

Minimally invasive veneer restoration with ceramic-based restorative material

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Abstract

Aesthetics is an aspect which now plays an important role in modern dentistry. As ever more patients desire a “perfect smile”, dentists are increasingly called upon to produce highly aesthetic restorations and optimise the natural situation. Reshaping of the teeth is a safe procedure with a predictable result which can be routinely performed to create a more appealing and harmonic smile. However, it requires corresponding diagnostics and treatment planning which takes both aesthetic and functional aspects into consideration. The employment of minimally invasive techniques to preserve the tooth substance and neighbouring structures and the use of dental materials boasting the highest possible stability and biocompatibility are also essential. Restorations made from indirect composite veneers are one possible treatment.

Clinical case

A 20-year-old patient wanted to improve the aesthetics of his smile (Image 1). Clinical examination revealed a diastema between the maxillary central incisors (Image 2). The patient wanted a quick solution without the necessity for orthodontic treatment. By analysing the photographs of the patient's face, we were able to establish that the line running along the incisal edges and cusp tips of the canines in the maxillary anterior teeth did not form a regular curve. To get an attractive smile, it was thus necessary to adapt the shape of all four maxillary incisors in such a way that they formed a positive smile line (Image 3). During the lateral movements, there was no contact between the mandibular anterior teeth and maxillary incisors, opening up the possibility of lengthening them.

As the patient was young, a minimally invasive technique was required, which is why we decided on a procedure in which preparation of the teeth is not essential. We chose an indirect technique in which the restorations were made from Admira Fusion (VOCO), a material containing a

ceramic matrix instead of the conventional methacrylate-based monomers, making it highly biocompatible. The use of indirect veneers produced by the dentist represents an alternative to prefabricated veneers. Producing the veneers yourself also offers further advantages such as the low costs, the possibility of personalising the tooth shape, the reduced thickness of the cement layer and the improved marginal seal.

The use of a mock-up, the basis for which was produced in this case with Die Silicone (VOCO) (Image 4), is advantageous for the simple and quick fabrication of indirect restorations. The corresponding shade for the restorative was selected right in the first treatment session. This was done by applying a small quantity of each of the possible shades to the vestibular surface of one of the teeth to be restored and curing it. After comparing the shades, we decided on A1 (Image 5).

The restorative material was applied to the silicone model with a metal spatula for production of the actual mock-up and thus also for the veneers (Image 6). During this step, it is important to try to stick to the planning specifications compiled based on the photo analysis. The aim was therefore to lengthen the maxillary incisors. Light-curing was followed by finishing and polishing with rubber polishers (Image 7). We then photographed the model and superimposed the image with a photo of the patient smiling in order to check whether the size and alignment of the teeth had been successful (Images 8 and 9).

The veneers were adapted directly to the patient's teeth (Image 10, 11, 12, 13). A considerable advantage of this technique is the possibility of checking whether the result will satisfy the expectations before the treatment is completed. Trying in the restorations also allows the patient to see the result and request any changes to be made. Once the marginal seal had been checked and the

patient was happy with the aesthetics achieved, preparations were made for placing the indirect veneers. We chose the adhesive Futurabond U (VOCO) in combination with the flowable composite GrandioSO Flow (VOCO) in shade A1 for the luting.

The gingival margin was retracted with a no. 000 retraction cord (Image 14) and 37% orthophosphoric acid applied to the teeth for 15 seconds (Image 15). Following rinsing with water and drying of the etched vestibular surfaces (Image 16), the adhesive was applied, the solvent dried with an air stream and light-curing was performed for 10 seconds. The interior surfaces of the veneers were sandblasted with aluminium oxide (90 µm) at a pressure of 60 psi in order to clean and roughen the surface. The homogeneous, clean surface of the interior of the veneer is evident when viewed against the light (Image 17). In the next step, the adhesive was applied to the same surface and then dried with a light air stream. We then distributed a small quantity of flowable composite on the surface (Image 18) and placed the veneer on the corresponding tooth (Image 19). Following application, the excess composite was removed and then light polymerisation performed.

Once all veneers were in position, the restoration margins were finished with a no. 15C scalpel and polished with rubber polishers. We assessed the results immediately upon completion (Image 20, 21, 22, 23). Corresponding grinding was carried out to ensure even contact between the mandibular incisors and maxillary central incisors during the protrusive movement (Image 24). Grinding was also employed to eliminate all contact between the veneers and the mandibular teeth during lateral movements (Image 25 and 26). Views from vestibular and palatal under indirect light revealed that the details were well elaborated and that the indirect restorations blend harmoniously into the neighbouring structures (Images 27, 28, 29, 30). A comparison of the preoperative and postoperative views shows a clear improvement of the tooth aesthetics (Image 31 and 32) – and the positive effect this has had on the patient's smile (Image 33, 34, 35).



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Mauricio Watanabe works as a dentist in São Paulo, Brazil, and is an expert in the treatment of gingival diseases and maxillofacial surgery. He holds a Master's degree in Prosthetics and regularly speaks on topics in the field of aesthetic dentistry. In addition, he is currently studying for a doctorate in Biomaterials at Unesp (Universidade Estadual Paulista) in Araçatuba.

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Clinical case



Fig. 1: A 20-year-old patient presented for dental treatment for aesthetic reasons due to a diastema between his maxillary central incisors.



Fig. 2: The intraoral view shows the positions of the anterior teeth and their morphology in more detail.



Fig. 3: We established that the four maxillary incisors would need to be treated if we were to achieve a satisfactory result.



Fig. 4: As a treatment method we selected the production of indirect restorations on a silicone model. This has advantages over the use of prefabricated facets, as producing them in-house allows for customisation and achievement of a better marginal seal.



Fig. 5: We selected the shade to be used right in the first treatment session by applying a small quantity of the material to the tooth, smoothing off the surface with a large metal spatula and then curing the material. In this case, we decided on A1.



Fig. 6: The restorative material (Admira Fusion, VOCO) was applied directly to the finished silicone model. Spatulas were used to model the teeth in accordance with the morphology of the corresponding group of teeth. In this case, veneers were to be used to restore a proper curve to the line connecting the cusp tips of the canines and the incisal edges.



Fig. 7: Following polymerisation, we removed the veneers from the model, finished them and polished them with rubber grinders/polishers for ceramic restorations.



Fig. 8: Superimposing a photo of the finished veneers with a photo of the patient allows us to predict the position and size of the restorations in the finished treatment.



Fig. 9: The simulation can be better assessed in black and white images as can be seen here.



Fig. 10
10-13: Try-in of the veneer on tooth 21. Note the direction of insertion. It is important to observe the direction of insertion precisely when determining the order for inserting the restorations, as no preparation was performed.



Fig. 12



Fig. 13



Fig. 14: We used 000 retraction cords to retract the gingival margin for all the maxillary incisors.



Fig. 15: 37 % orthophosphoric acid is applied to each tooth and allowed to act for 15 seconds. The neighbouring tooth is protected with a separating strip made of polyester.



Fig. 16: Teeth 11 and 21 following etching with phosphoric acid and drying.

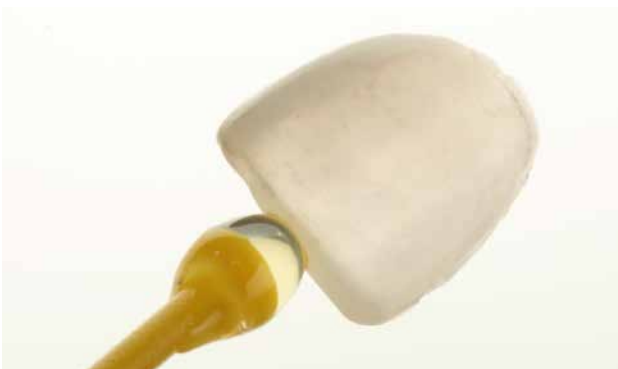


Fig. 17: The veneer for tooth 21. It has been sandblasted with aluminium oxide to clean the interior surface.

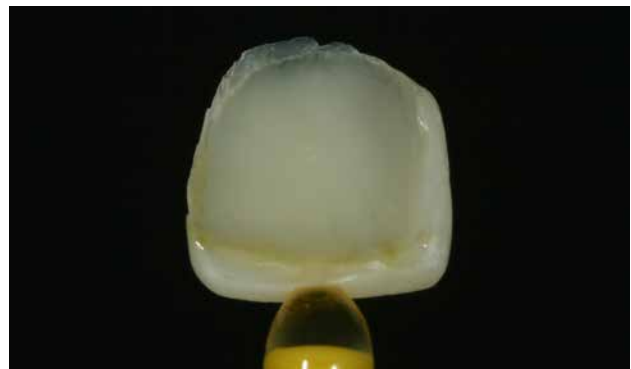


Fig. 18: Following application of the adhesive and drying with an air stream, the flowable composite GrandioSO Flow (VOCO) in shade A1 was used.



Fig. 19: View following placement of the restoration. We also removed all material excesses with a no. 5 probe prior to polymerisation.



Fig. 20
20-23: Various views of the veneer restorations following completion.



Fig. 21



Fig. 22



Fig. 23



Fig. 24 Contact between the anterior teeth during the protrusive movement.



Fig. 25
25-26: Following grinding of the veneers, there was no further contact between the anterior teeth during the lateral movements.



Fig. 26



Fig. 27
27-28: Images of the veneers under indirect light. The details are clearly visible.



Fig. 28



Fig. 29
29-30: View of the anterior teeth with a harmonic curve from vestibular and palatal perspectives.



Fig. 30



Fig. 31
31-32: A clear improvement in the tooth aesthetics can be seen when the preoperative and postoperative views are compared.



Fig. 32



Fig. 33
33-35: A comparison: The patient's smile before and after.



Fig. 34



Fig. 35