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"AN IN VITRO ANALYSIS COMPARING MICROLEAKAGE BETWEEN SMART DENTIN REPLACEMET AND FLOWABLE COMPOSITE, WHEN USED AS A LINER UNDER CONVENTIONAL COMPOSITE."

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ABSTRACT

Aim - The aim of this study is to compare microleakage of two different flowable composites when used as a liner under one common conventional composite. **Materials and Metods -** 40 extracted human maxillary 1st premolar teeth were taken for the study. Standard Class II cavities were prepared. Specimens were divided into 2 groups according to the liner material used:

Group1: Smart Dentin Replacement.

Group2: Tetric N Flow

The etchant and primer was applied to the prepared cavity for 20 seconds. Bonding agent is applied and light cured for 20 seconds. The liners in 1mm thickness were applied according to their respective groups and light cured for 20 seconds. All specimens were restored with same Nanohybrid Composite using an incremental technique & light-cured for 20 seconds. The teeth were subjected to thermocycling. Each sample was sectioned buccolingually through the center of the restoration. The linear dye penetration was studied under SEM. **Result -** The gap observed in teeth lined with smart dentin replacement was less compared to the teeth lined with Tetric-N-Flow, but none of the groups showed complete adaptation with dentin.

KEYWORDS: SDR, Flowable composite, liner, microleakage.

INTRODUCTION

Composites are versatile restorative material, which have vast applications in the field of dentistry. Since, their initial introduction in the 1960s, composite resins have undergone tremendous improvement in all areas, including aesthetics, wear and handling. However high-polymerization shrinkage which causes microleakage continues to present as a major disadvantage.[1] It has been proposed that secondary caries, marginal discoloration and microleakage at the margin accounts for majority of the failed restorations. The purpose of application of a liner is to provide a barrier to chemical irritants and bacterial invasion, thus providing a long term success of restoration. Materials that have been recommended as liners are calcium hydroxide, GIC, flowable composite resins.

SDR is introduced in dentistry as a flowable composite that has been recommended as liner due to their low viscosity, increased elasticity and wettability.[2] Thus it could help in reduction of microleakage and provide better marginal sealing ability.[3]

The aim of this study is to compare the marginal leakage between SDR and conventional flowable composite material. The sealing ability of this material will be assessed in vitro through SEM observation at the tooth cement interface, when used as liner under conventional composite restoration.

OBJECTIVES OF THE STUDY

The aim of this study is to compare microleakage of Smart Dentine Replacement and flowable composites when used as a liner under one common conventional composite restoration. The two materials selected for evaluation of microleakage are grouped as-

Group I - Smart Dentin Replacement.

Group II - Flowable Composite (Tetric N Flow)

ARMAMENTARIUM

METHOD

40 freshly extracted human maxillary 1st premolar teeth were taken for the study. Each tooth was cleaned using a hand scaler and polished using water pumice slurry in prophylactic rubber cups. Standard Class II cavities were prepared measuring a width of 1.5mm and depth of 2.5mm.

Specimens were divided into 2 groups according to the liner material used-

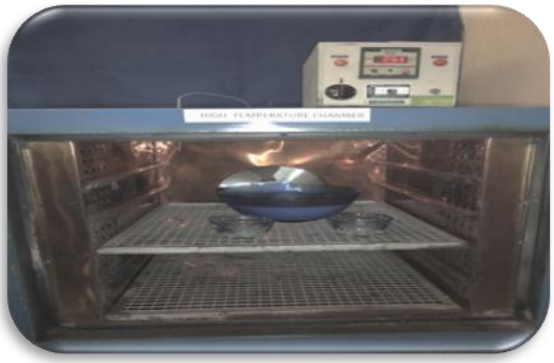
Group1: New generation flowable composite resin– Smart Dentin Replacement.

Group2: Conventional flowable composite resin (Tetric N Flow).

Single application consisting the etchant and primer was applied to the prepared cavities for 20 seconds. Bonding agent- Tetric N-Bond (ivoclar vivadent) was applied and light cured (Coltolux LED) for 20 seconds on the prepared cavities. The liners were applied in 1mm thickness according to their respective groups. All specimens were restored with the same light-activated, Nanohybrid Composite (3M ESPE FILTEK Z-250) using an incremental technique. Each increment was light-cured for 20 seconds with a light-curing unit (Coltolux LED). Restorations were polished with a series of finishing disks of decreasing abrasiveness.

Specimens were stored in distilled water for 24 hrs at 37°C. After 24 hr storage in distilled water at 37°C, the restored teeth were subjected to thermocycling for 1000 cycles in water baths at 5^{o} and 55°C with a dwell time of 30 seconds.

Low temperature chamber 5^{0}C (Accuracy $^{+}$_ 0.1^{0}C)



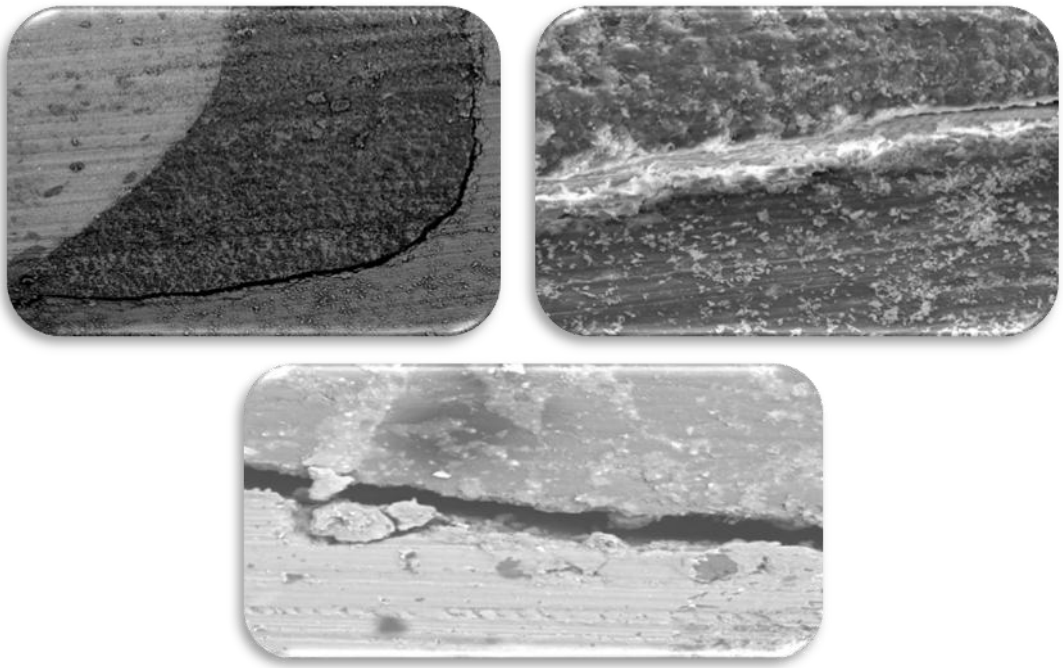
High temperature chamber 55^{0}C (Accuracy $^{+}$_ 1^{0}C)

All specimens were sectioned longitudinally in a mesiodistal direction through the center of the restorations with a low-speed diamond saw under water spray. Sectioned restorations in occlusal and gingival region were gold sputtered and examined under a Scanning electron microscope.

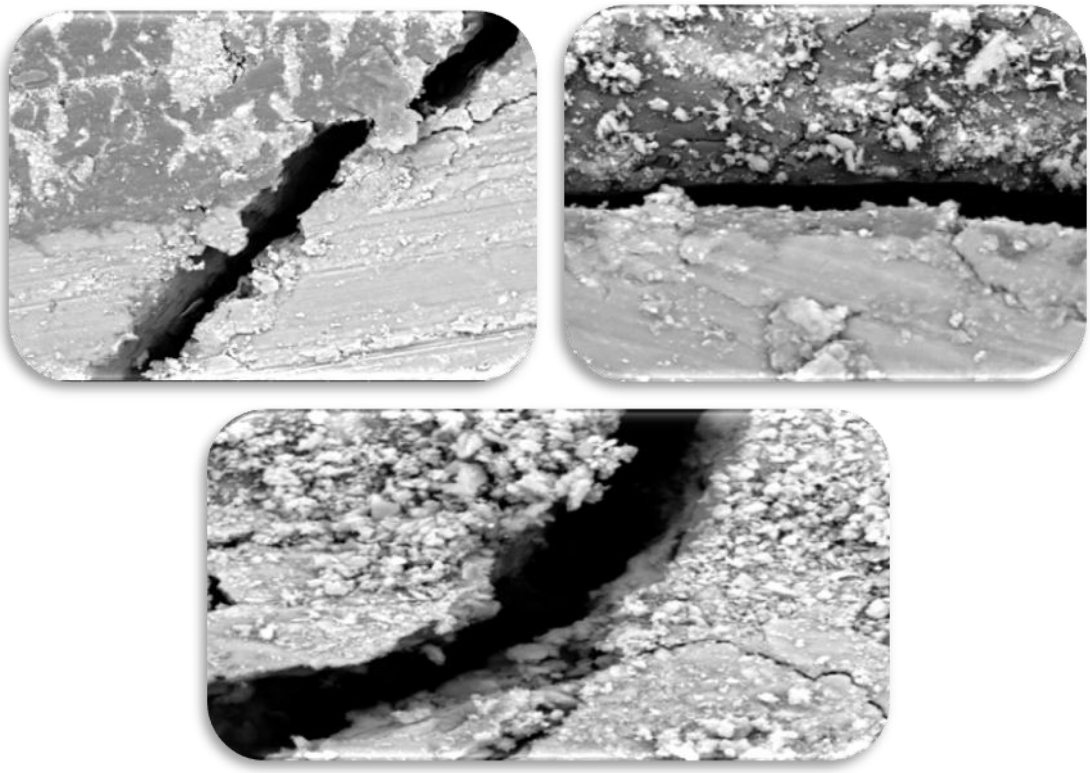
Gold sputtered Samples

Scanning Electron Microscope

SEM images: SDR



SEM images: TETRIC N FLOW

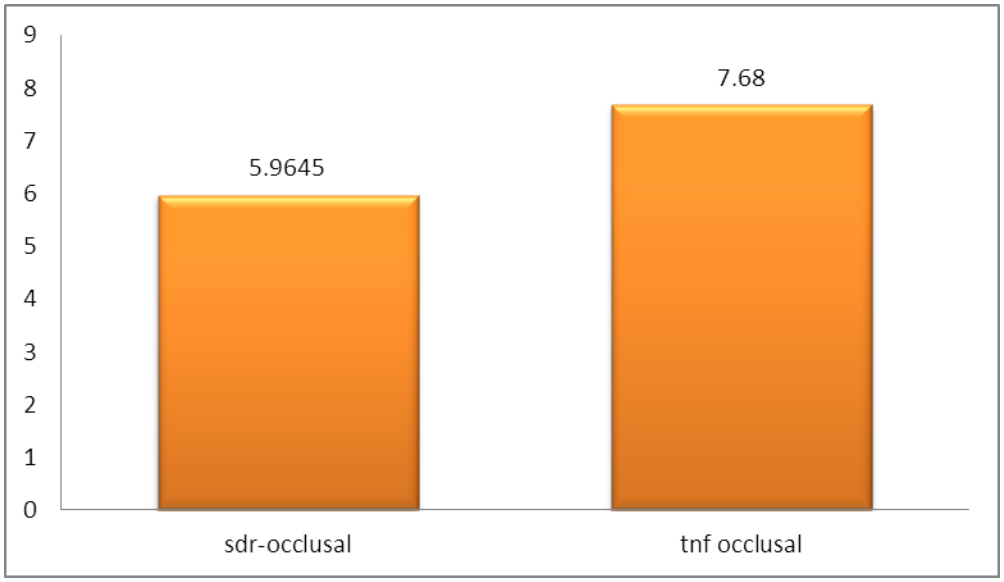


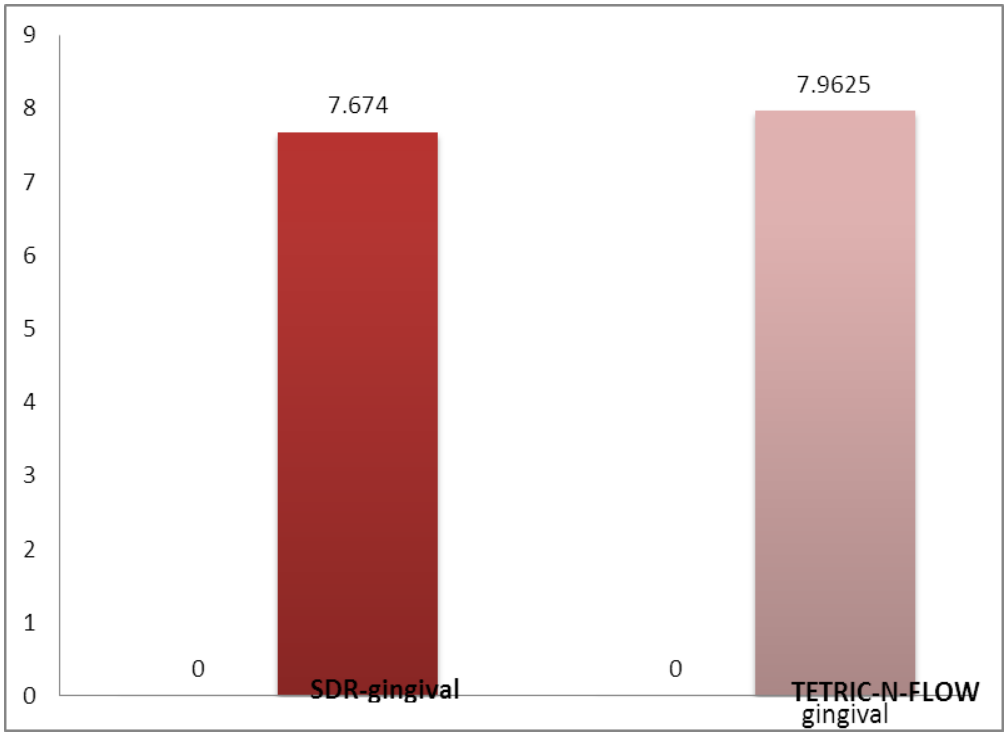
RESULTS

The gap was observed for the occlusal and gingival interface of both the groups. The results of the present study showed that the amount of interfacial gap in specimen belonging to group I and II was stastistically not significant (P<0.05). The gap observed in teeth lined with smart dentin replacement was less compared to the teeth lined with Tetric-N-Flow, but none of the groups showed complete adaptation with dentin.

Statistical Analysis

Statistical analysis was done using Student T-test.





DISCUSSION

Advances in resin composites have improved their properties and have increased their usefulness as restorative materials; however, polymerization shrinkage continues to remain one of the primary deficiencies of composite restorations. Polymerization shrinkage causes contraction stress within the restoration that leads to micro-leakage, as well as stress within the surrounding tooth structure.[4,5]

Micro leakage is defined as the clinically undetectable passage of bacteria, fluids, molecules, or ions between a restorative material and the cavity wall to, which it is applied.[6] In vitro studies have reported significant effects of using flowable materials on gingival surface in reducing micro leakage of Class II Nano hybrid composite restorations.[7,8] Sadeghi M. in his study concluded that the flowable composite significantly decreased the micro leakage at gingival margins of Class II micro hybrid (Tetric Ceram) composite restorations.[9] A recently introduced SDR is a flowable composite, shown to have lower micro leakage than other flowable composites.[10] This can be attributed to the fact that, SDR contains urethane dimethacrylate in its composition. The photo active group aids in controlling polymerization kinetics. It also shows delay in gel point, which is one mechanism to decrease shrinkage stress.

The results of the current study are in accordance with the previous studies conducted by Arslan et al who concluded that the use of new-generation and conventional flowable composite resins as an

intermediate layer between restoration and dental substrate does not reduce micro-leakage.[6] Although SDR had the lowest shrinkage stress, in the present study, no differences were observed in micro-leakage.

CONCLUSION

The use of new generation flowable composite sdr and a conventional flowable composite(tetric- n-flow) as a line under conventional composite did not decrease the micro leakage statistically. Though present study shows that sdr performed better in reducing micro leakage at the gingival and occlusal level, further studies are required to confirm this result.

REFERENCES

1. Alonso RC, Sinhoreti MA, Correr Sobrinho L, Consani S, Goes MF. Effect of resin liners on the microleakage of class V dental composite restorations. J Appl Oral Sci., 2004; 12: 56-61.
2. MSoubhagya, K Mallikarjun Goud, B S Deepak, So phia Thakur, T N Nandini, J Arun. Comparative in vitro evaluation of internal adaptation of resin-modified glass ionomer, flowable composite and bonding agent applied as a liner under composite restoration: A scanning electron microscope study. Journal of International Oral Health, 2015; 7(4): 27-31.
3. Hegde MN, Vyapaka P, Shetty S. A comparative evaluation of microleakage of three different newer direct composite resins using a self etching primer in class V cavities: An in vitro study. J Conserv Dent, 2009; 12: 160-3.
4. Kim E-H, Jung K-H, Son S-A, Hur B, Kwon Y-H, Park J-K. Effect of resin thickness on the microhardness and optical properties of bulk-fill resin composites. *Restorative Dentistry & Endodontics*. 2015; 40(2): 128-135. doi:10.5395/rde.2015.40.2.128.
5. Aranha AC, Pimenta LA. Am J Dent. Effect of two different restorative techniques using resin-based composites on microleakage. 2004 Apr; 17(2): 99-103.
6. Arslan S, Demirbuga S, Ustun Y, Dincer AN, Canakci BC, Zorba YO. The effect of a new generation flowable composite resin on microleakage in Class V composite restorations as an intermediate layer. J Conserv Dent, 2013; 16: 189-93.
7. Attar N, Korkmaz Y. Effect of two light-emitting diode (LED) and one halogen curing light on the microleakage of Class V flowable composite restorations. J Contemp Dent Pract, 2007; 8: 80-8.
8. Civelek A, Ersoy M, L'Hotelier E, Soyman M, Say EC. Polymerization shrinkage and microleakage in Class II cavities of various resin composites. Oper Dent, 2003; 28: 635-41.
9. Sadeghi M. Influence of flowable materials on microleakage of nanofilled and hybrid Class II composite restorations with LED and QTH LCUs. Indian J Dent Res., 2009; 20: 159-63.
10. Lotfi N, Esmaeili B, Ahmadizenouz G, Bijani A, Khadem H. Gingival microleakage in class II composite restorations using different flowable composites as liner: an in vitro evaluation. Caspian J Dent Res., 2015; 4: 10-6.