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Total Etch versus Self Etch Adhesive; Effect on Post-Operative Sensitivity

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ABSTRACT

Objective: To compare post-operative sensitivity after placement of composite restoration in Class I cavity using total etch adhesive and self-etch adhesive.

Study Design: Quasi-experimental study.

Place and Duration of Study: Department of Operative Dentistry, Armed Forces Institute of Dentistry (AFID), Rawalpindi Pakistan, from Jul to Dec 2019.

Methodology: Total 80 patients were chosen with Class-I cavities present on premolars and molars of both maxillary and mandibular arch. They were divided into two groups. 40 patients each in Group-A (Self etch adhesive) and in Group-B (Total etch adhesive). Composite restorations were sited in both groups and evaluated for post-operative sensitivit y after 24 hours and after one week. Data was recorded by using Visual Analog Score in response to air stimulus.

Results: The mean VAS scores for the Self Etch Group, group was lower than the Total Etch group at the 1-day (0.525 and 0.850 respectively), and 1-week (0.050 and 0.10 respectively) evaluation periods with a statistically significant difference after 24 hours only.

Conclusion: Significantly less post-operative sensitivity observed with Self Etch adhesive as compared to total etch following 24 hours of restoration placement. Sensitivity faded over the period of one week.

Keywords: Composite, Post-operative sensitivity, Self-etch adhesive, Total etch adhesive.

How to Cite This Article: *Inam S, Taj RU, Masud M, Nadeem WA, Islam R, Adil M. Comparison of Post Circumcision Complications of Conventional Open Technique Versus Plastibell Method. Pak Armed Forces Med J 2023; 73(Suppl-1): S156-159.DOI: https://doi.org/10.51253/pafmj.v73iSUPPL-1.4250*

INTRODUCTION

Due to increased insistence of tooth colored posterior restoration, the use of direct composite restorations has efficaciously increased but the aesthetics will be of no help if the patient experience discomfort of pain post restorations. The incidence of postoperative sensitivity in adhesive restorations of Class-I cavities is not uncommon.[1] Factors responsible for post-operative sensitivity include depth of cavity, dentin etching, over drying of dentin, placement technique and polymerization shrinkage.[2,3]

Post-operative sensitivity can be reduced through the application of supplies that will secure the dentino-pulp structure, for instance calcium hydroxide, glass ionomer and resin-based adhesive systems. These materials should have bacteriostatic and bactericidal properties that shield the pulp against the thermal, electrical or noxious stimuli and have bio compatible with the pulp and restorative material used but in some instances Post-operative sensitivity is also evident even when the dentin liner is used.[4]

Polymerization shrinkage produces stress within the material between adhesive interface and tooth surface.[5] To reduce the polymerization shrinkage various recommendations have been made. The use of a base of materials with a low modulus of elasticity, use of nano hybrid composites, placing the resin in small increments, moderate and cautious light activation techniques and maintain the wavelength emit by the light source are some of the suggestions.[6,7]

Well known hydrodynamic theory given by Bränström and Ästron in 1964 describes after certain stimuli, movement of fluid within the dentinal tubules which changes intratubular pressure, elicits the painful phenomenon in dentin by the thus leading to excitation of the nerve terminals of pulp, producing a sensation of pain. Therefore, the character, size, form of dentinal tubules and the dentin type has a direct relationship with dentinal sensitivity.[8] Secondary caries and fracture at the margin sites are also the cause of failure of restoration.[9]

Total etch adhesive is an extensively used generation of dental adhesive. Latest adhesives have condensed the number of steps in placing composite restorations. Self-etch adhesives found to be beneficial for operators with reduce steps (no etch and rinse).[1] Majority of clinicians' perspective is that the self-etch cause less post-operative sensitivity than total etch.[3,10]

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Received: 04 May 2020; revision received: 06 Oct 2020; accepted: 14 Oct 2020

The purpose of this study was, to compare Post-operative Sensitivity for composite restoration of self-etch and total etch adhesive used in class I cavity.

METHODOLOGY

A Quasi Experimental study was carried out on the patients reporting to Department of Operative Dentistry in Armed Forces Institute of Dentistry, Rawalpindi Pakistan, from July to December 2019 were included. Thorough history, clinical examination and pulp vitality tests were performed. The study was permitted by the Ethics Review commission of AFID (ltr no. 905/Trg–ABP1K2). Informed consent was taken from the included patients.

Inclusion Criteria: Participants aged between 18–45 years, of either gender, presenting with Class-I carious lesion with vital pulp, sound occlusal and proximal contacts and caries observed in outer to middle third of dentin on radiographic examination were included.

Exclusion Criteria: Patients with abnormal occlusion, non-vital teeth, parafunctional habits, generalized sensitivity, and recent history of desensitizing treatment, periodontal disease, fractured or cracked teeth and patients allergic to resin materials were excluded in this study.

The total sample size was 80 patients, 40 in each group. Simple randomization was done for distribution of patients in treatment groups. Sample size was calculated from Openepi calculator keeping Confidence interval=95% Power of test=80% and odds ratio as 3.

Under constant cooling water cavity was prepared by working with a small size round diamond bur in a high speed hand piece followed by excavator. Operative area was isolated with cotton rolls and disposable suction tips. No calcium hydroxide lining was placed.

In Group-A, Self etching adhesive (Prime & Bond active, DENTSPLY) was applied for 15 seconds with microbrush, air dried for 5 seconds and then light cure for 20 seconds using Quartz tungsten halogen curing light (HILUX 200, Turkey). Prepared tooth surface was then cured with SDR+ flow composite and light cure for 40 seconds.

In Group-B, 37% phosphoric acid etchant gel (Scotch bond 3M, ESPE) was applied for 30 seconds then washed with water and air dried for 10 seconds by triple syringe. Bonding agent (Prime & Bond NT, DENTSPLY) was apply and light cure for 15 seconds. Cavity was then filled with composite (Spectrum, DENTSPLY) in small increments to prevent polymerization shrinkage and light cure for 40 seconds. At the end, the restorations of both groups were finish with flame shaped diamond burs and polishing was done using silicone polish cups in slow speed handpiece.

Evaluations of restored teeth were done after 24 hours and 1 week for post-operative sensitivity.

Patients were instructed and advised to mark on the VAS according to the intensity of sensitivity felt in tested tooth when compressed air from triple syringe of dental unit at a distance of 2cm was applied. It was applied for 5 seconds using stop watch with a rest period of 5 minutes between applications.

The degree of sensitivity recorded by Visual Analog Score (VAS) with readings from 0 to 10 which were divided into 4 groups on the basis of range of scores as shown in Table-I.

Table-I: Visual Analog Scores Representing Degree of Sensitivity

Score	Degree of Sensitivity
0	Sensitivity
1–3	Mild sensitivity
4–7	Moderate sensitivity
8–10	Severe sensitivity

The data was gather on a Performa and analyzed by using Statistical Product and Service Solutions (SPSS) version 23. Comparison of age between both groups was done using independent sample t-test. Distribution of gender of participants of both group were compared by chi-square test. p-value <0.05 considered a significant deviation.

Data were presented as mean and standard deviation (SD) values. Friedmann test was used to compare between different follow-up periods for different tested groups, followed by Fisher exact test for Pairwise comparison. Mann Whitney test was used to compare between different tested groups. The significance level was set at $p \leq 0.05$. Statistical analysis was performed with IBM® SPSS® (SPSS Inc., IBM Corporation, NY, USA) Statistics Version 20 for Windows.

RESULTS

A total of 80 patients were recruited after meeting the eligibility criteria. All patients (100%) returned to a 1-week recall. In a total of 80 patients, the average age of the patients was 31.86±6.89 years. Age range was 18-45 years. Out of 8 Patients majority 47(57.3%) were males 33(40.2%) were females. Detail distribution of the demographics are summarized in Table-II.

Table-II: Demographic Details of the Patients (n=80)

		Self-Etch Adhesive	Total Etch Adhesive	*p*-value
Age (Years) (Mean±S.D)		30.35±5.789	33.38±7.625	0.049
Gender	Female	17(42.5%)	16(40%)	0.82
	Male	23(57.5%)	17(42.5%)	

As for the comparison between the two groups, the mean VAS scores for the Self Etch Group group was lower than the Total Etch group at the 1-day (0.525 and 0.850 respectively), and 1-week (0.050 and 0.10 respectively) evaluation periods with a statistically significant difference after 24 hours only as shown on Table-III and Figure.

Table-III: Comparison of Cold Sensitivity (VAS) By Time and Type of Treatment (n=80)

Post-Operative Sensitivity	Self-Etch	Total Etch	Man-Whitney U-test
After 24 hrs Mean±SD	0.525±0.6788	0.850±0.6621	0.020
At 1 Week Mean±SD	0.050±0.2207	0.1000±0.303	0.399

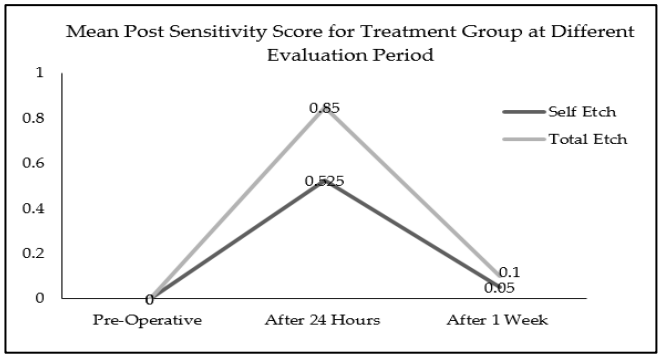

Figure : Line Graph showing Mean Post Sensitivity Score for Treatment Group at Different Evaluation Period

The mean VAS scores for both the groups after 24-hours evaluation periods was higher than the 1 week period but the result was non statistically significant (p>0.05; Fisher's Exact test)

DISCUSSION

Following the placement of composite restoration, post-operative sensitivity has been a problem faced by clinicians. Factors responsible for post-operative sensitivity like pre-operative causes including cracked and fractured tooth, dentin exposure in cervical area, pulp state, operative causes include abusive dental structure wear, incomplete caries removal, inadequate isolation of the operative area, handling restorative material and post-operative cause includes finishing and polishing of restoration, occlusal interference and cervical dentin exposure.[2,3]

In this study, there was a significant difference observed in sensitivity level during 24 hours with total etch which was later reduced to zero via the end of First week.

Self-etch adhesive partially dissolve the tooth structure for resin infiltration by conditioning and priming the enamel and dentin without rinse. Total etch adhesives is more technique sensitive than self-etch adhesives. As self-etch adhesives do not completely remove the smear layer, many practitioners believe that self-etch adhesives cause less post-operative sensitivity than total etch adhesives.[11]

Applying etchant in deep cavity as a component of the etch and rinse approach removed the smear layer and increased the permeability of dentin make the tooth vulnerable to postoperative sensitivity if dentinal tubules were not occluded by hybridization.[12]

Amin *et al.* conducted a similar study over a period of one week and concluded post-operative sensitivity with both self-etch adhesive and total etch adhesive remains till one week.[1] Manchorova-Veleva *et al.* concluded in six months follow up study that there was no significant difference in the frequencies of postoperative sensitivity between self-etch and total etches adhesive.[2]

Some studies showed no significant difference in post-operative sensitivity either by using total etch adhesives or by self-etch adhesives.[11] Oliveira in his one month recall period concluded that self-etch causes mild post-operative sensitivity in deep Class-I cavities that reduce with the period of time 10 which is in accordance with present study. Krithikadatta *et al.* conducted meta-analysis and concluded no significant difference in Post-operative sensitivity with both total etch and self etch.[13] Consequently the occurrence of post-operative sensitivity may not be effected by the bonding system.[14]

Opdam concluded that total etch system of composite restorations predicts favorable results if used in an appropriate way.[15]

Variations in the result of these studies also lead us to understand that technique and application factors also effects on post-operative sensitivity than adhesives used.[16] Age of the patient is also an important factor as tubules in dentin completely or partially occluded with the deposition of peritubular dentin with increased age.[16]

Distance from the tip of curing light to the surface of the restoration also influenced on the polymerization of composite resin.[17-18]

The present study showed no statistically significant difference in post-operative sensitivity in both group in 1 week follow up.

LIMITATIONS OF STUDY

Post-operative sensitivity was deliberate on air stimulus only. Stimulus like hot, cold and chewing force could have been used to evaluate. Only Class-I cavities are evaluated, there is a need for further future work in Class-II and Class-V.

CONCLUSION

Significantly less post-operative sensitivity observed with Self Etch adhesives during 24 hours of insertion of restoration. Study showed mild sensitivity with both total etch and self-etch adhesive groups for the first 24 hours which faded till the end of one week.

Conflict of Intereset: None.

Author's Contribution

Following authors have made substantial contributions to the manuscript as under:

NI & SMH: Data acquisition, data analysis, approval of the final version to be published.

FTZ & MA: Study design, drafting the manuscript, data interpretation, critical review, approval of the final version to be published.

AY & FB: Critical review, concept, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

REFERENCES

1. Amin M, Naz F, Sheikh A, Ahmed A. Post-operative sensitivity in teeth restored with posterior dental composites using self-etch and total-etch adhesives. J Pak Dent Assoc 2015; 24(1): 22-28.
2. Manchorova-Veleva NA, Vladimirov SB, Keskinova DA. Clinical impact of dental adhesives on postoperative sensitivity in Class-I and Class-II resin-composite restorations. Folia medica 2015; 57(3-4): 243-249.
3. Sabbagh J, Fahd JC, McConnell RJ. Post-operative sensitivity and posterior composite resin restorations: a review. Dent Update 2018; 45(3): 207-213. http://dx.doi.org/10.12968/denu.2018.45.0215643.207
4. Cortés O, Alcaina A, Bernabé A. Biocompatibility evaluation of four dentin adhesives used as indirect pulp capping materials. Acta stomatologica Croatica 2017; 51(2): 113-121.
5. Baracco B, Perdigão J, Cabrera E, Giráldez I, Ceballos L. Clinical evaluation of a low-shrinkage composite in posterior restorations: one-year results. Oper Dent 2012; 37(2): 117-129.
6. Fronza BM, Rueggeberg FA, Braga RR, Mogilevych B, Soares LE, Martin AA, et al. Monomer conversion, microhardness, internal marginal adaptation, and shrinkage stress of bulk-fill resin composites. Dent Mater J 2015; 31(12): 1542-1551.
7. van Dijken JW, Pallesen U. A randomized 10-year prospective follow-up of Class-II nanohybrid and conventional hybrid resin composite restorations. J Adhes Dent 2014; 16(6): 585-592.
8. Won Kim J, Park JC. Dentin hypersensitivity and emerging concepts for treatments. J Oral Biosci 2017; 59(4): 211-217. http://dx.doi.org/10.1016%2Fj.job.2017.09.001
9. Van Dijken JW, Lindberg A. A 15-year randomized controlled study of a reduced shrinkage stress resin composite. Dent Mater J 2015; 31(9): 1150-1158.
10. Oliveira NG, Lima AS, Silveira MT, Araújo PR, Monteiro GQ, Carvalho M, et al. Evaluation of postoperative sensitivity in restorations with self-adhesive resin: a randomized split-mouth design controlled study. Clin Oral Investig 2019; 24(5): 1829-1835. https://doi.org/10.1007/s00784-019-03046-0
11. Aboelenein AZ, Riad MI, Haridy MF. Effect of a self-etch adhesive containing nanobioglass on postoperative sensitivity of posterior composite restorations-a randomized trial. Open Access Maced J Med Sci 2019; 7(14): 2313.
12. Bhatti UA. The phenomenon of postoperative sensitivity and composite restorations-a review. JPDA. 2016; 28(01): 34. https://doi.org/10.25301/JPDA.281.339
13. Krithikadatta J. Clinical effectiveness of contemporary dentin bonding agents. J conserve Dent 2010; 13(4): 173-183
14. Sabbagh J, Fahd JC, McConnell RJ. Post-operative sensitivity and posterior composite resin restorations: a review. Dent Update 2018; 45(3): 207-213.
15. Opdam NJ, Bronkhorst EM, Roeters JM, Loomans BA. A retrospective clinical study on longevity of posterior composite and amalgam restorations. Dent mater J 2007; 23(1): 2-8.
16. Bucuta S, Ilie N. Light transmittance and micro-mechanical properties of bulk fill vs. conventional resin based composites. Clin Oral Investig 2014; 18(8):1991-2000.
17. Dunne SM, Millar BJ. Effect of distance from curing light tip to restoration surface on depth of cure of composite resin. Prim Dent J 2008; 15(4): 147-152. https:// doi: 10.1308/135576108785891150.
18. Caldas DB, Almeida JB, Correr-Sobrinho L, Sinhoreti MA, Consani S. Influence of curing tip distance on resin composite Knoop hardness number, using three different light curing units. Oper Dent 2003; 28(3): 315-320.