

# REFLECT

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## **Nano-technology in the anterior region**

Creating aesthetic direct anterior restorations with a nano-optimized composite

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# Nano-technology in the anterior region

## Creating aesthetic direct anterior restorations with a nano-optimized composite

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*Today, aesthetic dentistry is facing major challenges. When deciding on the feasibility of a case, clinicians need to take all physiological aspects into consideration. However, patient satisfaction is also increasingly being looked to as an indicator of positive outcomes and restorative quality and the patient is regarded as both a supporter and critic.*

A holistic treatment approach is required in order to achieve a result that mimics natural aesthetics and meets patient expectations. Not only the smile line needs to be taken into account, but also the contours of the gingiva and the incisal edges. From treatment planning to the actual fabrication of the restoration, composite restoratives offer a wide array of options and procedures to choose from, allowing dentists to achieve the desired results.

Since the advent of the acid-etch bonding technique, which was introduced in 1955, clinicians have seen a revolution occur in composite materials science and technology. The development of hydrophilic dentin bonding agents has opened up a whole new range of restorative possibilities. Modern composite/adhesive systems offer significant advantages over traditional systems as they allow minimally invasive preparation techniques to be applied. Consequently, sound tooth structure can be preserved.

The objective of this article is to present the clinical application of the new Tetric N-Ceram/Flow/Bond in clinical cases. The rationale behind the clinical technique and intricate application methods are discussed.

### **Clinical case**

A 16-year-old male patient presented to our surgery with large cervical and proximal carious lesions in all upper and lower anterior teeth (Figs 1 and 2). All these defects were surrounded by white hypo-calcified enamel lesions. The defects had been restored in the past but the restorations had failed over time. Clinically, chronic gingival inflammation and gingival hyperplasia with occasional bleeding in the marginal areas was observed.



**Fig 1** Initial situation with carious lesions in the maxillary and mandibular anterior teeth and inflammation of surrounding gingival tissues, compromising the aesthetics of the patient's smile



**Fig 2** Close-up view of the maxillary incisors

After proper evaluation, it was decided that good gingival health and contour had to be established first. After thorough prophylaxis treatment under local anesthesia, deep gingival scaling and gingival re-contouring was performed. The patient was instructed in proper brushing and plaque control measures with Cervitec Gel® at home to re-establish gingival health.

Reasonable gingival health was achieved after about ten days, so that the restorative treatment could be started. After gingival retraction, the carious tissue was completely excavated with high-speed diamond burs and slow-speed round burs. The soft, hypo-calcified enamel was also



**Fig 3** Tooth preparation included the application of a shorter bevel at the DE junction and a long bevel on the facial aspect.



**Fig 5** A hydrophilic single-component adhesive (Tetric N-Bond) was applied to the etched surfaces.



**Fig 7** Subsequently, increments of Tetric N-Ceram A2 Enamel and A1 Enamel were placed with the OptraSculpt instrument.

removed. A flame-shaped, high-speed diamond bur and coarse polishing discs were used to prepare the margins in the cervical region and to extend the preparation to the complete labial surface of the tooth. However, the labial enamel layer was only reduced by approx. 0.8 to 1 mm in order to preserve some of the natural enamel. A short bevel was applied along the cervical preparation margins as well as at the DE junction of Class III cavities. All the preparations were thoroughly rinsed with water (Fig 3).

#### **Restorative technique**

The treatment plan involved the restoration of the carious lesions (Class V and Class III) using a direct restorative technique with Tetric N-Ceram composite material. Following shade selection, the two maxillary central incisors were chosen as the first teeth to be restored. The prepared surfaces were etched with 37 percent phos-



**Fig 4** Application of Total Etch etchant gel



**Fig 6** The first increment that was placed was Tetric N-Ceram, shade A3.5 Dentin. It was lightly spread onto the short and long bevel using contouring instruments and artist brushes.

phoric acid gel (Total Etch) for 15 seconds (Fig 4). In order to protect the surfaces of the adjacent teeth, they were covered with Teflon tape. The teeth were rinsed and air dried, but not to the point of desiccation.

Next, the bonding agent Tetric N-Bond was applied to the enamel and dentin surfaces (Fig 5). After about 20 seconds, the bonding agent was gently air-dried and light cured for 10 seconds using the bluephase® C8 LED light in the LOP mode. Exposed dentin in deep proximal and cervical cavities was coated with a thin layer of flowable composite (Tetric N-Flow). The composite was spread with a thin brush and subsequently light-cured for 20 seconds with the bluephase C8 curing light in the SOF mode.

Tetric N-Ceram composite (shade A3.5 Dentin) was placed in the proximal as well as the cervical region to replace the natural dentin (Fig 6). The layer was also extended to include the short bevel in order to mask the transition between the enamel and dentin. Then the composite was light-polymerized for 20 seconds using the bluephase C8 LED light in the SOF mode. On top of the dentin layer, Tetric N-Ceram A2 Enamel was placed. After proper contouring (Fig 7), the layer was light-cured for 20 seconds. Shade A1 Enamel was applied from the middle to the incisal third, adapted with OptraSculpt® and light-cured for 20 seconds. Following this, a layer of highly translucent Tetric N-Ceram T was placed in the middle third and spread thinly on the entire labial surface. The incisal surface was also covered with this material using a disposable brush. A sable brush was used to adjust the anatomical contours and smooth the surface. Then the composite layer was cured for 20 seconds. Finally, the entire restoration was



**Fig 8** Finishing with Astropol HP (pink) silicone rubber cups



**Fig 9** Close-up view of the restored maxillary incisors showing the life-like anatomy and surface texture

light-cured for 10 seconds each from the labial, palatal and proximal aspect using the bluephase C8 LED light in the high power mode (HIP mode).

After having completed the two central incisors, the remaining lateral incisors and canines were restored using the same technique. The same approach was chosen for the restoration of the mandibular anterior teeth.

As in this case the gingival health was comparatively poor initially (because of the presence of caries and heavy plaque accumulation), the final finishing and polishing steps to establish the secondary anatomy were postponed until the next appointment scheduled for the following week. By deferring this step, clinicians are given the opportunity to re-check the restoration margins and modify them if needed. Dental photography is an essential tool for the clinician to judge the final outcome and achieve highly aesthetic restorative results! In this case, a few deficiencies were noticed on the photographs that were taken after shaping the primary anatomy during the first session. Based on the patient's requirements a few modifications were made by adding more composite on the mesial side of right central incisor and in other areas.

#### **Finishing and Polishing**

After the modifications had been carried out, the secondary anatomy (marginal ridges, developmental grooves, lobes, the cingulum, etc.) was accentuated with 12 fluted carbide and diamond finishing burs. The proximal, incisal and facial surfaces were contoured with aluminum oxide discs and finishing strips. For finishing, finishing burs, diamonds and Astropol® rubber wheels and points were used. The Astropol finishing and polishing system consists of rubber points, cups and discs impregnated with either silicon dioxide or silicon dioxide and fine diamond particles.

In a first step, Astropol F (grey) instruments were used in a slow-speed handpiece and with water cooling to remove excess and achieve a smooth surface. Then the Astropol P polishers (green) were employed in the same way. They impart a very delicate surface finish to composite restorations and can be used to establish the secondary anatomy and surface texture. The third step involved the use of the micro-fine Astropol HP (pink) high gloss polishers (Fig 8). Polishing was done without exerting any pressure. Astrobrush was used at slow speed and without

any pressure to impart the restorations with a high luster while maintaining the surface texture and anatomy previously created (Fig 9). This procedure was repeated after having modified the restoration according to the requirements of the patient.

#### **Conclusion**

When fabricated properly, composite restorations can be long lasting and beautiful, appearing as real as nature intended. State-of-the-art composite materials such as Tetric N-Ceram with their variety of shades, mechanical strength and good polishability allow clinicians to close gaps, transform spaces and enhance colours without having to remove a large amount of tooth structure. In the complex restorative case presented, which involved cervical and proximal caries, poor gingival health and poor overall aesthetics, a methodological approach was used. An incremental technique with composite resin was applied to create highly aesthetic restorations which mimic nature and blend in seamlessly with the surrounding dentition. The young patient was very happy with the final outcome!

He received Cervitec Gel and tips and tricks on how to maintain the current oral hygiene status to keep the final restorations in good condition for as long as possible. □

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