ABSTRACT

OBJECTIVE: To compare postoperative sensitivity between restorative type glass ionomer and resin composite restoration in Class (V) carious cavity.

STUDY DESIGN: A Cross sectional comparative study.

PLACE AND DURATION: At Department of Operative Dentistry, Isra Dental College Isra University Hyderabad from 1st March 2013 to 30th September 2013.

METHODOLOGY: Patients presented with class V carious lesion were restored in two groups. Group-I, patients were treated with restorative type glass ionomer. Group-II, patients were treated with Resin composite. Post-operative sensitivity was determined in with Ethyl chloride (cold test) and Electric pulp tester (EPT).

RESULTS: The results showed that postoperative sensitivity after 2 days for group-I were 8% mild sensitivity, 92% no sensitivity on Electric pulp tester and 8% mild sensitivity, 92% no sensitivity on cold. Postoperative sensitivity for group-II were 12% mild sensitivity, 88% no sensitivity on Electric pulp tester and 4% mild sensitivity, 96% no sensitivity on cold. Postoperative sensitivity after 7 days for group-1 were 4% mild sensitivity, 96% no sensitivity on Electric pulp tester  and 8% mild sensitivity, 92% no sensitivity on cold. Postoperative sensitivity for group-II were 12% mild sensitivity, 88% no sensitivity on Electric pulp tester and 4% mild sensitivity, 96% no sensitivity on cold. Postoperative sensitivity between two groups revealed no significant results with p-value greater than 0.05 (p>0.05).

CONCLUSION: There was no difference of postoperative sensitivity in both class V restorations on Electric pulp tester and cold after 2 and 7 days.

KEY WORDS: Postoperative sensitivity, Class V, Glass ionomer, Resin composite, Carious cavity.

HOW TO CITE THIS:

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INTRODUCTION

Postoperative sensitivity is the discomfort associated with restoration placement. A number of reasons have been postulated for the occurrence of postoperative sensitivity but the most commonly accepted theories related to polymerization shrinkage results in formation of a gap, which allows bacterial penetration and fluid flow with in it. The entrance of bacteria or their noxious products into the dentinal tubules cause inflammation in pulp and tooth sensitivity. The movement or contraction of fluid in the gap due to cold or other stimuli and rapid outflow of tubular fluid are the reasons that pulp interprets as pain or sensitivity. Class V carious lesions occur in smooth facial and lingual surfaces in the gingival third of teeth. Class V caries lesion are produced by bacterial plaque attaching to the surface of the teeth and producing acids that cause demineralization. The aesthetic restorative materials are normally used for restoration of Class V small carious cavities. These materials include restorative type glass ionomer cements, resin modified glass ionomer, compomer and resin composite respectively. The Glass ionomers are a restorative material and have unique features. They are able to bond with tooth structure due to self adhesive and ionic bonding to the tooth structure. However, GIC has several disadvantages as well, such as sensitivity to desiccation and moisture contact during the early setting stages. The developments of new restorative techniques and materials like composite resin restoration help to minimize this problem. Conservative cavity preparations is the major benefit during composite restorations. The strong bonds formed with enamel and dentin in composite restorations showed reduce post operative complications and less weakening of tooth structure. Polymerization shrinkage is a major disadvantage of for composite restoration occurs during polymerization.
The most common cause of postoperative sensitivity in restorative type glass ionomer restoration is the air void that is present in the interface between the traditional glass-ionomer cements and dentin. Most challenging problem in composite restoration of class V small carious cavity is post operative sensitivity due to polymerization shrinkage. The gap under the restoration is formed due to polymerization shrinkage and this gap is then filled with dentinal fluid within the first 24–36 h. The hot or cold stimulus on interaction with restored teeth causes fluid expansion and contraction in gap, which causes fluid movement within the dentinal tubules that leads to postoperative sensitivity.

Previous study have evaluated the incidence of postoperative sensitivity in class V carious restored teeth but there was limitations in methodology as they used different variables and assessment methods. Previous researcher normally recorded subjective symptoms and they didn't use any standard tools. Therefore this study aims to use the qualitative approach in order to find out the best possible dental restorative material between restorative type glass ionomer and resin composite to decrease a postoperative sensitivity after restoration in class V carious cavity. The result of this study will help the dental practitioner in selection of dental material for class V carious cavity with less postoperative sensitivity and comfortable restorations for the patient. So the aim of the study was to compare the post-restorative sensitivity in restorative type glass ionomer as compare to resin composite restoration in class V carious cavity.

**METHODOLOGY**

This cross sectional comparative study was conducted at the Department of Operative Dentistry/College of Dentistry Isra University, Hyderabad Pakistan from 1st March 2013 to 30th September 2013. Local ethical committee approval was obtained before the study start from the local research ethical committee, Isra University Hyderabad.

Hundred patients of either gender having teeth with class V small carious lesions without history of sensitivity presented in Dental OPD for restoration were selected. The patients of aged 20 to 65 years were included. The patients that presented with non carious lesions, gingival recession and using desensitizing agents regularly were excluded. An informed consent was taken from every patient. Hundred patients with class V small carious lesion were restored in two groups. Group-I, 50 patients of restorative type II glass ionomer (Type II Fuji Made in Japan), Group-II, 50 patients of Resin composite master fill (Biodinamica Made in Brazil). In group I Patients were given local anesthesia, Shade was selected and isolation with rubber dam was done. The high speed hand piece with round diamond burrs ¼ (Dentsply), cooled with a water spray was used for class v cavity preparation.

The preparation was only extended into dentin when the defect need such extension and at this initial stage was prepared no deeper than 0.2 mm into dentin because no groove retention form was used. Restorative type glass ionomer (Type II Fuji Made in Japan) powder was mixed with one drop of the liquid on a mixing pad and mix quickly with plastic mixing spatula. 10% polyacrylic liquid was applied cavity to condition the dentin and then the cement was applied, using conventional instrument. Water proof varnish (Nupro fluorid varnish dentsply) was applied and restoration was polished with soft abrasive rubber cups and slurry of fine grain alumina. In group-II cavity was prepared as in previous group .The enamel and dentine walls on the tooth was etched with 37% phosphoric acid etching gel (Biodinamica) for 15 sec, washed, dried and then lined with of master bond (Biodinamica Made in Brazil) and finally cured. The lined cavity was restored with increment layers of resin composite master fill. (Biodinamica Made in Brazil) For the evaluation of post-operative sensitivity patients was contacted after 2 and 7 days to determine postoperative sensitivity. The electric pulp tester and cold stimulus application using ethyl chloride were used to check the patient’s response for sensitivity at follow-ups.

At each of these appointments, the patients classified the sensitivity in restored teeth on cold and EPT as No, mild, moderate and severe sensitivity accordingly. Following sensitivity scale was used to determine to marks the sensitivity by patients.

0=No sensitivity 1=Mild sensitivity 2=Moderate 3=Severe sensitivity

**DATA ANALYSIS:** Statistical package for social sciences (SPSS 20) was used to calculate the mean age, frequency of teeth and gender distribution. Frequency or percentage of qualitative variables (no, mild, moderate and severe sensitivity) was determined in each group on clod test and EPT at different time intervals. The test Chi-square was applied to find out significant difference between two groups in this study with 0.05 level of significance.

**RESULTS**

Total of hundred patients took part in the study, twenty four patients (72%) were female and twenty six (28%) were male. The mean age of the patients was 33.2 with standard deviation of ± 7.18. Out of 100 permanent teeth 32 maxillary central incisors, 34 maxillary lateral incisors, 8 maxillary canines, similarly 2 mandibular central incisors, 2 mandibular lateral incisors, 20 mandibular canines and 2 maxillary first premolar were selected.

The study showed postoperative sensitivity on EPT after two days for Group I (n=50), there was mild sensitivity in 4 (8 %) cases and 46 (92 %) cases evaluated with no sensitivity after 2 days on EPT. For Group II (n=50), there was mild sensitivity in 6(12%) cases while 44 (88%) cases evaluated no sensitivity after 2 days on EPT as shown in Table - I. The Chi-square test revealed no significant results (p= 0.50) greater than p-value (p > 0.05) as shown in Table-I. Similarly, the study showed postoperative sensitivity on EPT after seven days for Group-I (n=50), there was mild sensitivity in 2 (4 %) and 48 (96%) evaluated with no sensitivity after 7 days on EPT. For group-II (n=50), there was mild sensitivity in 6 (12%) and 44 (88%) evaluated with no sensitivity after 7 days on EPT as shown in Table - I. The Chi-
square test revealed no significant results (p=0.14) greater than p-value (p > 0.05) as shown in Table-I.

The study showed postoperative sensitivity on cold after two days for Group-I (n=50), there was mild in 4 (8%) and 46 (92%) evaluated with no sensitivity after 2 days on cold test. For Group-II (n=50), there was mild sensitivity in 6 (12%) and 44 (88%) evaluated with no sensitivity after 2 days on cold test as shown in Table II. The Chi-square test revealed no significant results (p=0.50) greater than p-value (p>0.05) as shown in Table-II. Similarly the study showed postoperative sensitivity on cold after seven days for Group-I (n=50), there was mild sensitivity in 4 (4 %) and 46 (96%) evaluated with no sensitivity after 7 days on cold test. For group-II (n=50), there was mild sensitivity in 2(4%) and 48(96%) evaluated with no sensitivity after 7 days on cold test as shown in Table II. The Chi-square test revealed no significant results (p=0.39) greater than p-value (p>0.05) as shown in Table-II.

**TABLE-I: FREQUENCY OF POSTOPERATIVE SENSITIVITY ON EPT AFTER 2, AND 7 DAYS AND DIFFERENCE OF POSTOPERATIVE SENSITIVITY BETWEEN GROUP-I & II (N=100).**

<table>
<thead>
<tr>
<th>DAYS</th>
<th>Post Operative Sensitivity on EPT</th>
<th>Group 1 Count GIC Restoration</th>
<th>Group 2 Count Composite Restoration</th>
<th>Chi-Square</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>After 2 days</td>
<td>No sensitivity</td>
<td>46</td>
<td>44</td>
<td>0.44</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>Mild sensitivity</td>
<td>4</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After 7 days</td>
<td>No sensitivity</td>
<td>48</td>
<td>44</td>
<td>2.17</td>
<td>0.14</td>
</tr>
<tr>
<td></td>
<td>Mild sensitivity</td>
<td>2</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE - II: FREQUENCY OF POSTOPERATIVE SENSITIVITY ON COLD AFTER 2, AND 7 DAYS AND CHI-SQUARE TEST DIFFERENCE OF POSTOPERATIVE SENSITIVITY BETWEEN GROUP-I & II. (N=100)**

<table>
<thead>
<tr>
<th>DAYS</th>
<th>Post Operative Sensitivity On Cold</th>
<th>Group 1 Count GIC restoration</th>
<th>Group 2 Count Composite Restoration</th>
<th>Chi-Square</th>
<th>P-Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>After 2 days</td>
<td>No sensitivity</td>
<td>46</td>
<td>44</td>
<td>0.44</td>
<td>0.50</td>
</tr>
<tr>
<td></td>
<td>Mild sensitivity</td>
<td>4</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After 7 days</td>
<td>No sensitivity</td>
<td>46</td>
<td>48</td>
<td>0.71</td>
<td>0.39</td>
</tr>
<tr>
<td></td>
<td>Mild sensitivity</td>
<td>2</td>
<td>6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DISCUSSION**

There are several reasons for postoperative sensitivity after restorations have been documented in literature. The adverse effects of cavity preparation, such as dentine dehydration and excessive heat reach the pulp more easily when the greater numbers of dentinal tubules are open and expanded. The treatment of dentine with acid etchants further increased the problem. The removal of smear layer and widening of dentinal tubules due to the application of acid etchant break the physical seal and all outside stimuli can easily reach to the pulp. The gap between the restoration and cavity intensify the presence of bacteria in the cavity after restoration. The bacteria can easily invade the pulp through a gap due to any failure in the restoration and opening of dentinal tubule and may cause pulpal inflammation and post restorative sensitivity complications.

The reason of post operative sensitivity after glass ionomer restoration is also documented in literature. The common microscopic observation and possible cause of postoperative sensitivity is the presence of micro porosities as resemblance to bubbles into glass-ionomer cement matrices. The porosities are formed due to inclusion of air during mixing of the material and the air becomes entrapped as voids into the matrix during the maturation phase of glass-ionomer cements. As the materials were protected with varnish, the reason of water diffusion could be the movement of the dentin fluid across the bonded interface from the underlying dentin.

The new developments in dental adhesives greatly reduce the incidence of postoperative sensitivity after composite restoration. New developments, formulations and incorporation of new molecules in dentine bonding agent or adhesives has contributed greatly towards reducing the incidence of postoperative sensitivity. Dental adhesives bond the restorative materials with the tooth structure more effectively by using new formulations in dental adhesives. Dental adhesives obliterate open dentinal tubules.

Several restorative techniques have been applied to minimize the postoperative sensitivity and other consequences of polymerization shrinkage in Class V cavities. Postoperative sensitivity after placing class V restorations has been a problem experienced by clinicians for past long years. This study has reported postoperative sensitivity on cold test and EPT in Group-I and Group-II and no significant difference was found between the two groups at 2 days and 7 days follow up.

A thorough comparison of the results of this study with previous study has shown similar results. In the previous study out of the 124 Class V composite restorations that were placed, only one showed postoperative sensitivity that was in the mild categories. In previous study postoperative sensitivity in class V
restorations was compared between the two treatment groups (Self Etch Versus Total Etch Adhesive) on application of cold stimulus after 24 hours and 1 week follow up. The results of previous study showed significant difference of postoperative sensitivity in class V restorations at 24 hours. That result of our study is inconsistent with the result of previous study; because previous study reported milder to moderate sensitivity in class V restorations at 24 hours with significant difference between Self Etch Versus Total Etch groups. However, no statistically significant difference was observed at 1 week follow-up in previous study. Our study has same findings as previous study and found no difference of postoperative sensitivity at 7 days follow up.

This study used the postoperative sensitivity level of mild to severe level and the results of this study reported only mild and moderate sensitivity in our patients in both groups. This findings of mild and moderate sensitivity is consistent with previous carefully controlled international and local clinical study on postoperative sensitivity in class v restorations. However only few clinical studies focused on postoperative sensitivity of class V restoration so further comparisons cannot be done and there is need of further clinical studies on postoperative sensitivity and long term clinical outcome of class V restorations placed with different restorative materials or from the different technique.

CONCLUSION

There were no difference between two groups in postoperative sensitivity on Electric pulp tester and cold after 2 and 15 days.

CONTRIBUTION OF AUTHORS:

Iqbal Z: Conceived Idea, Designed Methodology, Manuscript Writing.
Sarwar G: Data Collection, Literature Review, Data Analysis, Critical analysis

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REFERENCES