

Postoperative Sensitivity of Self Etch Versus Total Etch Adhesive

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ABSTRACT

Objective: To compare postoperative sensitivity following composite restoration placed in supra gingival class-V cavities using self etch adhesive and total etch adhesive.

Study Design: A randomized clinical trial.

Place and Duration of Study: Operative Dentistry Department of Armed Forces Institute of Dentistry, Rawalpindi, from July to December 2009.

Methodology: A total of 70 patients having class-V supra gingival carious lesions were divided into two groups. Classes-V cavities not exceeding 3 mm were prepared. One treatment group was treated with self etch adhesive (adhe SE one Ivoclar) and the control group was treated with total-etch adhesive (Eco-Etch Ivoclar) after acid etching with 37% phosphoric acid. Light cured composite (Te-Econom Ivoclar) restoration was placed for both groups and evaluated for postoperative sensitivity immediately after restoration, after 24 hours and after one week. Data was recorded on visual analogue scale.

Results: Comparison of sensitivity between the two treatment groups on application cold stimulus after 24 hours of restoration showed significant difference; however, no statistically significant difference was observed at baseline, immediately after restoration and at 1 week follow-up with cold stimulus or compressed air application.

Conclusion: Less postoperative sensitivity was observed at postoperative 24 hours assessment in restoration placed using SE adhesives compared to TE adhesives. Thus, the use of SE adhesives may be helpful in reducing postoperative sensitivity during 24 hours after restoration placement.

Key Words: Dentin-bonding agents. Dentin sensitivity. Composite dental resin.

INTRODUCTION

Postoperative sensitivity after placing composite restoration has been a significant problem experienced by clinicians. This has been attributed to several factors including dentine etching, restoration technique, over-drying of dentin, polymerization shrinkage, depth of cavity and deformation of the cusps by occlusal forces.¹⁻⁴

Bonding to dentine has traditionally relied on three steps; conditioning, priming and bonding. Total etch (TE) dentine is a widely used generation of dentin adhesive. In attempts to decrease the number of steps and subsequent more chances of procedure errors in dentin bonding has led to development self etch (SE) adhesives.^{5,6} SE adhesives eliminates the need for separate acid etching/conditioning step and subsequent rinsing and drying of dentin. Over drying of dentin can lead to collapse of collagen meshwork in conditioned dentin and may lead to postoperative sensitivity and

decrease in bond strength. The reduction in number of steps in SE adhesives can lead to decrease in chair-side time and by avoiding potential overdrying it may also lead to lesser postoperative sensitivity.⁷ Some studies have reported equivocal results for postoperative sensitivity and dentin bond strength for method of application and adhesive used.^{8,9}

The objective of this study was to compare the post-operative sensitivity of class-V restoration placed with self etch adhesive and total etch adhesive.

METHODOLOGY

The patients reporting to Operative Dentistry Department of AFID, from July to December 2009, were screened by taking history, clinical examination and pulp vitality tests. The study was conducted after approval from the Ethics Review Committee. Written informed consent was taken from patients willing for enrollment in study after briefing of the aim of study and its methods.

Patients of either gender, aged 18-44 years, presenting with class-V carious lesion on buccal surface of anterior and premolar teeth were included. The vitality status was ascertained on thermal testing of teeth to rule out pulpal necrosis and irreversible pulpitis. Patients with parafunctional habits, generalized sensitivity, poor periodontal health and who were on desensitizing treatment were excluded.

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The total sample size was 70 patients, 35 in each group. For allocation of patients to treatment groups simple randomization with random number table was done. Patients were educated and advised to mark on the VAS according to intensity of their sensitivity in test tooth when cold stimulus (ethyl chloride spray on cotton pellet) and compressed air from three way dental unit syringe at a distance of 2 cm were applied. Each stimulus was applied maximally for 5 seconds using stop watch. A rest period of 5 minutes was given between applications of two stimuli. The pre-operative sensitivity was recorded on VAS in both groups.

In both treatment arms the cavity preparation was done using a round bur in high speed handpiece followed by excavation. Class-V cavities with the dimensions of 3 mm² were prepared. Patients with cavities larger than this dimension were excluded from the study at this point and more patients were enrolled to complete sample. All operative sites were isolated with cotton rolls, retraction cords and disposable suction tips.

The intervention arm patient's tooth was treated with self etch adhesive (adhesive one) for 15 seconds with microbrush, air dried for 5 seconds and then light cured for 20 seconds with Quartz Tungsten Halogen curing unit (HILUX 200, Bengoglu Turkey). Prepared tooth surfaces were restored by composite filling material (Te-Econom Ivoclar Vivadent) and light cured for 40 seconds. Finishing of restoration were done with flame shaped diamond burs and then polished with silicon polishers (Shofu, Japan) and aluminum oxide polishing discs (Soflex 3M ESPE) by slow speed handpiece.

In control arm, the teeth were treated with acid etching by 37% phosphoric acid (Eco-Etch 0) for 15 seconds, followed by rinsing with water spray for 10 seconds and drying with triple syringe air for 10 seconds. Total etch adhesive (adhesive Eco-Etch Ivoclar Vivadent) was gently applied with microbrush and was light cured for 10 seconds. The restoration was completed and polished as was done in the intervention arm.

Restored teeth were evaluated immediately after restoration, 24 hours and one week postoperatively for sensitivity as evaluated pre-operatively.

The data was entered into Statistical Package for Social Sciences (SPSS) version 12. The baseline characteristic like age of the two trial arms was done using independent sample t-test. The gender distribution of the participants of the two groups was compared using chi-square test. Shapiro-Wilk test was used to assess the normality of the outcome variable in the study groups, p-value less than 0.05 was taken as significant deviation from normal distribution.

Comparison of sensitivity to application of compressed air and cold stimulus was done between group-A and group-B using Mann Whitney U-test at baseline, immediately after placement of restoration and on follow

up visits after 24 hours and 1 week. A p-value ≤ 0.05 was considered as statistically significant.

RESULTS

The comparison of baseline characteristics of the two study arm showed that there was no significant difference in the mean age and gender distribution of the patients (Table I). This indicates that randomization was effective and the groups were comparable in the baseline characteristics.

Two patients were lost to follow-up after one recall visit. For both patients in each treatment group, worst case scenario was assumed and considered to have severe sensitivity. Shapiro-Wilk test for normal distribution of data showed significant p-value for all outcome assessment variables indicating a non-normal distribution of data in both group.

The pain score mean rank showed no significant difference between the two study arms at baseline, immediate postprocedure, after 24 hours and after 1 week with application of compressed air (Table II).

There was significant difference in the mean pain score at 24 hours follow-up between the two groups on evaluation with cold stimulus (p=0.05, Table II). On 24 hours follow-up, assessment showed lesser mean pain score for the self etch treatment than the total etch treatment.

Table I: Baseline comparison of treatment groups (n=70).

| Characteristic | Control arm (Total etch) n=35 | Intervention arm (Self etch) n=35 | p-value |
|--------------------|-------------------------------|-----------------------------------|---------|
| Age (mean and S.D) | 33.14 ± 7.57 | 36.03 ± 5.549 | 0.073* |
| Gender | | | |
| Male | 20 (57.1%) | 17 (48.6%) | 0.47** |
| Female | 15 (42.8%) | 18 (51.4%) | |

*Test of significance Independent sample t-test; **Test of significance chi-square test.

Table II: Comparison of sensitivity score of self etch arm and total etch treatment arm.

| Sensitivity assessment | Assessment | Mean rank | | p-value |
|-----------------------------------------|----------------|----------------|-----------------|---------|
| | | Self etch n=35 | Total etch n=35 | |
| Baseline assessment | Compressed air | 35.97 | 35.03 | 0.84 |
| | Cold stimulus | 36.54 | 34.46 | 0.66 |
| Immediate postoperative assessment | Compressed air | 37.01 | 33.99 | 0.51 |
| | Cold stimulus | 32.71 | 37.35 | 0.32 |
| Postoperative assessment after 24 hours | Compressed air | 31.34 | 39.66 | 0.07 |
| | Cold stimulus | 28.80 | 42.20 | 0.05** |
| Postoperative assessment after one week | Compressed air | 34.66 | 36.34 | 0.65 |
| | Cold stimulus | 31.40 | 36.34 | 0.08 |

** significant p-value; Test of significance = Mann Whitney U-test.

DISCUSSION

Postoperative sensitivity after placing posterior composite restorations has been a problem experienced by clinicians for past 20 years⁹ and has been reported to occur in almost 11% of composite restoration of all

type.¹⁰ Postoperative sensitivity has been attributed to the sensitive restoration technique and the microleakage resulting either from restorative material, bonding failure or from the technique employed.¹¹ In order to minimize variation in restorative technique in the current study the restorations were all done by a single operator. Post-operative sensitivity is typically reported by patient during the first week after the restorative procedure with reduction in incidence over period of time. In order to minimize recall bias in the current study the re-evaluation was done after 24 hours and after 1 week.

In the current study, self-etch adhesive was shown to have lesser mean pain score than the total etch adhesive in class-V composite restoration when postoperative sensitivity to cold stimulus was assessed 24 hours after procedure but no significant difference was elicited on other assessments.

Few clinical studies have focused on postoperative sensitivity caused by dentin adhesives and even fewer studies on comparison of postoperative sensitivity of class-V restoration placed with total etch and self etch adhesive.¹²⁻¹⁴

In current study, the postoperative sensitivity showed significant difference only at 24 hours recall and at all other assessment the difference were insignificant. Swift reported that postoperative sensitivity became less with time and the difference between SE and TE was not significant at any time of observation in this 3 years follow-up study.¹⁵ Sobral also reported almost no postoperative sensitivity with self-etch products where as total-etch products produced unpredictable and often irreversible sensitivity.¹³ A meta-analysis by Krithikadatta of clinical trials on comparison of different clinical outcome of composite restoration placed with SE and TE reported that there was no significant difference in postoperative sensitivity.¹⁶

Opdam reported sensitivity on loading in 56% of the restorations in posterior teeth placed with TE and an additional 14% of the teeth experienced spontaneous postoperative sensitivity at five to seven weeks. A lower proportion of postoperative sensitivity was observed in total etch treatment group.¹⁷ Burrow reported no significant difference in postoperative sensitivity,¹⁴ whereas other studies showed no difference in postoperative sensitivity in class-I and II composite restorations.¹⁸⁻²⁰ The diversity in results of various studies could be attributed to the different brands of adhesives used in various studies.

The present study shows that self etch adhesive can possibly reduce postoperative sensitivity to cold stimulus experienced by patients 24 hours after procedure. There is need for further clinical studies on long-term clinical outcome of the class-V restorations placed using self etch and total etch adhesive to assess the effectiveness of self etch adhesive.

CONCLUSION

Less postoperative sensitivity to cold stimulus was observed during the first 24 hours duration in restoration using SE adhesives as compared to TE adhesives. Thus, the use of SE adhesives may be helpful in reducing postoperative sensitivity during 24 hours after restoration placement. However, the choice of dentin adhesive (self etch or total etch) may not contribute to any significant reduction of postoperative sensitivity immediately after procedure and after 1 week.

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