Long-term documentation of an 11-year old restoration

A case of complex aesthetic and functional rehabilitation using glass-ceramic materials

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Resin-bonded single-tooth glass-ceramic restorations such as veneers and onlays have been routinely used for many years in dentistry. Nonetheless, their use for complex rehabilitations such as in patients with generalised hard-tissue defects, for example, is still much debated. These concerns are increasingly being resolved in view of the beneficial preliminary results reported in controlled clinical studies and the experiences gained in specialist practices.

It is essential for the long-term and reliable application of this method to accurately coordinate the stages between the dentist and technician and allow the patient to be actively involved. These stages consist of a careful treatment planning process, including a study wax-up/mock-up (aesthetic evaluation), an adequate pretreatment phase, including a functional evaluation, selection of the correct materials, combined with a preparation and placement technique appropriate for the materials selected, and implementation of an adequate occlusal design. This case report first describes the use of glass-ceramic restorations for the complex rehabilitation of a patient with extensive loss of tooth structure and then evaluates the restorations after they have been in situ for more than 11 years.

Clinical situation and treatment

A 40-year-old female presented at the practice requesting restoration of her dentition, which was severely worn. She said that she had become aware of an untoward change in her anterior teeth and in the fullness of her lips, particularly evident in photographs of herself.

The clinical findings and dental history showed large and, at times, extensive destruction of her tooth structure, as well as extensive changes in the proportion and exposure of dentine owing to a reduction in VDO. These changes were primarily caused by abrasive processes and had resulted in a reduction of the vertical dimension of occlusion (VDO).

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A functional analysis of the dentition did not reveal anything unusual. However, the loss of canine guidance and the emergence of anterior and posterior group guidance were conspicuous (Figs. 2a & b). The particular challenges we had to overcome in her case were the high complexity of the rehabilitation, the patient’s request for a prompt and minimally invasive improvement of her situation, the need for creating an appropriate tooth morphology and therefore for reconstructing the VDO, as well as the permanent placement of the restorations on damaged tooth structure.

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Fillings were placed on the teeth, some of which were severely damaged, with help of an adhesive composite system (Syntac and Tetric EvoCeram, both Ivoclar Vivadent) prior to planning of the permanent restoration. This way, we were able to better assess the severity of the destruction and obtain a better idea of where the potential preparation margins would be located. In order to achieve an aesthetic and functional rehabilitation, we had to create an adequate tooth morphology on the basis of a suitable width-length relationship of the teeth, establish an anterior canine-protected dynamic occlusion and rebuild the VDO.

The destructive processes to which the damaged teeth had been exposed had to be stopped and a stable occlusion had to be created. The patient wanted a long-lasting rehabilitation based on a minimally invasive procedure and tooth-coloured restorations. The final restoration would include adhesively bonded glass-ceramic veneers and onlays. Glass-ceramic crowns would be used for those teeth that were severely damaged (teeth #15–23). In view of the fact that these extensive aesthetic and functional modifications had to be combined with a re-adjustment of the VDO, the clinical team decided on the following treatment plan:

1. Fabrication of a study wax-up to assist in the creation of an adequate aesthetic and functional tooth morphology.
2. Intra-oral evaluation of the wax-up (mock-up) by the patient with the help of a diagnostic matrix.
3. Transfer of the increase in the VDO as determined with the wax-up to a stabilisation splint for functional evaluation.
4. Tooth preparation guided by the diagnostic matrices and reciprocal determination of the maxillomandibular relationship with a split stabilisation splint.
5. Trial of the direct temporaries on the basis of the outer contours established in the wax-up.
6. Impression taking and prompt fabrication of the permanent glass-ceramic restorations in the laboratory.
7. Try-in and permanent adhesive placement of the glass-ceramic restorations.

IPS e.max Ceram, both Ivoclar Vivadent) were used for the maxillary anterior region, which showed a high degree of tooth destruction (large composite fillings, Fig. 3a). In the mandibular anterior region, glass-ceramic veneers layered on refractory dies (IPS eSIGN, Ivoclar Vivadent) were placed (Fig. 3b). Full-contour onlays pressed from leucite-reinforced glass-ceramic similar to the other veneers, this area was in direct contact with the lithium disilicate crowns on the maxillary anterior antagonists during dynamic occlusion.

Conclusion

Given the enamel-like properties of the glass-ceramic material, the minimally invasive methods used for this case provided a long-lasting approach to restoring the function, aesthetics and biomechanics of the dentition while minimising the damage to the biological structures...

Clinical implementation and long-term evaluation

Crowns made of lithium disilicate ceramic in the layering technique (IPS e.max Press and IPS e.max Ceram, both Ivoclar Vivadent) were used for the maxillary anterior region, which showed a high degree of tooth destruction (large composite fillings, Fig. 3a). In the mandibular anterior region, glass-ceramic veneers layered on refractory dies (IPS eSIGN, Ivoclar Vivadent) were placed (Fig. 3b). Full-contour onlays pressed from leucite-reinforced glass-ceramic similar to the other veneers, this area was in direct contact with the lithium disilicate crowns on the maxillary anterior antagonists during dynamic occlusion.

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In recent years, we have mainly used glass-ceramic onlays based on lithium disilicate in conjunction with the staining technique. Given its increased strength, this material allows the minimum thickness to be reduced by one-third to just over 1 mm, further increasing the amount of tooth structure that can be preserved during preparation.

Owing to their extremely high strength and optimal marginal integrity, glass-ceramic onlays appear to be ideally suited for restoring the function, aesthetics and biomechanical properties of abraded and eroded posterior teeth. They offer an opportunity to circumvent traditional pros-thetic measures that are more invasive and involve higher biological costs.