

Clinical Protocol for Esthetic Restoration using a Self-etching Adhesive

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ABSTRACT

The advent of new adhesive systems is making techniques and clinical protocols to become faster and simpler, however it does not reduce the importance of knowledge of the properties, characteristics and interaction of dental materials with the tooth structure. Among the adhesives that have recently emerged, highlight the self-etching systems, especially the two-step self-etching, in which the acid primer is available in a separate bottle from the adhesive. These adhesives have shown good results for bond strength, microleakage and postoperative sensitivity, being an option for direct adhesive restorations in anterior teeth. This way, the present case report describes the step-by-step making of a class IV restoration in an upper right central incisor using a two-step adhesive system, obtaining satisfactory results.

Keywords: Dental esthetics, Dental bonding, Permanent dental restoration.

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INTRODUCTION

The adhesive dentistry has undergone great changes, both in the direct and indirect procedures. New materials are introduced into the market and new techniques are constantly emerging in the search for simplification associated with effective clinical performance.

With this development of adhesive systems, techniques and applications are simplified, then reducing the sensitivity of the technique.¹ In the adhesives that completely remove the smear layer, the etching with chelating agents or acids demineralize the surface of the dentin, which is then thoroughly rinsed, it is subjected to application of a primer (a diluted solution of resin monomers in organic solvents) and then the application of the adhesive (the most hydrophobic portion of the three-step adhesive systems). For simplified systems the application of the primer-adhesive contained in a single bottle is made on the conditioned substrate, completing then the adhesive protocol. While the self-etching adhesives use the smear layer as a dentin substrate, so that a self-etching primer is applied on the dentin covered by smear layer for a certain period of time and with no rinse, and then the adhesive layer

is applied to the dentin previously treated, thus incorporating the smear layer to the hybrid layer.² So it becomes possible to save time and improve the cost-effectiveness of the procedure for the clinician and therefore for the patient.^{3,4}

Several studies show that self-etching adhesives can provide bond strength to dentin equivalent or even superior to adhesive systems which use phosphoric acid as a pretreatment of the tooth structure.⁵⁻⁷ However, these values of bond strength appears to depend on the formulation of self-etching systems. The high mineral content of tooth enamel hinders demineralization, forming a microretentive pattern lower than that obtained with 37% phosphoric acid.⁸ Therefore, scientific research recommend the phosphoric acid etching only in the enamel surface, so as to create the microretentive pattern, followed by the application of self-etching adhesive all across the cavity.^{9,10}

Given the trend of increasing use of these systems, we recommend them in order to reduce postoperative sensitivity and to simplify the restorative technique. However, it becomes important accompaniments of case reports in both anterior and posterior teeth for better acceptance and confirmation of the scientific community. Thus, this case report proposes to describe the technique of anterior teeth direct restoration by the use of a self-etching adhesive system. The self-etching system used in this case features a spread that liquid-A will ensure the location at which the adhesive is applied, that is indicated by the color change at the time of application of liquid-B; besides being radiopaque, which minimizes the risk of misdiagnosis.¹¹

CASE REPORT

A 20-year-old woman attended to our dental clinic, reporting esthetic dissatisfaction in a restoration of her maxillary right central incisor (tooth 11). After completion of the clinical and radiographic examination, it was planned to remove the old restoration and to make a new restoration of the tooth in question. It was decided to carry out a direct composite resin restoration using the self-etching adhesive system Adper SE Plus (3M ESPE).

In the first clinical session it was performed: initial photograph (Figs 1 and 2); color selection through the use of Vita classical scale, so that the predominant color was A2; and study molding. The plaster model obtained was

waxed to facilitate the making of the incisal contour and palatal wall through a palate guide made of condensation silicone, according to the anatomy that was given by the wax sculp.

In the second clinical session, after prophylaxis, anesthesia and absolute isolation (Fig. 3), the old restoration was removed using diamond bur at high-speed and the decayed tissue was eliminated using carbide burs (size compatible with the cavity) at low-speed (Fig. 4). After caries removal (Fig. 5) it was performed the pulp-dentin complex protection using the resin-based glass ionomer Vitrebond (3M ESPE) (Fig. 6).

Neighboring teeth were protected with teflon tape and then acid etching with 37% phosphoric acid was performed for 15 seconds only on enamel as recommended by the literature^{8,9} when self-etching adhesives are used (Fig. 7). The acid was removed with abundant water/air spray (Fig. 8), and the tooth was gently dried with absorbent paper. The self-etching adhesive system Adper SE Plus (3M ESPE) was applied following the manufacturer's instructions. Liquid-A was applied turning the substrate pink-colored (Figs 9 and 10) and liquid-B was then applied for 20 seconds over liquid-A, which changes its color indicating which region received the adhesive (Figs 11 and 12). In order to

evaporate the solvent it was applied a gentle air spray for 10 seconds (Fig. 13), finishing this step with light-curing for 10 seconds (Fig. 14).

The restorative procedure was initiated with increments of composite resin on shade A2 Enamel (Z-350 XT - 3M ESPE) inserted in the silicone guide made initially, in order to restore the incisal contour and the palatal wall of the tooth (Fig. 15). With the silicone guide correctly positioned, resin was light-cured for 40 seconds and then the guide was removed, obtaining a thin palate layer (Fig. 16). Increments of composite resin on shade A2 Dentin (Z-350 XT - 3M ESPE) were inserted so as to restore the lost dentin (Fig. 17), and a small resin layer with medium opacity A2Body (Z-350XT - 3M ESPE) was accommodated in the region of the restoration line, leaving space for the last resin layer (Fig. 18). Finalization of increments was performed applying the resin on shade A2 Enamel (Z-350 XT - 3M ESPE) (Fig. 19) to recontour buccal enamel and light-curing was performed for 40 seconds.

In the next session, the patient returned to be accomplished finishing and polishing procedures. For this, there were marked with a graffiti pencil the reflection angles and regions of depression (Fig. 20). Abrasive disks (Sof-Lex Pop-On, 3MESPE) were used, following an order from



Fig. 1: Frontal view of the initial case



Fig. 3: Removal of old restoration



Fig. 2: Initial aspect of tooth 11 showing unsatisfactory restoration



Fig. 4: Presence of caries in dentin



Fig. 5: Appearance of the cavity after caries removal

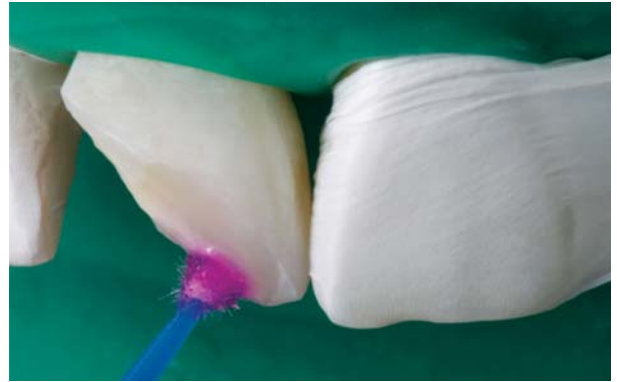


Fig. 9: Application of liquid-A of the self-etching adhesive Adper SE Plus (3M ESPE), which will only mark the region that will receive the next step



Fig. 6: Considering the depth of the cavity, it was held dentin-pulp complex protection with glass ionomer



Fig. 10: It is noted pink-colored appearance of the whole region that received liquid-A



Fig. 7: Phosphoric acid etching in enamel for 15 seconds

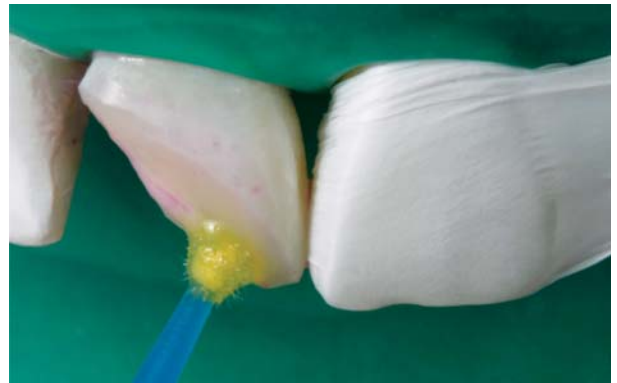


Fig. 11: It was applied liquid-B of the self-etching adhesive Adper SE Plus (3M ESPE) over the liquid-A



Fig. 8: Thorough rinsing with water spray to remove the acid



Fig. 12: After application of the second-step, it was observed the disappearance of the pink color that ensures the application of adhesive throughout the interface



Fig. 13: Evaporation of the adhesive solvent using a gentle air



Fig. 17: Application of the A2 dentin layer (Z350 XT, 3M ESPE) in order to restore the lost dentin and sculpt the dentinal mamelons

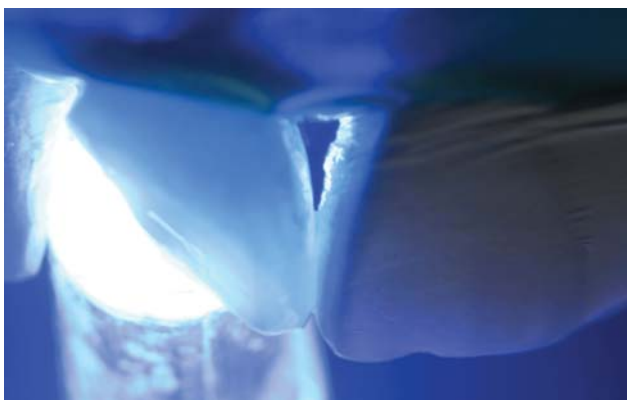


Fig. 14: Light-activation for 10 seconds



Fig. 18: Use of medium opacity resin A2 Body (Z350 XT, 3M ESPE) for masking the bond line



Fig. 15: Insertion of the first increment of resin A2 enamel (Z350 XT, 3M ESPE) on the silicone guide that was brought into position



Fig. 19: Accommodation of the last layer of resin to restore enamel lost, A2E (Z350 XT, 3M ESPE)



Fig. 16: Aspect of the first enamel palatal layer after light-cured. Note the thinness of the layer



Fig. 20: Demarcation with graphite pencil areas that should receive more refined finish



Fig. 21: First disk of the sequence of abrasive disks Sof-Lex Pop-On (3M ESPE)



Fig. 25: Appearance after finishing procedures



Fig. 22: Medium-grained disk being applied to the buccal surface of the tooth in question



Fig. 26: Front view of the final result



Fig. 23: Use of fine-grained disk in incisal edge



Fig. 27: Note a satisfactory outcome from the functional and esthetic points of view



Fig. 24: Making areas of depressions in order to mimic the natural

largest to smallest grain (Figs 21 to 23), and prior to use the last disk of sequence, a laminated finishing bur was used for making depressions on enamel (Fig. 24), providing natural appearance to the restoration (Figs 25 to 27).

DISCUSSION

Self-etching adhesives are systems that partially dissolve the smear layer¹ and eliminate the need for phosphoric acid by the use of an acid primer, and are available with either self-etching primers or single-step adhesives.

Both the intratubular as the intertubular dentin permeability are required to obtain the penetration of the resin monomers for the dentinal tubules and for the exposed

collagen fiber network. The use of self-etching adhesive system, for being applied directly on the 'dry' smear layer, prevents damage associated with the use of three separate steps.¹¹ Self-etching adhesives increase dentin permeability by its intrinsic acidity, and facilitate the penetration of resin monomers in microporosities produced in dentin. Thus, they become easier to use, constituting themselves as technically simpler alternatives. Authors^{12,13} reported that self-etching systems have advantages over conventional adhesives, especially in their application, for simplifying bonding technique and reducing postoperative sensitivity.^{14,15}

However, one problem with self-etching adhesives is about bonding to enamel, because these systems have weak acids in their composition, leading to an unsatisfactory effect on bond strength, so some manufacturers recommend the use of phosphoric acid on enamel previously for best effectiveness, as the present case reports.

CONCLUSION

Adhesive restorations have evolved considerably in recent years. Among the different adhesive systems and application protocols that are emerging, the self-etching stand out, becoming an option for direct adhesive restorations. Due to achieve better effectiveness of these systems, it is recommended that acid etching of enamel with 37% phosphoric acid prior to application of self-etching adhesive, enabling satisfactory results in terms of function and esthetic.

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