Harsukh Educational Charitable Society
International Journal of Community Health and Medical Research
Journal home page:www.ijchmr.com doi: 10.21276/ijchmr

ISSN E: 2457-0117 **ISSN P:** 2581-5040 **Index Copernicus** ICV 2018=62.61

ORIGINAL RESEARCH

Comparative evaluation of microleakage among different restorative materials

Anuradha[1], Tanvi Sudan[2], Munnasha Uppal[1]

[1]PG Student, Department of Pedodontics, Himachal Dental College, Sundernagar [2]Consultant Pedodontist & Private Practitioner, Udhampur

ABSTRACT:)
Background: Microleakage is defined as the clinically detectable passage of bacteria, fluids, molecules or ions. The present study was conducted to evaluate the microleakage of different restorative materials. **Materials & Methods:** The present study was conducted on 45 mandibular molars teeth. Teeth were divided into 3 groups of 15 each. Class I cavity was prepared in all samples. Group I teeth were restored with with Filtek Z350, group II with GC Fuji II LC, group III with Ketac Molar Easy Mix. The degree of dye penetration in the occlusal cavity walls was assessed. **Results:** The mean microleakage in group I was 0.05, in group II was 0.76 and in group III was 2.19. The difference was significant (P< 0.05). **Conclusion:** Microleakage is common phenomenon seen in restorative materials. Maximum microleakage was observed in Ketac Molar Easy Mix followed by GC Fuji II LC and Filtek Z350.

Key words: Microleakage, Restorative materials, GC Fuji

Corresponding author: Anuradha , PG Student, Department of Pedodontics, Himachal Dental College, Sundernagar

This article may be cited as: Anuradha, Sudan T, Uppal M. Comparative evaluation of microleakage among different restorative materials. HECS Int J Comm Health Med Res 2019; 5(3):82-84.

INTRODUCTION

Microleakage is defined as the clinically detectable passage of bacteria, fluids, molecules or ions between a cavity wall and the restorative materials applied to it and are the major problem in clinical dentistry.[1] Achieving a micromechanical and biomechanical bond between the restoration and tooth is considered effective and a standard procedure in clinical practice. Instead of simply lathe-cut low copper amalgam or silicate cement, the menu of available materials has expanded to include hybrid, microfilled or optimal size particle, flowable or packable composites, glass ionomers, resin reinforced glass ionomers and compomers in varying viscosities.[2]

A good seal at tooth surface- restoration interface is very essential for an ideal restorative material to minimize the microleakage. Poor adaptation can lead to marginal discoloration, post-operative sensitivity, bacterial penetration, secondary caries, failure of restoration, and pulpal inflammation. Recent advancement in technology and devices has sought to improve the quality and longevity of restorative material to provide predictable life of the treatment. Glass ionomers seem to be the material of choice in class I and class V cavities in primary teeth.[3]

Among various restorative materials, GIC, composite etc. are common one. In recent few years there have been advancement in the field of restorative dentistry. Increasing demand for more esthetic restorations has led to the invention of a variety of tooth-colored restorative materials. Instead of simple lathe-cut low copper amalgam or silicate cement, the menu of available materials has expanded to include hybrid, microfilled, or optimal size particle, flowable or packable composites, glass ionomers, resin-reinforced glass ionomers, and compomers in varying viscosities.[4] The present study was conducted to evaluate the microleakage of different restorative materials.

MATERIALS & METHODS

The present study was conducted in the department of Pedodontics. It comprised of 45 mandibular molars teeth. The study protocol was approved from institutional ethical committee. Teeth were divided into 3 groups of 15 each. Class I cavity was prepared in all samples. Group I teeth were restored with with Filtek Z350, group II with GC Fuji II LC, group III with Ketac Molar Easy Mix. Dye solution of 50 percent Silver nitrate was used for teeth specimens. The specimens were immersed in the photographic film developing solution for 4 hours under 200 watt bulb. The degree of dye penetration in the occlusal cavity walls was assessed separately under a binocular stereomicroscope at 10X magnification. Results were tabulated and subjected to

statistical analysis. P value less than 0.05 was considered significant.

RESULTS

Table I Distribution of teeth

Groups	Group I	Group II	Group III
Materials	Filtek Z350 LC	GC Fuji II	Ketac Molar Easy Mix
Number	15	15	15

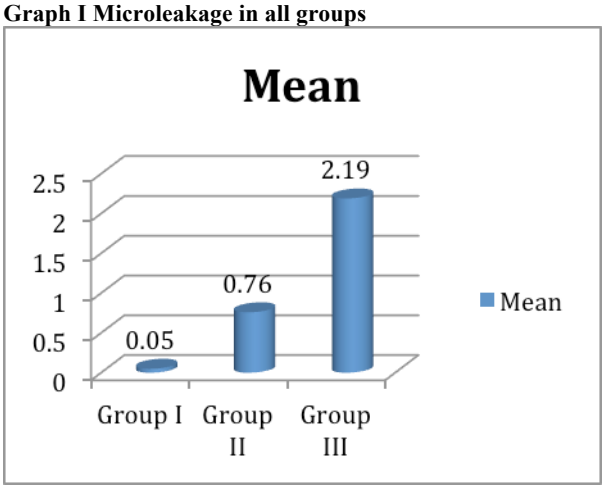
Table I shows that group I teeth were restored with Filtek Z350, group II teeth with GC Fuji II LC and group III with Ketac Molar Easy Mix. Each group comprised of 15 teeth.

Table II Microleakage in different restorative materials

Groups	Mean	S.D	P value
Group I	0.05	0.11	0.01
Group II	0.76	0.19	
Group III	2.19	0.21	

Table II, graph I shows that mean microleakage in group I was 0.05, in group II was 0.76 and in group III was 2.19. The difference was significant (P< 0.05).

Graph I Microleakage in all groups



DISCUSSION

Glass ionomer maintains its bulk volume through internal microcracks. With water sorption, the cracks close to repair cohesive strength, and the dimensional stability of glass ionomer cement is maintained, resulting in excellent adaptation with tooth structure. In *in vitro* condition, absence of water and lower cohesive strength can alter the properties of glass ionomer cement. Different methods have been used including silver nitrate, air pressure, radioactive isotopes, and Scanning electron microscope (SEM) to evaluate the microleakage of restoration. Dye penetration has been considered as an easy method since the dye penetrates successfully into the flaws and crevices of the test object.[5] The present study was conducted to assess the microleakage of different restorative materials.

In present study, group I teeth were restored with Filtek Z350, group II teeth with GC Fuji II LC and group III with Ketac Molar Easy Mix. Each group comprised of 15 teeth. Korkmaz et al[6] assessed the microleakage associated with bulk-fill, horizontal-incremental, and oblique-incremental compomer placement techniques in primary molars. 58.2% of the specimens presented with microleakage involving the entire axial wall and pulpal floor in the bulk-fill group, whereas 52.6% and 48.6% of the specimens in the horizontal-incremental and oblique-incremental groups showed microleakage up to two-third and one-third of the axial walls, respectively. A significant difference in scores was observed between groups. Microleakage was observed with all the three techniques but was comparatively lower with the incremental placement techniques. The oblique-incremental technique offered the least microleakage.

We found that mean microleakage in group I was 0.05, in group II was 0.76 and in group III was 2.19. Korkmaz [9] suggested that the incremental placement technique is the preferred restorative technique over the bulk-fill technique for posterior resin restorations as it results in better marginal adaptation. It has shown a proportional relationship between the stress relief in thin resin increments to the amount of resin porosity.

Mccoy et al[7] conducted a study to evaluate and compare the microleakage of different restorative materials. Fuji IX showed the maximum leakage, followed by LC II and the least was observed in KN 100. In class I restorations, there was significant difference while comparing Fuji IX with Fuji LC II and KN 100 and non-significant difference between LC II and KN100. In class V restorations, Fuji IX and KN100, KN 100 and LC II showed significant difference. Fuji IX and LC II showed non-significant difference.

Hayakawa et al[8] found that Durafill VS, microfilled composite showed moderate microleakage because of the particle size which improves the flow of material due to improved viscosity and hence better adaptability. Also, water sorption of these materials compensates for polymerization shrinkage, which is attributed to less filler content. Parbhakar et al[9] suggested that GC Fuji II LC, resin-modified glass ionomer cements showed higher adhesiveness to dentin than conventional glass ionomer cements. Nakanuma et al[10] found that Filtek P60, packable composite contain higher filler load as well as filler distribution. They exhibited more microleakage than resin modified glass ionomers, microfilled and nanocomposites, but less than self-cured glass ionomers and compomers.

CONCLUSION

Authors suggested that microleakage is common phenomenon seen in restorative materials. Maximum microleakage was observed in Ketac Molar Easy Mix followed by GC Fuji II LC and Filtek Z350.

REFERENCES

1. Maleknejad F, Moosavi H, Shahriari R, Sarabi N, Shayankhah T. The effect of different adhesive types and curing methods on microleakage and the marginal adaptation of composite veneers. J Contemp Dent Pract 2009; 3: 18-26.
2. Loguercio AD, de oliverre Bauer JR, Reis A, Grade RH. In vitro microleakage of packable composites in Class II restorations. Quintessence International 2004; 1: 35-38.
3. Mali P, Deshpande S, Singh A. Microleakage of restorative materials, an in vitro study. J of Indian

Society of Pedodontics and Preventive Dentistry 2006; 1: 24-27.
4. Mathew M, Nair EKP, Krishan K. Bonding agent is a decisive factor in determining the marginal leakage of dental composites subjected to thermal cycling: An in vitro study. J of Oral Rehabilitation 2001; 28: 68-77.
5. Santini A, Ivanovic V, Ibbetson R, Milia E. Influence of cavity configuration on microleakage around Class V restorations bonded with seven self-etching adhesives. J Esthet Restor Dent 2004; 2: 128-135.
6. Korkmaz Y, Ozel E, Attar N, Bicer CO, Firatli E. Microleakage and scanning electron microscopy evaluation of all-in-one self-etch adhesives and their respective nanocomposites prepared by erbium: yttrium-aluminum-garnet laser and bur. Lasers Med Sci 2010; 4: 493-502.
7. Mccoy RB, Anderson MH, Lepe X, Johnson GH. Clinical success of Class V composite resin restorations without mechanical retention. J of American Dental Association 1998; 6: 129-134.
8. Hayakawa T, Tomita T, Yamazaki M. Effect of the application of dentin primers and a dentin bonding agent on the adhesion between the resin-modified glass-ionomer cement and dentin. J of Dent Mater 1998; 14: 281–286.
9. Parbhakar AR, Madan M, Rju OS. Marginal seal of flowable composites, injectable resin modified Glass Ionomer and composites in primary molars an in vitro study. J of Indian Society of Pedodontics and Preventive Dentistry 2003; 2: 21-25.
10. Nakanuma, Deshpande S, Singh A. Microleakage of restorative materials, an in vitro study. J of Indian Society of Pedodontics and Preventive Dentistry 2006; 1: 24-27.