Smile design in the anterior zone
Achieving lifelike tooth aesthetics with direct veneers from Ivoclar Vivadent’s Tetric N-Collection

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Direct additive procedures with bonded resin composites are considered the most conservative and least invasive technique to restore missing, diseased and unesthetically tooth structure to enhanced form, function and aesthetics in the anterior zone. However, the creation of natural-looking restorations can be quite a challenge for the clinician. For complex anterior composite restorations, the clinician must have a comprehensive understanding of the colour, translucency and morphology of natural teeth, as well as their materials science and the restorative techniques involved.

Nowadays, nano-hybrid composites provide improved strength, wear resistance, handling properties and surface characteristics. However, it remains to be determined whether their optical properties can ideally mimic natural teeth, as well as of materials science and the restorative techniques involved.

A 29-year-old male patient presented to our practice requesting improvement of the appearance of his smile. A clinical examination found that teeth 15, 12, 11, 21, 22 and 23 exhibited multiple carious lesions, various discoloured composite restorations and slight erosion. In addition, the incisal edges of teeth 12, 11 and 21 were abraded and too short.

Tooth proportions were not harmonious, as teeth 11 and 23 were too wide in relation to teeth 12 and 22 (Fig. 1). The patient wished to have the discoloured restorations replaced and to have the anterior teeth lengthened in order to regain a more harmonious appearance in terms of shape and colour. In addition, the patient specifically requested that the treatment be performed with minimal loss of tooth structure and at a low financial cost.

Polyvinyl siloxane double-mix impressions (Virtual Light Body and Virtual Putty, Ivoclar Vivadent) of the patient’s existing dentition allowed us to make plaster models. As a first measure, the tooth proportions were corrected by preparing the distal aspects of both central incisors. All anterior teeth from the canine to the contralateral canine were then waxed up by the author in the laboratory to design the new smile, which was to have the correct length and position of the incisal edges, as well as ideal tooth contours. This wax-up was captured in a silicone key (Virtual Putty) that served as a chairside template for the subsequent anatomically layered composite build-ups (Fig. 2).

Chairside treatment
For good access to the treatment field, the patient’s lips and cheeks were retracted using an OptraGate (Ivoclar Vivadent), which is comfortable to wear over longer periods.

Prior to any tooth preparation, the shade was determined using the Tetric N-shade guide (Ivoclar Vivadent; Fig. 3). The selected shade (B2) was then confirmed by applying and light curing a small composite sample of Tetric N-Genam (Ivoclar Vivadent, B2) to the central incisor without bonding. In order to correct the tooth proportions, the distal aspects of both central incisors were carefully prepared with a diamond-coated wheel at slow speed and without water-cooling (Fig. 4). The additional space gained with this preparation procedure allowed the dimensions of the lateral incisors to be changed with additive procedures. Their width needed to be increased by building up the mesial aspects with composite to correct the overall tooth proportions according to the golden ratio (Fig. 5).

After all the defective composite restorations and decayed tooth tissue had been removed, large defects and multiple diastemas became visible. For achieving seamless integration of the composite build-ups, minimally invasive veneer preparations with a supragingival chamfer design were performed with a round-ended tapered diamond bur (Figs. 6 & 7).

Bonding procedure
An etch-and-rinse protocol was selected as the standard bonding procedure for the direct veneers. After differential etching of the enamel for 30 seconds and the dentine surfaces for 10 seconds with 35% phosphoric acid gel (Fig. 8), the teeth were rinsed with copious amounts of water and briefly air-dried to keep the dentine surfaces slightly moist.

A light-curing bonding agent (Tetric N-Bond, Ivoclar Vivadent) was dispensed directly from the VivAvan (Ivoclar Vivadent), which allows for precise and economical application. By activating the chick mechanism several times, the attached VivaPen brush cannula was wet with Tetric N-Bond (Fig. 9). All the etched tooth surfaces were then coated with a thick layer of bonding agent, which was then scrubbed in for at least 10 seconds. Excess bonding material was removed with a saliva ejector, and the solvent (ethanol) was evaporated by a gentle stream of air.

In the next step, the bonding layer was light cured for 10 seconds using a polywave LED curing light with an energy density of 1,200 mW/cm² (Bluephase N, Ivoclar Vivadent). The resulting shiny appearance indicated that all of the tooth surfaces were entirely bonded and ready to be restored.

The laboratory-fabricated silicone key was applied to the palatal-incisal aspects of the patient’s maxillary anterior teeth and checked for fit. A significant discrepancy between the remaining healthy tooth structure and the projected outline of the teeth became apparent with the silicone key in place (Fig. 10).

Composite stratification
The overall goal was to rejustify the patient’s smile not only in terms of tooth contours but also in terms of a natural colour gradient and different translucency levels. The incisal edges of younger, unabraded teeth often show a high level of opalescence. The goal in this clinical situation was to reproduce this effect. Hence, a translucent flowable composite (Tetric N-Flow, shade Bleach 1, Ivoclar Vivadent) was applied with the silicone key in place. It was spread to a thin layer with a dental probe (Fig. 11) and light cured for 10 seconds.

The Bleach 1 shade shows a much higher degree of translucency (20 per cent) compared with standard enamel shades (15 to 15 per cent) and allows light to pass through the composite. These thin enamel shells are highly opalescent and show the characteristic halo effect around the incisal edges (Fig. 12).

The existing dentine defects and the dentine cores were built up

Fig. 1: Initial situation: unsatisfactory smile with multiple carious lesions, discoloured composite restorations and abraded areas.— Fig. 2: Wax-up of the new smile on the plaster model with the silicone key in position.— Fig. 3: Shade selection with the Tetric N-shade guide; lips and cheeks retracted with an OptraGate.— Fig. 4: Distal aspects of both central incisors prepared with a diamond-coated wheel.— Fig. 5: Additional space gained for the lateral incisors to correct tooth proportions.— Fig. 6 & 7: Minimally invasive veneer preparation with a round-ended tapered diamond bur (a) results in a supragingival chamfer preparation design (b).— Fig. 8: Differential etching of the enamel and dentine surfaces with 35% phosphoric acid gel.— Fig. 9: Precise and economical application of Tetric N-Bond using the VivaPen.— Fig. 10: The laboratory-fabricated silicone key applied and checked for fit.— Fig. 11: Application of a translucent flowable composite, spread to a thin layer.— Fig. 12: Thin, translucent and opalescent enamel shells with the characteristic halo effect.
tissue. Therefore, the colour was developed within the depth of the restoration, thereby avoiding the restoration having a greyish appearance. Enough space was kept for the subsequent enamel composite stratification.

In order to create a natural colour gradient, a small amount of a darker opaque flowable dentine material with a high chroma (Tetric N-Flow, shade Dentin A3.5) was applied to the cervical aspects of the teeth (Fig. 14). In order to further enhance the opalescence of teeth 12, 11, 21 and 22, additional opalescent composite (Tetric N-Ceram, shade Bleach 1) was applied to the incisal third of the central and lateral incisors in thin layers.

By applying minuscule scattered amounts of a light-curing white stain (Tetric Color, white, Ivoclar Vivadent) on the anatomically layered surface, the illusion of discreet whitish opaque areas of hypoplastic enamel was created within the incisal edge. A medium-translucency enamel shade (Tetric N-Ceram, shade B2) was applied to build up all of the teeth to full contour with natural emergence profiles. In order to conclude the composite stratification, proximal vertical ridges and embrasures were shaped with a non-stick disposable chisel tip (OptraSculpt, Ivoclar Vivadent; Fig. 15).

Tetric N-Ceram was easily sculpted and showed excellent stability after application prior to light curing.

Finishing and polishing

For natural light reflection, the anatomically layered surface was refined using a fine-grit diamond finishing bur at low speed and without a water spray. This enabled perfect visual control and reduced the risk of excessive removal of composite material. In order to create a homogenous and smooth surface, another dry finishing step was performed with an abrasive silicon carbide-containing rubber polisher (Astropol F, Ivoclar Vivadent) at slow speed. At this stage, a silky surface lustre started to emerge. Anatomical surface characteristics, such as vertical grooves, can be further enhanced under good visual control. Subsequently, all composite surfaces were wet polished at high speed (Fig. 16) to achieve a glossy surface lustre (Astropol HP, Ivoclar Vivadent). Generally, for finishing and polishing aesthetic anterior composite restorations, the best results are achieved with multistep polishing systems.

The patient was recalled two weeks after treatment. With the tooth proportions and shapes corrected, the patient’s smile was now in harmony with the lips and face (Fig. 17). A close-up photograph of the patient’s smile revealed a pronounced lifelike opalescence, characterisations and a halo effect of the central and lateral incisors (Fig. 18). The lateral view displayed natural light reflections from the highly polished macron- and micro-anatomically shaped composite surfaces (Fig. 19).

As an alternative to the treatment described here, all-ceramic veneers (e.g. IPS e.max, Ivoclar Vivadent) would have been a viable aesthetic and durable treatment option, mainly owing to their less invasive nature compared with all-ceramic crowns. Unfortunately, the cost of all-ceramic veneers is substantially higher than any kind of direct resin restoration. Since the patient expressed serious financial concerns, ceramic veneers were not pursued.

In this clinical case, direct adhesive composite restorations were the preferred option. They are also a very conservative treatment modality because any tooth preparation was strictly limited to the purpose of generating retentive surfaces. Moreover, in the case of future fractures or chipping, composite veneers can be repaired much more easily and predictably than ceramic veneers. This can be an advantage for patients conscious of cost.

Conclusion

The selection of a suitable composite material with optical properties that ideally mimic natural tooth tissue is a key factor in creating restorations that blend well with the remaining tooth structure and are invisible to the human eye. In the clinical case described here, the universal composite system Tetric N-Collection was used for the build-up of the patient’s anterior teeth. The combination of opaque dentine shades with high-chroma, medium-translucency enamel shades and highly translucent enamel shades with natural opalescence yielded a predictable and aesthetic outcome that included colour saturation, translucency and opalescence.

In addition, the material features finely tuned filler technology, which imparts favourable polishing properties that result in a high surface gloss. Tetric N-Collection has proved to be a universal composite system with great aesthetic potential and, therefore, also suitable for aesthetically challenging cases in the anterior dentition.