

Post cementation hypersensitivity with glass ionomer and with resin cement in vital abutments: a comparative study

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Abstract

Background: Fixed prosthodontics treatment involves restoration of teeth by artificial substitutes that are not readily removed from the mouth by the patient and serve to restore function, esthetics and comfort. The study results in future for better treatment planning of fixed prosthesis and its implementation for improved patient's care and decreased risk of post cementation complication of hypersensitivity. **Objective:** To compare the mean post cementation hypersensitivity with glass ionomer and with resin cement in vital abutments. **Duration and Setting:** Dental Department Bolan Medical College Quetta Balochistan from 7/7/2018 to 7/1/2019. **Material and Method:** In this study a total of 66 patients (33 in each group) were observed. The groups were approximately similar regarding age range and gender ratio. Group A were provided with permanent prosthesis luted with Glass Ionomer Cement and group B patients were provided prosthesis luted with a resin based cement. The sensitivity results were checked at the time of cementation, after 1 week, after 1 month, and after 3 months of cementation using ethyl chloride impregnated cotton pellets applied on lingual side of prosthesis for 5 seconds. **Results:** In this study mean age in Group A was 33 years with $SD \pm 11.55$ while mean age in Group B was 36 years with $SD \pm 13.07$. In Group A 42% patients were male and 58% patients were female. Where as in Group B 45% patients were male and 55% patients were female. In Group A (glass

*ionomer) mean post cementation hypersensitivity score was 1.01 with SD \pm 0.38 while in Group B (resin cement) mean post cementation hypersensitivity score was 0.75 with SD \pm 0.88. **Conclusion:** This study concludes that there was no difference between glass ionomer versus resin cement in vital abutments in term of post cementation hypersensitivity.*

Keywords: mean post cementation hypersensitivity, glass ionomer, resin cement, vital abutments.

INTRODUCTION:

Treatment involves restoration of teeth by artificial substitutes that are not readily removed from the mouth by the patient and serve to restore function, esthetics and comfort.¹ Amongst the other available treatment options, metal ceramic fixed partial dentures are most commonly used treatment option for replacement of missing teeth ^{2,3}, which frequently involves preparation of vital abutments to support the retainers.³

Post cementation sensitivity is an unwanted and complicated consequence of a newly cemented fixed partial denture. It is characterized by a short, sharp pain when a thermal stimulus is introduced to the abutment following cementation of the prosthesis⁴, which cannot be ascribed to any other dental defect or pathology.⁵ According to survey by Rosenstiel and Rashid, the incidence of post cementation hypersensitivity is about 10%.¹

This complication occurs because clinicians face the task of preparing teeth for restorations without knowing the proximity of the pulp to the prepared surface. It is particularly troublesome when preparing teeth for complete crowns such as metal ceramic or all ceramic.⁶ Pulpal damage during and after preparation depends on various factors such as heat generated by bur, amount of remaining dentin, dentin permeability, procedures used in construction of provisional crowns, and cements used for final cementation.⁵ Selection of luting cement for cementation of prosthesis is critical because it has an important role in controlling post cementation sensitivity.² Luting means to fill the joint or to fill the pores or irregularities which are present on the prepared tooth and on the fitting surface of the prosthesis.⁷

Glass ionomer luting cement is one of the most commonly used luting agent for permanent cementation of fixed prosthesis^{2,3}, because of its introduction in dentistry in 1970s.⁴ it has low initial setting PH which has been implicated as a major cause of post cementation sensitivity in vital abutments. Resin based luting cements exhibit lower solubility and higher PH as compared to glass ionomer cement. However they have also been reported to cause post operative sensitivity because of marginal defect and gaps caused by polymerization shrinkage^{2,3}. According to one study in which glass ionomer was used for group A and resin cement was used for group B when tested 7 days after post cementation with a significance level of 0.05, higher postoperative sensitivity was seen with glass ionomer cement when compared to resin cement.³

Since resin based cements are introduced recently no comprehensive studies exist that compare post cementation sensitivity of the two luting cements. So usually in most of the setups and in our setup glass ionomer cement is used for cementation of prosthesis in vital abutments, because it is consider as superior most in producing less post cementation hypersensitivity.

METHODOLOGY:

Total 66 patients were selected who fulfills the inclusion criteria from outpatient department of BMC, Quetta after approval from the ethical clearance committee of the institute. The patient was underwent history and complete examination along with perapical radiographs to assess the pulpal health, root structure and periodontal status of the abutment teeth. Generalized sensitivity, marked attrition and in cases where desensitizing agents are applied had excluded in order to reduce bias and confounders. All the risks and potential benefits had explained to patients who will be willing to participate in the study and care had taken not to harm any patient. Before starting any procedure verbal and written informed consent was taken. Care had taken for the comfort of the patient during the procedure, and patient was allowed to rest. If principle operator is male female patient were checked in the presence of chaperone.

The principle operators were prosthodontists and post graduate residents of year 2 and 3. General guidelines regarding tooth

preparation were agreed upon to ensure the proper tooth reduction for metal ceramic restorations that is occlusal reduction of 1.5-2.0 mm, circumferential reduction around 1.5 mm and planning supragingival margin, shoulder margin on the buccal side and chamfer margin on lingual side. All teeth were prepared using a high speed handpiece (NSK Panamex) with 380,000-450,000 rpm, diamond burs (Shofu Japan), and air water coolant spray to avoid over heating and damage to pulp. Impression was recorded using silicone putty (hydroxtreme, swisstec) and prepared abutment teeth had protected by metal temporary crowns (PD Switzerland) for 15 days. The temporary crown was luted in place using non-eugenol containing temporary cement (proviscell, septodont).

The abutments for metal ceramic fixed partial denture were given only metal coverage to lingual aspect so that cold sensitivity test using ethylchloride impregnated cotton pallets could be easily performed. After 15 days, at the time of cementation of permanent prosthesis, patients were divided randomly in two groups by lottery method. The groups were approximately similar regarding age range and gender ratio. Group A were provided with permanent prosthesis luted with Glass Ionomer Cement and group B patients were provided prosthesis luted with a resin based cement. The sensitivity results were assessed by a principal investigator using visual analog scale who were collect data on data collection proforma. The sensitivity results were checked at the time of cementation, after 1 week, after 1 month, and after 3 months of cementation using ethyl chloride impregnated cotton pellets applied on lingual side of prosthesis for 5 seconds.

Data was entered and analyzed in SPSS 20.0. categorical variables like (gender) was measure in frequency and percentages, where as continuous variables like (age of the patients and post cementation hyper sensitivity score were expressed in mean and standard deviation. the comparison between 2 groups (A and B) for post cementation hyper sensitivity score was done using independent T test. P value less than and equal to 0.05 was taken as significant. Effect modifiers like age and gender were adjusted through stratification. Post stratification independent T test was applied. P value less than and equal to 0.05 was taken as significant.

RESULTS

In this study age distribution among two groups was analyzed as in Group A 13(39%) patients were in age range 20-30 years, 20(62%) patients were in age range 31-40 years. Mean age was 33 years with SD \pm 11.55. Where as in Group B 12(36%) patients were in age range 20-30 years, 21(65%) patients were in age range 31-40 years. Mean age was 36 years with SD \pm 13.07. (as shown in table no 1)

Gender distribution among two groups was analyzed as in Group A 14(42%) patients were male and 19(58%) patients were female. Where as in Group B 15(45%) patients were male and 18(55%) patients were female. (as shown in table no 2)

Mean post cementation hypersensitivity among two groups was analyzed as Group A mean post cementation hypersensitivity score was 1.01 with SD \pm 0.38. Where as Group B mean post cementation hypersensitivity score was 0.75 with SD \pm 0.88. (as shown in table no 3)

**Table No 1. Age Distribution
(n=66)**

AGE	GROUP A	GROUP B
20-30 years	13(39%)	12(36%)
31-40 years	20(62%)	21(65%)
Total	33(100%)	33(100%)
Mean and SD	33 year \pm 11.55	36 year \pm 13.07

Group A:GIC was cementation of prosthesis

Group B:Resin cement was cementation of prosthesis

T Test was applied in which P value was 0.3268

**Table No 2. Gender Distribution
(n=66)**

GENDER	GROUP A	GROUP B
Male	14(42%)	15(45%)
Female	19(58%)	18(55%)
Total	33(100%)	33(100%)

Group A: GIC was cementation of prosthesis

Group B:Resin cement was cementation of prosthesis

Chi Square test was applied in which P value was 0.8041

**Table No 3. Mean Post Cementation Hypersensitivity
(N=66)**

MEAN POST CEMENTATION HYPERSENSITIVITY	GROUP A	GROUP B
Mean and SD	1.01 ± 0.38	0.75 ± 0.88

Group A: GIC was cementation of prosthesis

Group B: Resin cement was cementation of prosthesis

T Test was applied in which P value was 0.1241

DISCUSSION:

The mean age in Group A was 33 years with SD ± 11.55. While mean age in Group B was 36 years with SD ± 13.07. In Group A 42% patients were male and 58% patients were female. Where as in Group B 45% patients were male and 55% patients were female. In Group A (glass ionomer) mean post cementation hypersensitivity score was 1.01 with SD ± 0.38. While in Group B (resin cement) mean post cementation hypersensitivity score was 0.75 with SD ± 0.88.

Similar findings were observed in another study conducted by Shetty RM et al³ in which mean post cementation hypersensitivity in GIC cementation of prosthesis was 1.04± 0.73. while mean post cementation hypersensitivity in Resin cement cementation of prosthesis was 0.52± 0.77.

Glass ionomer luting cement is one of the most commonly used luting agent for permanent cementation of fixed prosthesis^{2,3}, because of its introduction in dentistry in 1970s.⁴ it has low initial setting PH which has been implicated as a major cause of post cementation sensitivity in vital abutments. Resin based luting cements exhibit lower solubility and higher PH as compared to glass ionomer cement. However they have also been reported to cause post operative sensitivity because of marginal defect and gaps caused by polymerization shrinkage^{2,3}. According to one study in which glass ionomer was used for group A and resin cement was used for group B when tested 7 days after post cementation with a significance level of 0.05, higher postoperative sensitivity was seen with glass ionomer cement when compared to resin cement.³

Rosenstiel et al⁸ in his study, showed that the incidence of this postoperative complication is usually underestimated by most dentists. The factors considered very important' in reducing

sensitivity by more than 50% of the respondents to his survey study were desiccation, luting agent, occlusion, provisional and water spray. While preparing vital abutments, the dentist may carry out elective endodontic treatment for the vital abutments or may try and preserve pulp vitality.^{9,10}

The choice of luting agent is important, as they have been known to contribute to post cementation hypersensitivity. Brannstrom¹¹ suggested certain precautions for pre cementation procedures to reduce the risk of an inflammatory response in the pulp: (1) The provisional crown should be well fitting, covering cervical dentin but not impinging on the periodontal tissues. The definitive crown should be cemented as soon as possible. (2) The superficial smear layer should be removed and the dentinal surface should be treated with an anti bacterial solution before the provisional crown is placed. (3) To decrease dentinal permeability under the provisional crown, the dentinal surface should be covered with a liner that can be easily removed before final cementation. (4) To ensure optimal micromechanical bonding, the dentinal surface should be thoroughly cleaned, and the dentin should be kept moist until cementation. (5) The occlusion should be carefully checked before cementation of the crown. However, post cementation hypersensitivity is still a cause for concern and GIC has been implicated in the past. Hence, the present study was conducted to evaluate, assess and compare the post cementation response with GIC and a newer resin system. It was a single blind study where the result was assessed by an evaluator blind to the nature of luting agent. Post cementation response was assessed by a subjective method on a visual analogue scale. This was done pre cementation, immediate post cementation, 24 hours and 1 week. Along with this debonding and marginal seal was also checked. No statistically significant difference in response was seen with both cements immediately and 24 hours. However, with GIC the patients continued to show a higher response 7 days post cementation whereas with resin cement the hypersensitivity was nil in most cases after 7 days. The presence of hypersensitivity with GIC at the end of 7 days is in accordance with many of the previous studies which showed that hypersensitivity with GIC usually resolves after a few weeks.¹² The better performance of resin cement used in our study is in contrast with studies by Denner N et al¹³ in which both the resin and GI group

had decreased sensitivity 1 week post cementation. In their study, slight sensitivity was found in 13.3% of subjects with resin cement and only 5.9% subjects with GIC.

CONCLUSION

Our study concludes that there was no difference between glass ionomer versus resin cement in vital abutments in term of post cementation hypersensitivity.

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