All-ceramic anterior restorations
A clinical case involving a crown next to a veneer next to a crown

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Every intra-oral restorative treatment can change the character of a smile. Therefore, a controlled course of action is indicated. In prosthetic treatment, the achievement of a balanced smile is a very important step towards establishing a natural appearance.

A 22-year-old female patient and dental student presented at the clinic because she was dissatisfied with the appearance of the composite veneers on her maxillary anterior teeth. Moreover, she was unhappy with the inflammatory appearance of the surrounding gingiva (Figs. 1a & b).

The patient requested functional and aesthetic anterior restorations. Her dental history was recorded and she was examined intra-orally. In such aesthetically demanding cases, portrait photographs are essential. Ideally, these photographs should be taken from different angles. With the help of the photographs and additional information, the patient’s expectations and goals were discussed.

In the intra-oral exam, we found discolourations in the maxillary central incisors, as well as inflamed gingival tissue. — Fig. 2a & b: All-ceramic crown and veneer preparations for maxillary central and lateral incisors, respectively. — Fig. 3: Ensuring the shade match (crowns and veneers) with IPS Natural Die Material. — Fig. 4: The restorations are ready for try-in. — Fig. 5: The restorations were photographed in the patient’s mouth. — Fig. 6: Virtual tooth shape harmonises well with the patient’s rounded face. — Fig. 7: Close-up view of the restorations on the control model. — Figs. 8 & 9: The smile line and lip line harmonise well with the permanent restorations.

The treatment plan included the use of custom-shade fibre-reinforced composite post and cores owing to the previous extensive preparation of the canals, all-ceramic crowns for teeth 11 and 21, as well as all-ceramic veneers for teeth 12 and 22. The central incisors were prepared for receiving the post and cores. The final impressions of the canals were taken with condensation silicone.

The fibre-reinforced composite post and cores were fabricated in the dental laboratory and cemented after the try-in using the dual-curing composite system Variolink N (Ivoclar Vivadent).

The central incisors were prepared according to the general principles of all-ceramic crown preparation. For this, a 1.0 to 1.2 mm rounded shoulder was created subgingivally. The lateral incisors were prepared according to the general principles of veneer preparation. A 0.5 mm chamfer was created equigingivally with a 0.5 to 0.7 mm bevel reduction. In addition, a 3 mm level was prepared at the incisal edge (Figs. 2a & b). The final impression of the maxillary arch was taken using the addition silicone Virtual (Ivoclar Vivadent).

With the help of the silicone index, the temporary restorations were fabricated directly in the patient’s mouth. In this way, she was able to see her expected post-operative appearance.

Preliminary treatment and preparation
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Preliminary impressions were taken to produce a study model, which would provide us with a physical reference on which we could draw lines, straighten long axes, adjust lengths and perform cosmetic contouring in relation to the adjacent teeth. Based on this initial plan, a diagnostic wax-up was made, followed by a silicone index, which is a proven and indispensable tool for the fabrication of temporary restorations and for use as a guide in tooth preparation.

Virtual (Ivoclar Vivadent) was most helpful in this task (Fig. 3).

In order to achieve a natural-looking restoration and to increase the light transmission and guarantee the shade match in depth, chroma, value and hue, an identical layering diagram had to be used for all the restorations (veneers and crowns). However, before this layering diagram was determined, the dentine background of the natural preparations from the patient’s mouth had to be transferred to the restorations. This approach ensured a perfect shade match through-out the fabrication procedure up to cementation.

The IPS Natural Die Material (Ivoclar Vivadent) was most helpful in this task. (Fig. 4). Only then was the layering diagram created and were the required materials selected from the IPS e.max Ceram (Ivoclar Vivadent) range.

Wash firing was performed on the pressed frameworks. The cervical and proximal areas were characterised with IPS e.max Ceram Stains (Shade and Essence) for the first firing, which enabled not only an optimum shade match but also a lighter shade. For the second
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firing cycle, a thin layer of dentine body material was built up to adjust the long axes and even out the sizes.

The laterals were rotated 3 to 5 degrees on the long axis (mesial out and distal in), which imparted a soft aesthetic and youthful effect.

In general, the dental technician has to be aware that by changing the long axis the light reflective surface of one tooth in relation to another (central-lateral in our case) also changes.

The structure of the mamilons in the mandibular teeth was clearly visible in the photographs. The IPS e.max Ceram Mamelon materials enable the lifelike reproduction of these structures. The natural effect of the mamilons and the opalescence should be achieved by means of the halo effect. From the incisal edge towards the tips of some mamilons, a mixture of Opal Effect 1 and Transpa blue was applied in the middle of the incisal area. Brighter IPS e.max Ceram Impulse materials (OE 5 and OE 4) were used to apply internal characteristics and contrast. The third firing cycle of the Transpa Incisal material served more to improve the shape of the restoration than to give it shade. After firing, considerable time was invested in contouring, surface texturing and finishing.

After the restoration had been finished in the laboratory, the patient came in for a clinical try-in, during which photographs were taken from all angles (Figs. 4–6). The dental technicians had the opportunity to discuss the expectations of the dentist and the patient. At the try-in, it was observed that the left central incisor was a little off-set. This important aspect would have been missed had the restoration not been tried in. The lip line in particular and the integration of the crown into the facial surroundings of the lips are crucial to the technician’s work. Subsequently, the necessary adjustments were made in the laboratory. In this case, a slight curving adjustment was made at the incisal edge to complement the feminine character of the patient’s face (Fig. 7).

Only after these final adjustments was the glaze firing performed, which allowed the restorations to blend in harmoniously with their natural surroundings. Glaze firing is a critical step and its results are greatly influenced by manual polishing, glaze consistency and firing parameters.

The final restorations, now in line with the patient’s and dentist’s expectations, were delivered to the dental practice. The maxillary central incisor crowns were permanently seated with Variolink N (base and catalyst), while the maxillary lateral incisor veneers were placed with only Variolink N Base. Fine-grit diamond burs and finishing and polishing rubber heads from the OptraFine range (Ivoclar Vivadent) were used to remove excess cement and to eliminate any occlusal interference. The patient was highly satisfied with the result (Figs. 8 & 9). During the follow-up appointment, another check-up was done and final modifications were made.

Conclusion
The analysis of the components inherent in a soft and delicate smile demonstrated that the lateral incisors (axis, inclination and rotation) have the largest effect on the personality and appearance of a person’s smile. It is important to note that if one central is slightly off-set from the other, an asymmetrical and unnatural look is produced. The dental technician and the patient may require some courage for this approach, but when the aesthetic parameters involved and the art of reproducing them are perfectly understood, the aesthetic result will reward all involved.