Fig. 13: The restorations after 4 weeks.

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The renaissance of a classic: Tetric-N Ceram—a perfect combination of experience and innovation

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We are living in a changing world and get the impression that the changes are happening even faster day-by-day. The problem is that these changes are not always improvements but sometimes involve drawbacks. This is true for our profession as well. In the dental field, new systems continuously simplify our job. However, they do not always represent improvements in the properties of the materials. The renaissance of Tetric Ceram, in its new form Tetric-N Ceram, however, is an improvement in all the important clinical properties of a composite.

During the past few years, the amount of scientific information, corroborating the success of composite restorations in indications that only a few years ago were ‘experimental,’ has grown dramatically. All these changes in the dental world’s perception towards composites are due mainly to the improvements in the adhesion and mechanical properties of new systems.

Tetric-N Ceram is a nanohybrid composite. The nanoparticles impart the composite with important characteristics. If we analyse the history of composites, look at the problems they had in the beginning and the improvements that have been realised to date, we understand how much has been achieved. Below are some of the major improvements shown by the example of Tetric-N Ceram:

Microfilled & hybrid composites

The first macrofilled composites were clinically unsuccessful because of their inadequate surface properties and poor wear resistance. Microfilled composites brought a breakthrough because they were the first materials to be sufficiently wear-resistant and maintained an acceptable surface quality during clinical service. Hybrid composites represented another step forward with respect to the mechanical properties of composite materials. Tetric-N Ceram, with a mean particle size of <1µm and nanoparticles <100nm, achieves higher standards in abrasion.

Nanohybrid & prepolymer technology

Microfilled composites exhibit high polymerisation shrinkage and inorganic microfillers do not reinforce the composite material as well as macrofillers, which results in low flexural strength and low flexural modulus. These disadvantages, in particular the shrinkage, can largely be overcome by preparing a microfilled composite, which is milled to a grain size that can be employed as filler in a new composite. Such fillers are called 'prepolymers' or 'isofillers.' The shrinkage in microhybrids is better than that in microfilled composites because of the high inorganic filler content. However, the combination of a nanohybrid with the prepolymer technology, as the one used in Tetric-N Ceram, provides the composites with an even lower shrinkage.

Polishability & final gloss

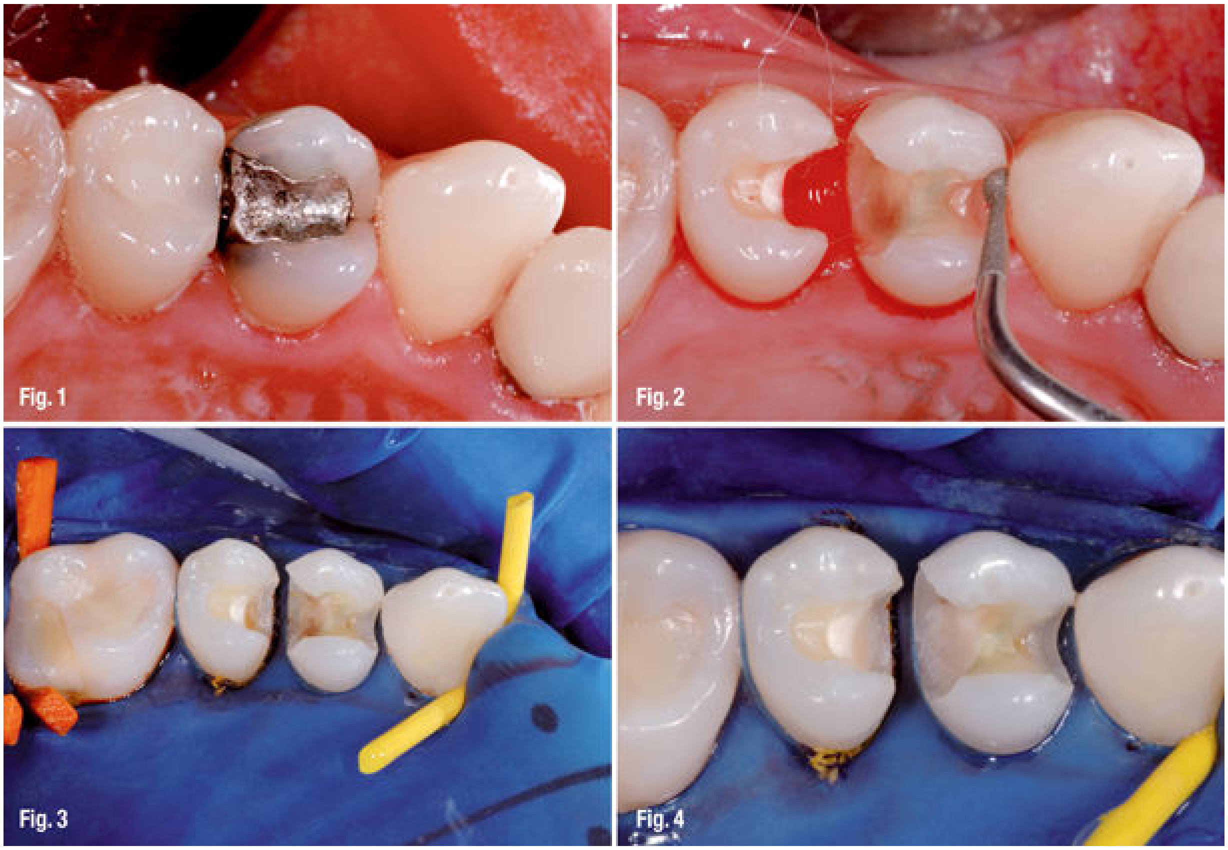
Surface polishing is important to achieve a smooth and dense surface as well as an aesthetic result. This characteristic was a problem before microfilled composites were launched on the market. Their polishing properties are excellent but they have a low flexural strength and a low flexural modulus. Hybrid composites were appropriate for the posterior region due to their mechanical properties. However, their gloss and surface roughness was not sufficient for the anterior region. With the new, improved technology, Tetric-N Ceram is strong enough for Class I and II restorations and high aesthetic Class III, IV and V restorations. In addition, a high gloss can be achieved within seconds, which also helps to save time. The final gloss is particularly beautiful and it is very similar to that of natural enamel.

Radiopacity

Posterior restorations must demonstrate adequate radiopacity to permit the detection of secondary caries, excess or inadequate quantities of material, air bubbles and other imperfections. The minimum radiopacity of restorative materials has been defined to comply with the radiopacity of dental enamel (200% of aluminium [%Al]). Nevertheless, only a few composite restoratives demonstrate a radiopacity higher than 250% Al. Tetric N-Ceram features 400% Al in all the shades and 280% Al in the flowable version.

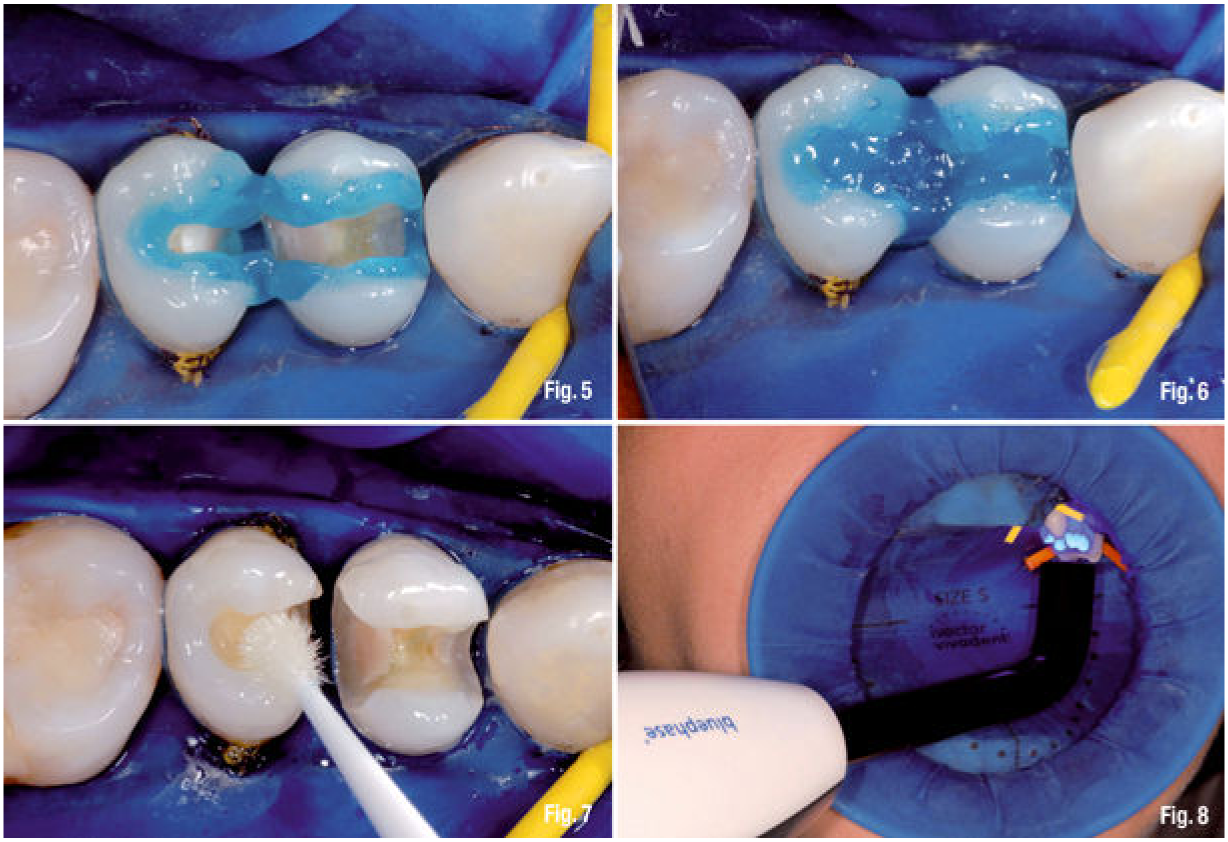
Clinical case

A 28-year-old female patient presented to our practice with the request to remove an amalgam filling in the first premolar of the upper left quadrant. The initial situation showed a defective amalgam filling with secondary caries, especially in the mesial part. The composite filling in tooth 25 seemed to be caries-free from the occlusal view (Fig. 1). The X-ray image did not reveal any caries in the proximal region. After removing the amalgam, the caries in the mesiocervical of tooth 25 was obvious. Therefore, we decided to replace the restorations. After the existing restorations had been removed, the cavity margins were prepared with an oscillating instrument (Fig. 2). The tips are diamond-coated on only one side to prepare the tooth without the risk of causing iatrogenic damage to the adjacent healthy tooth structure. The treatment field was isolated using OptraDam. The three-dimensional design enables treatment without clamps (Fig. 3).



Figs. 1–4: Defective amalgam filling with secondary caries in tooth 24. The composite filling in tooth 25 seems acceptable from the occlusal aspect (Fig. 1). The cavity margins were prepared with an oscillating instrument to prevent iatrogenic damage to the adjacent healthy tooth structure (Fig. 2). The treatment field was isolated with OptraDam (Fig. 3). A glass ionomer cement liner, Vivaglass CEM, was applied and light cured (Fig. 4).

The areas closer to the pulp were protected with Vivaglass liner, a light-curing glass ionomer cement. The special consistency allows very precise application (Fig. 4). Then, the enamel margins were etched selectively with 37% phosphoric acid for 30 seconds (Fig. 5). The etching gel was applied and distributed quickly on the dentin, where it was allowed to react for only 10 seconds to avoid the frequent technical error of overetching the dentin (Fig. 6). Following, Tetric-N Bond was applied. It is important to make sure that all the cavity surfaces are covered with the adhesive. Therefore, in some special cases, such as for very small or too large cavities where the application is more difficult, the stipulated agitation time of 10 seconds has to be prolonged (Fig. 7). Tetric N-Bond was polymerised with the bluephase G2 curing light in the Low Power mode to avoid overheating the pulp. If such a powerful new generation LED unit is used, it is crucial to have the option of different programmes to cover the different indications (Fig. 8).



Figs. 5–8: The enamel margins were etched selectively for 30 seconds (Fig. 5). The phosphoric acid was allowed to react for only ten seconds on dentin (Fig. 6). Tetric-N Bond was applied (Fig. 7). The adhesive was polymerised with the bluephase G2 curing light in the Low Power mode (Fig. 8).

Once we placed the matrix (OptraMatrix), we built up the proximal cavity walls, thus creating tight proximal contacts. Due to the 10 µm thick OptraMatrix, it is easy to achieve tight contact points (Figs. 9, 10). These functional contacts are the key to prevent periodontal damage, food impact and the resulting secondary caries. After finishing tooth 24, the same procedure was applied on tooth 25 (Fig. 11). Predictable, high-quality results, with regard to proximal contacts and occlusal surfaces prior to polishing, are achieved due to the incremental technique and the easy handling properties of the material (Fig. 12). Finally, the restorations were finished and polished to achieve an exceptionally aesthetic appearance. Due to the excellent final gloss and the chameleon effect of the composite, the restorations are almost invisible (Fig. 13).

Figs. 9–12: OptraMatrix was placed and the proximal cavity walls were built up (Figs. 9 & 10). After finishing tooth 24, the same technique was applied on tooth 25 (Fig. 11). The restorations after the last layer was applied (Fig.12).

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