The concept and practice of esthetic dentistry now is common to most clinicians around the world. Retention of restorative materials to the surface of tooth structure by means of adhesion is carried out routinely. So successful have been adhesion techniques that retentive pins are seldom, if ever, incorporated into dental practice. The long sought after dream of bonding virtually any type of material to the tooth surface has been realized.

Over the course of years, a number of modifications have been made to the dentin adhesives. Each major change invariably led to significant enhancements of the shear bond strength between the restorative materials & the underlying dentin. Dental manufacturers & professionals have marked these changes by characterizing each subsequent formulation as the next (generation). Although such a term has no inherent significance, it commonly is used by the profession to differentiate between currently available systems. The story was started from the 1st till it reached the 6th generation. The most commonly used systems in dental practice are the 4th & 5th generations.

In fourth generation adhesives three constituents are used: etchant, Primer & adhesive resin. The use of the total-etch technique is one of the main characteristics of fourth-generation bonding system. The total-etch technique permits the etching of enamel and dentin simultaneously using 35-37% phosphoric acid for 15-20 seconds. The surface must be left moist (wet bonding) to avoid collapse of the unsupported collagen network, inhibiting adequate wetting & penetration by the adhesive. However, the clinician must be aware that pooled moisture should not be allowed to remain on the tooth, as excess water can dilute the material & reduce its effectiveness. A glistening, hydrated surface is the preferred appearance. The second component (primer) containing hydroxyethylmethacrylate, or HEMA, wetting agents & solvents penetrates the open dentinal tubules, promote surface wetting & resin permeation of the moist demineralized dentine matrix. The third component is the adhesive resin is applied & penetrates into the primed dentin, copolymerized with the primer to form an intermingled layer of collagen & resin commonly called (hybrid layer). These bonding systems create a mechanical interlocking with etched dentin by means of resin tags (polymerized resin inside dentinal tubules), adhesive lateral branches & hybrid layer formation. Many investigators have reported shear bond strengths for these materials that approach or exceed the typical enamel bond strength of 20 MPa. Several major dental product manufacturers market fourth-generation bonding systems. Examples include All Bond 2, ProBond, Amalgambond, Clearfil Liner Bond & Scotchbond Multi-Purpose Plus.

To simplify the clinical procedure by reducing the bonding steps & thus, the working time, a better system was needed. Also, clinicians needed a better way to prevent collagen collapse of demineralized dentin. The fifth generation of bonding systems was developed to make the use of adhesive materials more reliable for practitioners. The fifth generation consists of two different types of adhesive materials: the so-called (one bottle system) & the self-etching primer bonding systems.

One-bottle systems. To facilitate clinical use, one-bottle systems combined primer & adhesives into one solution to be applied after etching enamel & dentin simultaneously (the total- etch- wet- bonding technique). These bonding systems show high bond-strength values both to the
etched enamel & dentin. Numerous one-bottle adhesives are now available, including Prime&Bond, OptiBond Solo & Single Bond. The description of these materials as (single-component), (one-bottle), or (one-step) systems is inaccurate. They require conditioning of enamel & dentin prior to application of the primer/adhesive, & most require two or more applications of the latter.

Self-etching primers. Two categories of bonding agents represent the self-etching primer concept. One category involves two components, a combined acid etching/priming solution & a bonding agent. The other involves a single component, a combined acid etching, priming & bonding material.

Two-component agent. The self-etching primer concept leaves the so-called smear layer in place (in contrary to the total etching concept in which complete removal of smear layer is required), does not require washing off the tooth surface & seals the dentinal surfaces well that decreases the postoperative sensitivity. Clearfil SE Bond is an example of this category.

One-component agent (the 6th generation). In the second category of self-etching primers, all three constituents are placed on the tooth surface at one time & not washed off the tooth surface. Prompt L-Pop is an example. Similar to the two-component agent, the one component agent has been reported to have excellent lack of post operative sensitivity.

References:

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