

Direct composite restoration with AFG modeling technique

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With the technological development of materials and the refinement of adhesive techniques, restorations with composite resins performed directly at the chairside have increasingly become dentists' first choice for both anterior and posterior restorations.

The reasons for this trend are many. First of all, the possibility of exploiting their adhesion to cavity walls often allows a considerable conservation of dental structure.

The increased biomechanical properties of composites allow the stable restoration of form and function even in large cavities. The possibility of completing the restoration in a single appointment and without the intervention of a dental laboratory, simplifies and speeds up the treatment.

Finally, their aesthetic value makes them increasingly popular and requested by patients. Obviously, extensive direct restorations, especially those that involve more than one dental surface, make it necessary for the clinician to pay particular attention to the anatomy that must be restored with respect to the dental function within the physiology of the stomatognathic cavity.

Sometimes, an accurate and natural reproduction of the morphology of a specific tooth is not easy, especially when the operative field is only partially visible because it is isolated by rubber dam.

This is due in part to the technical difficulty of operating in the oral cavity and in part to the lack of solid knowledge of dental morphology on the part of the dentist, as these are only marginally part of his/her training.

The purpose of this article is to show how a direct composite restoration in a Class I caries, reproduces a natural and personalized reproduction of the lost dental anatomy through an anatomical modeling technique called AFG, conceived by Alberto Battistelli, which uses codes of geometric relationships.

The AFG technique (Anatomic Functional Geometry) with codes of normal dental function already inscribed in the natural shape of the teeth.

There are 4 criteria on which the operator must base the AFG technique:

1. Knowledge of normal anatomy (measurements)
2. Mental acquisition of a basic form with normal characteristics (also on a numeric basis)
3. Knowledge of the invisible background of the dental anatomy (lines with comparative measurements)
4. Observation and reproduction of the anatomical detail.



Fig 1: Class I caries with involvement of the palatal wall



Fig 2: Caries removal and cavity preparation



Fig 3: Enamel conditioning with orthophosphoric acid



Fig 4: Reconstruction of the distal palatal wall

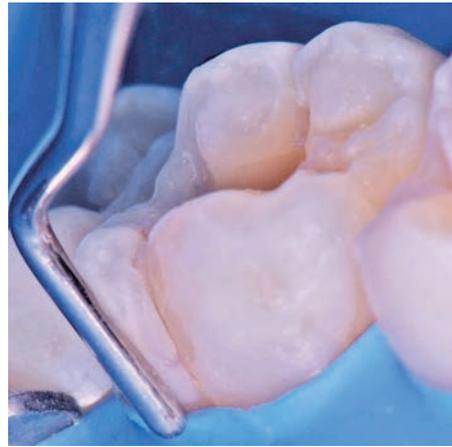


Fig 5: Closure of the palatine sulcus



Fig 6: Restoration of the primary ridges for each cusp



Fig. 7



Fig. 8



Fig. 9

Figs 7 to 9: The restoration and build-up of the primary and secondary ridges automatically create the grooves

The rules for the reproduction of teeth are the same as those used by artists for the creation of their work: you must first imagine them and then reconstruct them. The AFG modeling technique can be compared to the basting technique practised by tailors - starting from a standardized size, the garment can be personalized.

Clinical Case

After removal of carious tissue (Figs. 1 and 2) or the previous restoration, it is good practice to proceed with normalization of the cavity margins in order to obtain a smoother and more regular perimeter design. This step can be performed with fine-grained diamond burs or with hard stones such as an Arkansas stone (Durawhite). Finally, the cavity preparation is concluded with the polishing of the edges using rubber silicone with a medium degree of abrasion.

This step plays an important role in giving the substrate a smooth and easily wettable surface, so that both the adhesive and the composite can easily adapt to it, thus

reducing the possibility of formation of macro and micro porosity, the site of possible future secondary infiltrations.

The preparation of the substrate for the adhesion of the composite is called conditioning and is obtained through the application of acidic substances called etchants that increase the surface by creating micro porosity on the surface of the enamel and dentin. Through the partial dissolution of the inorganic matrix, the exposure of a fibrillar network which, infiltrated by the adhesive, will form a hybrid layer. Enamel etching is obtained through the application of the gel based on orthophosphoric acid in a concentration of 37% for 30 seconds. Dentin etching can be obtained by two different methods:

- Application of acid gel for 15 seconds which is then removed by abundant rinsing with water.
- Application of a self-etching liquid, which, at the same time, also promotes the penetration of the adhesive in the interfibrillar spaces and in the peritubular microcavities.



Figs 10 to 12 : Finished case



The liquid is called self-etching-primer that must not be removed but, after an adequate period of action must be deprived of the volatile solvent by means of a gentle and prolonged blowing of air.

Whatever technique is used (total etching or self-etching) it is important to know that the conditioning of enamel and dentin require different procedures and therefore require different etching techniques.

(Fig. 3). The final step, common to both techniques, consists of the application of the actual adhesive bond, which will have to be applied through special brushes (microbrush) and after adequate time, deprived of its volatile solvent through a delicate jet of air.

At this point you can proceed with the cavity filling. To reduce the formation of microdetachments of the material from the cavity floor due to the shrinkage stress that the resins undergo during polymerization, it is recommended to first apply a layer of flowable composite, which has greater elasticity. Then we pass the application of the micro-hybrid composite with which we will realize the anatomical reconstruction.

In this case, the cavity presents a palatal box and therefore can be equated to Black's Class II. To facilitate the anatomical reconstruction, it is always advisable to first restore the axial walls of the box (be it interproximal or lateral) and transform it into a single-walled cavity (Figs. 4 and 5). Through the tracing of some diagonals that unite some cuspal vertices (AFG technique), the position of the central pit will influence the direction and extension of the primary ridge crests of the cuspal slopes. For convenience, it is possible to mark the position of the fossa by means of a dot executed with a super color (stain).

At this point we proceed with the restoration of the primary ridges of each cusp (Fig. 6). Once the primary ridges have been created, we will proceed to connect them with each other by means of flat surfaces, called triangular slopes.

The last step is the creation of the secondary ridges. These will give the surfaces connection, better defining the grooves and giving the occlusal anatomy the naturalness and softness of form (Figs. 7 and 8).

To make anatomical design more visible, it is possible to highlight the grooves through the application of super colors (Fig. 9).

Since the polymerization of composite resins is partially inhibited by the presence of oxygen, after completion of the reconstruction, it is always good practice to coat the restoration with a glycerine gel, which displaces the oxygen, and then complete the polymerization.

The last step consists of finishing and polishing the restoration that give it a natural brilliance and prevent the future accumulation of bacterial plaque (Figs. 10 to 12).

If these simple steps are followed, the direct fabrication of composite restorations will become easy to implement and you can easily restore the lost anatomy of teeth, both from an anatomical and functional perspective. ■



Dr. Elisabetta Pastorini has an affinity for dental prostheses, conservative aesthetic techniques and aesthetic mucogingival surgery. In 1996, she graduated with high marks from the University of Cagliari with degrees in Dentistry and Dental Prosthetics. She regularly attends courses and conferences on conservative treatment, implantology, mucogingival surgery and dental aesthetics.