoration imparts the tooth with the necessary brightness.

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