initial LiSi Press

Ceramic Adhesive Restorations: Management of two different substrates

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Research in the field of biomaterials has led to the advent of glass ceramics enriched with lithium disilicate. This type of ceramic combines bonding ability, mechanical strength, choice of degree of translucency and high aesthetic potential. The current adhesive techniques associated with this material have changed the principles of preparation of indirect restorations towards a dentistry more respectful of dental tissue. Hence, veneers, also called ceramic adhesive restorations (CARs) are the core of aesthetic adhesive dentistry[1].

Clinical case

A 25-year-old woman came for a consultation because she did not like the appearance of the voluminous composite restoration on tooth 11 (Fig. 1).

The latter was done urgently one month ago. The patient had indeed lost an old composite made three years ago, at the same time that a veneer was made on tooth 21. Both restorations were made after a brutal fall. The patient indicated that 21 was vital and 11 had been devitalized, which explained the slight discolouration. She also reported that tooth 21 had been sensitive to cold for some time. The clinical examination showed a fracture of the veneer at its palatal margin which probably caused the sensitivity (Fig. 2).

Finally, the patient requested not to have composites and wanted a more reliable restoration.
After reflection, the therapeutic solution chosen is the realization of 2 CARs on 11 and 21. An aesthetic project simply consisting of a slight lengthening of the central incisors and an adjustment of their shape was established. This was materialized on the study models, in the laboratory, by means of a wax-up on teeth 11 and 21 (Fig. 3). The project was then transferred to the mouth using a silicone key that allows for a mock-up. The result was satisfactory in terms of dental proportions. In the following session the calibrated preparations were made through a new mock-up (Fig. 4) to follow the principle of tissue economy[2-4].

Figure 1: Smile of the patient before treatment.

Figure 2: Presence of a palatal fracture of the veneer on tooth 21.

Figure 3: Wax-up created at the laboratory.

Figure 4: Calibrated preparations through the mock-up.

This was especially true for 11, since for 21 it was necessary to remove the existing fractured veneer without removing additional healthy tissue. Special instrumentation was used to avoid damaging the adjacent teeth and the periodontium (Fig. 5).

Figure 5: Preparation technique respecting the surrounding tissues.

The occlusal impact points were mainly tested in maximum intercuspid occlusion (MIO), which resulted in lowering the palatal preparation margin on 21 and thus avoiding contact with it (Fig. 6)[5].

Figure 6: Check of the occlusion and lowering of the preparation limit of the palatal side of tooth 21 in order to avoid occlusal contact on the margin.

A control of the reduction thicknesses is then carried out using a silicone key, then the preparations are validated (Fig. 7). The tint of the two supporting teeth is raised with a dedicated shade guide, in order to take into account the discolouration of 11.

Figure 7: Validation of the thickness and preparation limits.

After making the impression (Fig. 8) and pouring the models, the ceramist used a pressing technique to create lithium disilicate frameworks from a low-translucency GC Initial™ LiSi Press (LT) ingot.

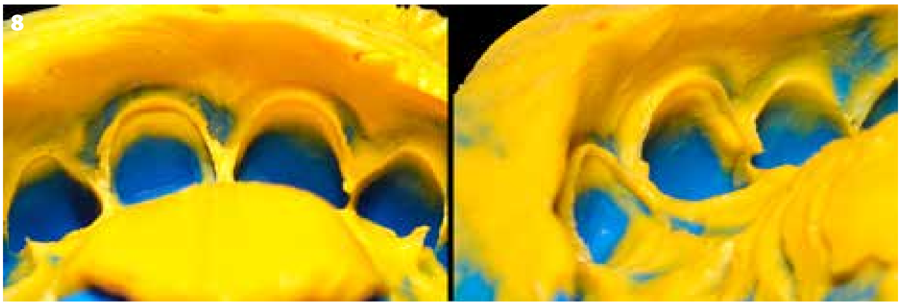

Figure 8: Double mixed impression technique presenting an excellent registration of the margins.

These frames were then veneered using GC Initial™ LiSi powders (Fig 9). The dentine mass was first applied to the cervical half of the tooth. Then an unsaturated dentine mass and a CL-F mass were applied onto the remaining half. The free edge was then veneered with different opalescent and transparent masses (EOP-3, TM-05, neutral). Finally, the incisal third was covered with incisal (E-58 and E-57), and CT-22 was added to the cervical area to slightly saturate it.

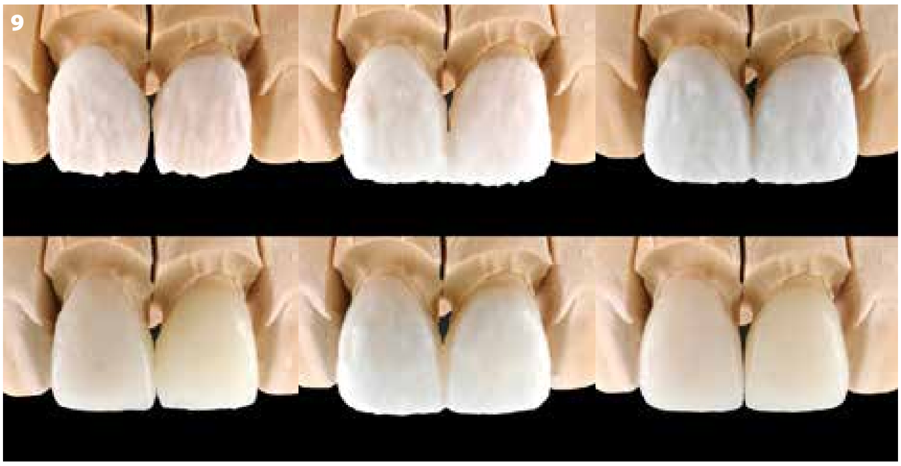

Figure 9: Stratification steps of the aesthetic ceramic GC Initial LiSi on Initial LiSi Press LT framework.

The shapes were then refined (curved, transition lines) using the "two-shade pencil technique" (Fig. 10)[6].

The surface micro-relief was also created before final glazing (Fig. 11).

After validation of the restorations, the rubber dam was placed and the CARs were retried (Fig. 12) and then bonded with a resin cement (G-CEM LinkForce, GC) combined with a universal adhesive (G-Premio BOND, GC) used in total-etch mode (Fig. 13).

Figure 10: Work on the transition lines using the two-colour pencil technique.

Figure 11: Work on the micro-texture of the surface.

Figure 12: Placement of the operatory field and verification of the seating of the CARs.

Figure 13: Cementation of the restorations.

The occlusal adjustments were made after checking the static and dynamic occlusion in order to integrate the restorations in the previous guidance. A clinical check-up after one month allowed to appreciate the good biological, functional and aesthetic integration of the restorations (Figs 14 and 15).

Figure 14: Integration of the restorations at the dentogingival level one month after treatment.

Figure 15: Integration of the restorations at the level of the smile.

Discussion

An internal bleaching of tooth 11 together with mesial angle repair by a new composite restoration could have been an alternative therapeutic solution. Similarly, a composite repair of the fractured CAR on tooth 21 could have been considered. These possibilities were not retained. The decision was primarily motivated by the quality and durability of the aesthetic outcome desired by the patient.
The fracture of the previous CAR on tooth 21 resulted from two imprudences that should not be repeated. The first was to leave the palatal margin on an MIO contact weakening the restoration at this level. The second came from the choice of the material, since it was a feldspathic ceramic, mechanically unsuited for the considerable volume of the restoration. The paradox of this clinical case lies in the fact that the 11, which was endodontically treated received a smaller CAR (butt margin) while the rather bulky CAR was made on the 21, which was vital. This shows that it was the initial tissue loss that guided the type and shape of the preparation[6], thus placing it in its proper place within the therapeutic gradient[7].
For the laboratory, the difficulties lie in the management of the shade of 11 and the significant difference in thickness between the two preparations. The choice of the low translucency (LT) ingot solved the first problem by allowing the slight discolouration to be sufficiently masked at the level of 11. It was then necessary to act on the thicknesses of the framework. The manufacturer recommends a minimum value of 0.4 mm to maintain some mechanical strength. The latter was chosen for the frame of 11 because it is in adequacy between the preparation and the final volume of the restoration. It allows on the other hand to obtain the desired masking effect. At 21, with the larger and more extensive preparation, a thicker frame (0.9 mm) was designed to achieve a shape corresponding to the final volume of the future restoration and to obtain increased mechanical strength. It were the stratification steps that finalized the harmonization of the two elements.
Thanks to the adhesive revolution and the improvement of the materials, the preparations were essentially guided by the initial tissue loss and the prosthetic project. The technique and the artistic sensitivity of the prosthetist are essential to obtain a good optical and aesthetic integration of the restorations.

References

1. Magne P, Belser U. Restaurations adhésives en céramique sur dents antérieures. Approche biomimétique. (Quintessence, 2003).
2. Gürel G. Predictable, precise, and repeatable tooth preparation for porcelain laminate veneers. Pract Proced Aesthet Dent, 2003;15: 17-24.
3. Magne P, Magne M. Use of additive waxup and direct intraoral mock-up for enamel preservation with porcelain laminate veneers. Eur J Esthet Dent, 2006; 1(1): 10-19.
4. Etienne O. Préparations pour céramiques collées : technique des masques et préservation tissulaire. Réal Clin, 2010; 21(4): 289-297.
5. Lasserre JF, Laborde G, Koubi S, Lasfargues H, Couderc G, Maille G et al. Restaurations céramiques antérieures (2) : préparations partielles et adhésion. Réal Clin, 2010; 21(3): 183-195.
6. Ubassy G. Trucs et Astuces. Teamwork Media Srl, 2008.
7. Tirlet G, Attal JP, Attal JP, Bukiet F. Traitement de la dent dépulpée antérieure : une approche graduée. Réal Clin, 2011; 1(22): 33-41.
8. Tirlet G, Attal JP. Le gradient thérapeutique : un concept médical pour les traitements esthétiques. Inf Dent, 2009; 91: 251-256.