

Comparative evaluation of post operative sensitivity in etch and rinse and self etch adhesives: A longitudinal study

Anjana Banthia Nahar^{1*}, Apoorva Gupta²

^{1,2}Resident, ^{1,2}Dept. of Conservative and Endodontic, Rishiraj College of Dental Science and Research, Bhopal, Madhya Pradesh, India

***Corresponding Author: Anjana Banthia Nahar**

Email: drajananahar@gmail.com

Abstract

Introduction: It is presumed that self-etch adhesives prevent postoperative sensitivity in posterior restorations. In this study, the author tested a hypothesis: a self-etch adhesive would result in postoperative sensitivity less than etch and rinse. Methods: Patients were recruited on the basis of class I and class II restorations in molars and premolars. The author placed 60 restorations with self-etch adhesive [Adper Easy Bond, 3M ESPE, Germany] and 72 restorations with Tetric N-Bond [Ivoclar-Vivadent, India], which uses 34% phosphoric acid to etch enamel and dentine simultaneously. Cavity preparations were of established design for composite restoration, with no beveling on occlusal surface with supported enamel margins. Restoration done with corresponding composite materials under rubber dam isolations. The restored teeth were evaluated preoperatively and at 15 days, 2 months and 6 months postoperatively for sensitivity to cold [ice], air and masticatory forces. Results: Analysis of variance revealed no statistically significant difference in postoperative sensitivity between the self-etch and etch and rinse at any recall time. Conclusion: The study was that the self-adhesive did not differ from the etch and rinse in terms of sensitivity.

Keywords: Self etch adhesive, Total etch, Sensitivity, Beveling.

Introduction

Buonocore in 1955 introduced the acid etch technique.¹ Dentine bonding has different mechanisms because dentine has water, organic and inorganic molecules.² Organic material primarily Collagen type I. The number of tubules decreases from the about 45,000/mm² close to pulp to 20,000/mm² near the DEJ.

Etch and rinse technique [total etch] term used after 1990⁸ for resin-dentin bonding. Removal of smear layer and demineralized the underlying dentine through acid. Open the dentin tubules expose a dense collagen and increase the microporosity of the dentin. The depth of demineralization is approximately 8 micrometer depend upon type of acid, application duration and concentration.^{8,9}

When adhesives resins applied to the etch dentine, they penetrate the intertubular dentin, forming a resin-dentine interdiffusion zone or hybrid layer. They also penetrate and polymerize in the open dentinal tubules, forming resin tags. For etch and rinse adhesives the microscopic morphologic status of the changes in hybrid layer, unaffected dentine showed that an instantaneous change from hybrid layer to mineralized layers without space or pathways that could result in micro leakage.^{3,4,5}

For self-etch adhesives resin the microscopic morphologic status is more progressive, with a superficial zone of resin tags smear residues and inner layer near to the unaffected dentine, which is more mineralized.^{6,7} Self-etch adhesives are two step and one step. Dentist more demands for simplification of adhesive system, no – rinse self – etch materials that include the fundamental steps of etching, priming, and bonding in to one solution.

A long time, 30yrs dentist experienced a problem of post operative sensitivity after placing a composite restoration over posterior teeth.¹⁰ The aim of this longitudinal study to compare the post op sensitivity placed with self etch and total etch adhesives.

Clinical Considerations

All 132 patients had class I and class II restoration in premolars and molars for restoration of primary carious lesions. Patient who had non vital teeth, history of tooth sensitivity, xerostomia, periodontal diseases, allergy to resin, pregnancy, orthodontic treatment, painful pulpitis, fractured teeth, long distance patient not come for follow up are excluded from study. Under local anesthesia, rubber dam apply, wooden wedges and matrix system apply for class II restoration.

Materials and Methods

After caries excavation and conventional cavity preparation the author apply self etch adhesive [Adper Easy Bond, 3M ESPE, Germany] or by etching with phosphoric acid for 5 sec on cut surfaces of tooth. Although their no need to rinse to self etch adhesive, the phosphoric acid rinse for 1 min. and the dentin was left moist, apply adhesives [Tetric N-Bond [Ivoclar-Vivadent, India], on prepared surfaces. Cure it according to manufacturer instruction. Place a composite material and polymerize for 40 sec per increments. Finishing and polishing done by Ivoclar polishing kit and polishing strips [brasseler USA].

Evaluation of Hypersensitivity

The restored teeth were evaluated preoperatively and at 15 days, 2 months and 6 months postoperatively for sensitivity to cold [ice], compressed air and masticatory forces. A visual analog scale 1 to 10 used. Patients raise their hand when stimulus gives, with maximum application time 15 sec.

Statistical Methods

Cold sensitivity, response time and air sensitivity and response time 4 dependent variable were analyzed. At three

follow up times each analysis was a repeated measures analysis of variance were used.

Results

132 restoration, 60 restorations with self etch adhesive [Adper Easy Bond, 3M ESPE, Germany] and 72 restorations with Tetric N-Bond [Ivoclar-Vivadent, India], which uses 34% phosphoric acid to etch enamel and dentine

simultaneously, done the difference was not significant. Table 1 shows means and standard errors for severity and time to response for air, cold stimuli. For all four dependent variables was not significant in main effect and its interaction between treatment and time. No tooth shows masticatory sensitivity.

Table 1: Review on adhesive material uses in study [Table- A]

| Adhesive system | classification | Composition of adhesive system | Uses Instruction |
|---|--------------------------------------|--|---|
| [Adper Easy Bond, 3M ESPE, Germany] | self etch adhesive 7th Generation | MDP Phosphate Monomer Dimethacrylate resins HEMA 3M™ Vitrebond Copolymer Filer Ethanol Silane Initiator water | Application of the bonding agent requires 20 seconds of scrubbing the material into the preparation, followed by 5 seconds of air and 10 seconds with a curing light |
| Tetric N-Bond [Ivoclar-Vivadent, India] | Total etch | Tetric N-Bond is the phosphoric acid gel N-Etch. Bis-GMA, rethane dimethacrylate, hydroxyethyl methacrylate, phosphonic acid acrylate ethanol, film-forming agent, initiators and stabilizers. | Apply N-Etch on enamel and subsequently on dentin; and allow a reaction time of 15 seconds. Afterwards, thoroughly rinse off the etchant with water spray and dry the tooth surfaces with oil-free air. Avoid excessive drying of the dentin. The etched enamel surface should have a chalky white Dispense the desired amount of Tetric N-Bond into a mixing well and apply it using a disposable applicator. Apply a thick layer of Tetric N-Bond on the enamel and dentin surfaces, using the enclosed application brush. Brush the material gently into the dentin for at least 10 seconds. Remove excess material and the solvent by a gentle stream of air so that the adhesive completely covers the enamel and dentin. Light cure according to manufacture. |

Table 2: Severity and time of respons to air, cold and masticatory forces

| stimulus | Before treatment | 2 weeks after treatment | 8 weeks after treatment | 6 months after treatment | Before | 2 weeks after treatment | 8 weeks after treatment | 6 months after treatment |
|--|------------------|-------------------------|-------------------------|--------------------------|-------------|-------------------------|-------------------------|--------------------------|
| Air Mean [standard error] Severity [1 to 10 scale] | 1.65 [0.29] | 1.73 [0.17] | 2.16 [0.17] | 1.26 [0.18] | 1.83 [0.29] | 1.12 [0.17] | 1.76 [0.18] | 1.06 [0.17] |
| Mean [SE] response Time[0 to 15 sec] | 9.5 [0.78] | 10.06 [0.40] | 9.5 [0.78] | 11.30 [0.50] | 9.80 [0.79] | 10.08 [0.50] | 9.70 [0.50] | 11.38 [0.50] |
| Cold Mean [standred error] Severity [1 to 10] | 2.48 [0.41] | 2.76 [0.24] | 2.8 [0.24] | 1 [0.15] | 2.4 [0.3] | 2.04 [0.15] | 2.6 [0.14] | 2.4 [0.13] |
| Mean [SE] Response time[0 to 15 sec] | 8.9 [0.85] | 7.4 [0.52] | 7.5 [0.62] | 9.3 [0.5] | 8.42 [0.52] | 7.04 [0.64] | 8.74 [0.64] | 8.53 [0.64] |
| Masticatory force Mean [SE] Severity [1 to 10] | 0 | 0 | .1 | 0 | 0 | .1 | 0 | 0.1 |

Discussion

many factors contribute post operative sensitivity like etching of dentine, microorganisms reaching up to pulp,¹¹ cuspal deflection due to shrinkage of composite¹² less study have analyzed postoperative sensitivity of self etch adhesives, etch and rinse adhesive or both in posterior tooth.¹³ self etch adhesives etch and prime enamel and dentine simultaneously no rinse required; its bond strength depend upon partially dissolved hydroxyapatite crystal obtained resin – infiltrated layer with minerals incorporated.¹⁴ One drawback of self etch is that they do not etch enamel to the depth achieved with phosphoric acid. some studies shows that self etch adhesive effective on ground enamel rather than intact. Miyazaki and colleagues done a study in which they found a significant decrease in enamel bond strengths for the three SE adhesives tested when specimens were thermocycled up to 30,000 cycles, while for three of the four TE adhesives tested, they found no significant differences from baseline to 30,000 cycles.¹⁵ self etch are less technique sensitive, moist bonding not required and do not remove the smear layer completely some dentist believe that they cause less postoperative sensitivity than etch and rinse adhesive.¹⁶ Incremental technique minimized the polymerization shrinkage 2mm increments thickness maximum polymerization. Our study state that no significance difference in post operative sensitivity between self and total etch adhesives.

Conclusion

The self adhesive did not differ from the etch and rinse in terms of sensitivity.

Conflict of Interest: None.

References

1. Buonocore MG. A simple method of increasing the adhesion of acrylic filling materials to enamel surfaces. *J Dent Res* 1955;34:849-53.

2. Veis A. Mineral-matrix interactions in bone and dentine. *J Bone Miner Res* 1993;8(2):S493-7.
3. Swift EJ, Bayne SC. Shear bond strength of a new one-bottle dentin adhesive. *Am J Dent* 1997;10:184-8.
4. Kanca J. Effect of resin primer solvents and surface wetness on resin composite bond strength to dentin. *Am J Dent* 1992;5:213-5.
5. Finger WJ, Fritz U. Laboratory evaluation of one-component enamel/dentin bonding agents. *Am J Dent* 1996;9:206-10.
6. Tay FR, Sano H, Carvalho R, Pashley EL, Pashley DH. An ultrastructural study of the influence of acidity of self-etching primers and smear layer thickness on bonding to intact dentin. *J Adhes Dent* 2000;2:83-98.
7. Eick JD, Gwinnett AJ, Pashley DH, Robinson SJ. Current concepts on adhesion to dentin. *Crit Rev Oral Biol Med* 1997;8:306-35.
8. Van meerbeek B, Ionkoshi S, Braem MI. Morphological aspects of the resin-dentin interdiffusion zone with different dentin adhesive system. *J Dent Res* 1992;71:1530-40.
9. Perdigao J, Lambrechts P, Van Meerbeek. Morphological field emission SEM study of the effect of six phosphoric acid etching agents on human dentin. *Dent Mater* 1996;12:262-71.
10. Leinfelder KF. Posterior composites. In: Taylor DF, ed. *Proceedings of the International Symposium on Posterior Composite Resins*. Chapel Hill, N.C.: University of North Carolina Press; 1984:353
11. Brännstrom M. Etiology of dentin hypersensitivity. *Proc Finn Dent Soc* 1992;88(1):7-13.
12. Pashley DH, Tay FR. Aggressiveness of contemporary self-etching adhesives, part II: etching effects on unground enamel. *Dent Mater* 2001;17:430-44.
13. Opdam NJ, Feilzer AJ, Roeters JJ, Smale I. Class I occlusal composite resin restorations: in vivo post-operative sensitivity, wall adaptation, and microleakage. *Am J Dent* 1998;11:229-34.

How to cite this article: Nahar AB, Gupta A. Comparative evaluation of post operative sensitivity in etch and rinse and self etch adhesives: A longitudinal study. *Int Dent J Student's Res* 2019;7(2):35-7.