

Original Research

A comparative study between two different restorative material- An invitro study

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ABSTRACT:

Background: Restoration of root canal-treated teeth with a permanent postendodontic restoration is a final step for successful root canal treatment. Post endodontic restoration is very important as these teeth are considered more prone to fracture. **Aim:** The purpose of the present study was to evaluate and compare the sealing ability of glass ionomer cement (GIC) and composite resin when placed post endodontically. **Material and Method:** Sixty single rooted freshly extracted teeth were cleaned, shaped and obturated with gutta-percha and AH Plus. The teeth were decoronated 5mm above the CEJ using hot plugger. Samples were divided randomly in three different groups. Group 1 received GIC as post endodontic restoration, group 2 received composite and group 3 received no restorative material. All root surfaces were covered with nail varnish. India ink was used to immerse the teeth and observed under stereomicroscope for the depth of dye penetration. **Result:** The comparison of mean micro leakage of two different restorative materials showed no significant difference. A significant difference was seen in control group ($p < 0.001$). Fracture was more common in control group i.e. with no restoration. **Conclusion:** Glass ionomer composite and composite can be used for post endodontic restoration. Teeth which don't receive restoration shows poor results.

Keywords: Glass ionomer cement, composite, root canal treatment, extracted teeth.

Received: 14 April, 2022

Accepted: 18 June, 2023

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This article may be cited as: Saini S. A comparative study between two different restorative material- An in vitro study. J Adv Med Dent Scie Res 2023;11(8):13-15.

INTRODUCTION

Caries, trauma to tooth or root resorption often leads to endodontic treatment of tooth. However isolation of such tooth is a complex process and poor isolation complicates the endodontic procedures.^{1,2}The microleakage occurring in obturated canals, leading to microbial reinfection is one of the major causes of endodontic failure. The entering point for the microorganisms is through the coronal or apical regions of the tooth.³there comes the role of post endodontic restorative material. Few authors suggested restoration of root canal treatment is very important, and said root canal treatment should not be considered complete until post endodontic restoration has been placed. Final restoration maintains aesthetics, function, preserves the remaining tooth structure, and prevents micro leakage.^{4,5} Various material used as pre-endodontic restoration are silver amalgam, glass ionomer cements, flowable composite, packable composite or dual-cure

composite. Usage of material totally depends on clinician choice of material. Glass-ionomer cements have been used in endodontics for sealing root canals for very long time due to its sealing properties and esthetics. Gupta Ret al in their study mentioned about flow able composite compete with stress development in their low elastic module and thus help to maintain the marginal seal of the restoration.⁶ So we aimed to evaluate and compare the sealing ability of glass ionomer cement (GIC) and composite resin when placed post endodontically

MATERIAL AND METHOD

The Sample size we selected for the present study was 60. Sixty single rooted freshly extracted teeth were cleaned, shaped and obturated with gutta-percha and AH Plus. Teeth selected for the study were premolars. The teeth were decoronated 5mm above the CEJ using hot plugger. Teeth were divided randomly in three different groups. Root canals were

debrided and patency of canal was determined using 10k file. Root canals were instrumented in a step back manner using k files. Canals were prepared till 40 sizes. Absorbent points were used to dry canals. Obturation was done with gutta-percha and AH Plus sealer using cold lateral condensation method.

Group 1: Twenty patients received GIC as post endodontic restoration. High strength GLASS ionomer cement was used for paediatric restoration and for posterior tooth restoration. Mixed in 1:1 ratio for restorative use.

Group 2: Twenty patients received composite restoration. 3M ESPE Adhesive system was applied according to the manufacturer's instructions. 37% Phosphoric acid was applied to the enamel and dentine for 15 seconds. The cavity was rinsed and excess water removed with a gentle, five-second air blast. One drop each of activator and primer were mixed and applied to the etched enamel and dentine for 15 seconds; the preparations were dried gently for five seconds. The composite material was placed before the bonding material had set; the restorations were then polished.

Group 3: Twenty patients received no restorative material. All root surfaces were covered with nail varnish. India ink was used to immerse the teeth and

observed under stereomicroscope for the depth of dye penetration.

RESULTS

Table 1 represents distribution of samples in present study. Total sample selected were 60 extracted teeth. Group 1 consisted of 20 teeth which received glass ionomer cement as restorative material i.e. 33.3%, group 2 received composite restoration i.e. 33.3% and group 3 also consisted of 20 teeth and received no restoration post endodontically.

Table 2 is descriptive statistics of both the restorative material. It shows the comparison of mean micro leakage of two different restorative materials using. The result was statistically indicating that there exists no significant difference in the mean values of two restorative materials however microleakage was seen more in control group i.e. in 45% cases. A significant difference was seen in control group (p<0.001)

Table 3 represents the mean forces at fracture, the minimal and maximum values for each group. The mean forces at fracture were: Group 1 (885.00 N), group 2 (932.03). According to the results there is no significant difference between the teeth restored with composite resin and GIC.

Table 1: Distribution of Samples

Groups	n	Percentage
Group 1 Glass ionomer cement	20	33.3%
Group 2 Composite	20	33.3%
Group 3 Control	20	33.3%
Total	n = 60	100%

Table 2: Descriptive statistics of restorative material

Groups	N=60	Minimum	Maximum	%
Group 1 GIC	20	2	3	25%
Group 2 Composite	20	2	3	25%
Group 3 Control	20	3	6	45%

Table 3: Fracture resistance

Groups	N=60	Mean	Minimum	Maximum
Group 1 GIC	20	885.00 N	431.21	1356
Group 2 Composite	20	932.03 N	541.46	1587
Group 3 Control	20	1054.25 N	1100	1250

DISCUSSION

Various factors play an important role in the choice of the definitive restoration, it is strongly dependent on the amount of the remaining tooth structure, the

morphology of the tooth, its position in the dental arch, functional loading on the tooth and the esthetic requirements.⁷Plotino G et al mentioned in his study that root canal-treated teeth have been restored with

cast restorations and full/partial coverage crowns which include cusp coverage to improve the fracture resistance.⁸ In present study fracture resistance was evaluated for all the three groups. No significant difference between the teeth restored with composite resin and GIC, however control group showed increased number of fractures. Siso SH et al in their study mentioned that restoration is the final step in root canal treatment and it determines the success of the treatment, our study correlates with authors finding.⁹

Few authors suggested composites as build-up material should be favoured. However they mentioned that one of the main drawbacks associated with composite restoration is its shrinkage during polymerization which is responsible for marginal gaps around restorations resulting in micro leakage. Which further leads to marginal staining, poor marginal seal and recurrent caries, thus affecting the longevity of the restoration.^{2,10} In present study result was statistically indicating that there exists no significant difference in the mean values of two restorative materials however microleakage was seen more in control group i.e. in 45% cases. A significant difference was seen in control group ($p < 0.001$). In our study fracture resistance of teeth restored with composite was less when compared to that of GIC. In past studies some authors suggested that the reason for this finding could be the dehydration and loss of dentin after the endodontic procedures and the removal of important anatomic structures which provide much of the necessary support for the natural tooth.^{11,12} In present study increased fracture were seen in teeth which received no restoration.

CONCLUSION

In our study we found that there exists no significant difference in the mean values of two restorative materials however microleakage was seen significantly more in control group i.e. in 45% cases. A significant difference was seen in control group ($p < 0.001$). Tooth restored with composite had a greater chance of fracture however the result was not significant.

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