

Post Cementation Sensitivity of Conventional Glass Ionomer Cement as a Luting Material

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ABSTRACT

Objective: Was to determine the frequency of post cementation sensitivity of glass ionomer cement (GIC).

Materials and methods: This cross sectional study included 86 participants with age from 20 to 65 years, both males and females, Pakistani nationals, abutment teeth with vital pulp without attrition, erosion or abrasion and no pulp capping agents used. The participants who had undergone Orthodontic treatment in last three months, or used bleach, having periodontal surgery, using medication like carbamazepine or analgesics and Psychiatric patients were excluded. Participants were asked about post cementation sensitivity on call at 24 hours. Descriptive statistics were calculated. Chi-square test was applied for comparison among gender and age groups.

Results: The mean age was 40.27±10.68 years. The females were 33 (38.37%) and males were 53(61.63%). Postcementation sensitivity was found in 10(11.63%) participants. The most common type of sensitivity was moderate present in 5(5.81%) followed by severe present in 3(3.49%) and least was mild present in 2(2.23%) participants. The frequency of postcementation sensitivity was higher in younger age (n=7, 35%) than older ages statistically (p=0.003). Similar results were found for type of postcementation sensitivity (p=0.046).

Conclusion: The frequency of post cementation sensitivity is quiet higher and most frequent in young ages.

Keywords: Post cementation sensitivity, glass ionomer cement, luting agent.

INTRODUCTION

To rehabilitate patients with missing teeth, dental prostheses are warranted.¹ The gold standard treatment option for patients with missing teeth is fixed partial denture (FPD). The majors aim of FPD is restore esthetics, masticatory function and speech.² Luting materials are applied to anchored FPD to abutment teeth.³ The successful luting material should be insoluble in saliva or other fluids, biocompatible, no leakage and absence of post cementation sensitivity.⁴ The luting materials are resin modified glass ionomer cement, zinc phosphate cement, zinc oxide eugenol cement and glass ionomer cement (GIC). Glass ionomer cement are considered durable materials for luting purpose.^{5, 6}

When the crown is freshly cemented, one of the common complaint is sensitivity.⁷ Post cementation sensitivity is term used for pain which is sharp in nature of brief interval to hot and cold stimuli in patients having freshly cemented crowns.⁸ The origin of post cementation sensitivity is due to exposure of dentinal tubules and pain nerve ending inside these tubules during crown preparation. GIC is acidic in nature due to poly acrylic acid as an ingredient which result in chemical stimuli for dental pulp.⁹

A study was conducted in India on 50 patients of whom crowns were cemented with GIC. Thiers results showed that post cementation pain was quiet higher in GIC.¹⁰ Another study reported that post cementation sensitivity for GIC was 5.9%.¹¹

This study is conducting to know post cementation sensitivity of GIC. Post cementation sensitivity is most disturbing agent for patients and affects the quality of life. There is lack of local literature in local population on this topic. The post cementation sensitivity is subjective can be variable from population to population due to genetic and ethnic variation. The objective of this study was to determine the frequency of post cementation sensitivity of GIC.

METHODOLOGY

This cross sectional descriptive study was conducted at Prosthodontics department, Sardar Begum Dental College, Peshawar on 86 participants by non-probability consecutive sampling technique. The sample of 86 was calculated by WHO at 95% level of confidence and 5% margin of errors using 5.9% post cementation sensitivity in GIC from previous study¹¹. Ethical

approval was obtained before the inception of study. Verbal informed consent was obtained from all participants.

The inclusion criteria were age from 20 to 65 years, both males and females, Pakistani nationals, abutment teeth with vital pulp without attrition, erosion or abrasion and no pulp capping agents used. The participants who had undergone Orthodontic treatment in last three months, or used bleach, having periodontal surgery, using medication like carbamazepine or analgesics and Psychiatric patients were excluded. Vital abutment requiring crown or bridge was prepared by post graduate trainees of FCPS. Temporary crown was inserted until permanent crowns or bridges become ready. At the cementation time complete isolation was done with cotton roll and air syringe. Mixing and all manipulation of GIC were done according to manufacturer's guidelines. Prostheses were cemented using GIC as luting cements. Occlusal equilibration was done before cementation. Participants were asked about post cementation sensitivity on call at 24 hours.

Post cementation sensitivity was assessed on 10 point visual analog scale (VAS) where 0 shows no pain/sensitivity and 10 shows worst ever pain/sensitivity. Sensitivity was classified as; absence of sensitivity having VAS score 0-1, mild sensitivity having VAS score 2-3, moderate sensitivity having VAS score 4-7 and severe sensitivity having VAS score 8-10.

Analysis of data was performed in SPSS 22. Mean and SD was computed for continuous data while percentages for categorical like gender, age group and post cementation sensitivity. The frequency of post cementation sensitivity was stratified among age group and gender using chi-square test. P≤0.05 was the significant level.

RESULTS

The mean age was 40.27±10.68 years with range from 22 to 60 years. The females were 33 (38.37%) and males were 53(61.63%). Most common age group was 31-40 years having 26 (30.23%) followed by 51-60 years having 22 (25.58%) participants. Postcementation sensitivity was found in 10(11.63%) participants. **(Table 1)**

The most common type of sensitivity was moderate present in 5(5.81%) followed by severe present in 3(3.49%) and least was mild present in 2(2.23%) participants. **(Fig 1)**

Table 1: Frequency of gender, age group and postcementation sensitivity

Variable	Characteristic	n(%)
Gender	Female	33 (38.37)
	Male	53 (61.63)
Age group (years)	20-30	20 (23.26)
	31-40	26 (30.23)
	41-50	18 (20.93)
	51-60	22 (25.58)
Post-cementation sensitivity	Absent	76 (88.37)
	Present	10 (11.63)

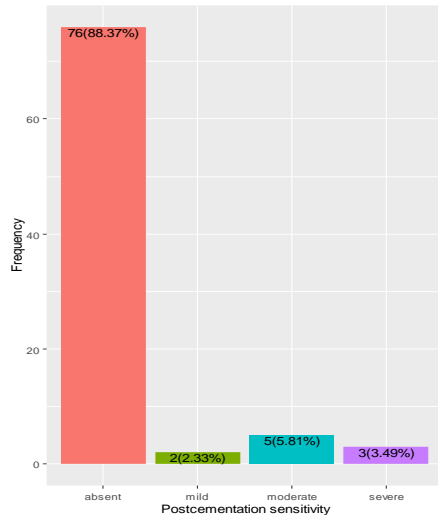


Fig 1: Pattern of post cementation sensitivity

The frequency of post cementation sensitivity was higher in males (n=7, 13.21%) than females (n=3, 9.09%) but the difference was not statistically significant (p=0.816). Frequency of mild and moderate type of post cementation sensitivity was more in males than females but the difference was not statistically significant (p=0.826). (Table 2)

Table 2: Comparison of post cementation sensitivity between males and females

Characteristic	Female, n = 33	Male, n = 53	p-value ^a
Postcementation sensitivity			0.816
Absent	30 (90.91)	46 (86.79)	
Present	3 (9.09)	7 (13.21)	
Type of postcementation sensitivity			0.826
Absent	30 (90.91)	46 (86.79)	
Mild	1 (3.03)	1 (1.89)	
Moderate	1 (3.03)	4 (7.55)	
Severe	1 (3.03)	2 (3.77)	

^aFisher exact test

The frequency of postcementation sensitivity was higher in younger age (n=7, 35%) than older ages statistically (p=0.003). Similar results were found for type of postcementation sensitivity (p=0.046).

Table 3: Comparison of post cementation sensitivity among age groups

Variable		Age in Years				Sig.
		20-30	31-40	41-50	51-60	
Post-cementation sensitivity	Absent	13 (65%)	25 (96.15)	17 (94.44)	21 (95.45)	0.003
	Present	7 (35%)	1 (3.85)	1 (5.56)	1 (4.55)	
Type of post-cementation sensitivity	Absent	13 (65%)	25 (96.15)	17 (94.44)	21 (95.45)	0.046
	Mild	1 (5%)	1 (3.85)	0 (0.00)	0 (0.00)	
	Moderate	4 (20%)	0 (0.00)	1 (5.56)	0 (0.00)	
	Severe	2 (10%)	0 (0.00)	0 (0.00)	1 (4.55)	

^aFisher exact test

DISCUSSION

This study was conducted to know the frequency of post cementation sensitivity after 24 hours of cementation of FPDs with GIC luting material. Our study found that 11.63% have post cementation sensitivity and it was more in young age. Most participants suffering from post-cementation sensitivity were of moderate and severe type of sensitivity.

Glass ionomer cement is most commonly used luting material in Pakistan for cementing cast restoration. Due to low pH it can cause post cementation sensitivity when FPDs are cemented to vital pulp abutments.¹²

The frequency of post cementation sensitivity of GIC as luting material in various clinical investigations is variable and ranged from 3 to 34%.¹³ Rosenstiel et al.¹⁴ conducted a study on prevalence of post cementation sensitivity of GIC and reported the 10%. Johnson et al.¹⁵ reported that post-cementation pulpal sensitivity is very higher i.e. about 25%. Bebermeyer et al.¹⁶ reported that patient-perceived postcementation sensitivity with glass-ionomer is about 10%.

A study conducted in Pakistan on 182 patients in Rawalpindi reported that most common sensitivity was mild type (in 95%) on cold provocation test.¹⁷ However in our study moderate type of post cementation sensitivity was common. Saad et al.¹⁸ reported that most common type post cementation sensitivity was moderate and mild type.

In our study in young age the post cementation sensitive was higher than old ages statistically. This can be attributed to large pulp and more patent dentinal tubules in young ages than old. With aging the size of dental pulp recedes and narrowing of dentinal tubules happen due to secondary dentine formation. The formation of secondary dentine is protective response of pulp to prevent the tooth from non-vitality.¹

However this study has limitation like level of experience of the operator, type of tooth being prepared, angulation of abutment teeth can affect the frequency of post cementation sensitivity.

CONCLUSION

Within the limits of this study it can be concluded that frequency of post cementation sensitivity is quiet higher and most frequent in young ages.

REFERENCES

- Kern M, Passia N, Sasse M, Yazigi C. Ten-year outcome of zirconia ceramic cantilever resin-bonded fixed dental prostheses and the influence of the reasons for missing incisors. *J Dent.* 2017;65:51-5.
- Attia S, Schaaf H, El Khassawna T, Malhan D, Mausbach K, Howaldt H-P, et al. Oral rehabilitation of hypodontia patients using an endosseous dental implant: functional and aesthetic results. *J Clin Med.* 2019;8(10):1687-94.
- Agha A, Parker S, Patel M. Polymerization shrinkage kinetics and degree of conversion of commercial and experimental resin modified glass ionomer luting cements (RMGICs). *Dent Mater.* 2020;36(7):893-904.
- Abad-Coronel C, Naranjo B, Valdiviezo P. Adhesive systems used in indirect restorations cementation: review of the literature. *Dent J.* 2019;7(3):71-6.
- Bakhadher W. Modification of glass ionomer restorative material: A review of literature. *EC Dent Sci.* 2019;18:1001-6.
- Almuhaiza M. Glass-ionomer cements in restorative dentistry: a critical appraisal. *J Contemp Dent Pract.* 2016;17(4):331-6.
- Suzuki S. Clinical evaluation of a new resin composite crown system to eliminate postoperative sensitivity. *Int J Period Restorat Dent.* 2000;20(5):34-40.
- Iqbal H, Noor N, Aftab S, Tufail M, Ahmad BRM. Experience of post cementation hypersensitivity: a kap study done on dentists & faculty in Rawalpindi Islamabad. *Pak Oral Dent J.* 2018;38(4):519-22.
- Gupta N, Reddy UN, Vasundhar PL, Ramarao KS, Varma KP, Vinod V. Effectiveness of desensitizing agents in relieving the pre-and postcementation sensitivity for full coverage restorations: a clinical evaluation. *J Contemp Dent Pract.* 2013;14(5):858-65.
- Mehta D, Shetty RM, Bhat S, Srivatsa G, Shetty YB. Comparative analysis of postcementation hypersensitivity with glass ionomer

- cement and a resin cement: an in vivo study. *J Contemp Dent Pract.* 2012;13(3):327-31.
- 11 Denner N, Heydecke G, Gerds T, Strub JR. Clinical Comparison of Postoperative Sensitivity for an Adhesive Resin Cement Containing 4-META and a Conventional Glass-Ionomer Cement. *Int J Prosthodont.* 2007;20(1):73-8.
- 12 Denner N, Heydecke G, Gerds T, Strub JR. Clinical comparison of postoperative sensitivity for an adhesive resin cement containing 4-META and conventional glass-ionomer cement. *Int J Prosthodont* 2007; 20: 73-78.
- 13 Pramod KAV, Rohit S, Vinni TK, Gilsa KV, Dhanya KPC. Effect of immediate dentin sealing in prevention of post-cementation hypersensitivity in full coverage restorations. *IOSR J Dent Med Sci.* 2015; 14 (5): 80-4.
- 14 Rosenstiel SF, Rashid RG. Post-cementation hypersensitivity: scientific data versus dentists' perceptions. *J Prosthodont.* 2003; 12:73-81.
- 15 Johnson GH, Powell LV, DeRouen TA: Evaluation and control of post-cementation pulpal sensitivity: Zinc phosphate and glass ionomer luting cements. *J Am Dent Assoc.* 1993; 124:38-46.
- 16 Bebermeyer RD, Berg JH: Comparison of patient-perceived postcementation sensitivity with glass-ionomer and zinc phosphate cements. *Quintessence Int.* 1994;25:209-214.
- 17 Hassan SH, Azad AA, Niaz O, Amjad M. Post cementation sensitivity in vital abutments of metal-ceramic fixed partial dentures. *Pak Oral Dent.* 2014; 31:210-3.
- 18 Saad Del-D, Atta O, El-Mowafy O. The postoperative sensitivity of fixed partial dentures cemented with self-adhesive resin cements: a clinical study. *J Am Dent Assoc.* 2010; 141: 1459-66.