

To Evaluate and Compare the Amount of Gingival Displacement Using Three Gingival Retraction System: An In Vivo Study

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ABSTRACT

Background: One of the most challenging aspects of crown and bridge is the management of the gingival tissues when making an impression. With the advent of new materials (like expasyl, magic foam, racegel homeostatic agents) retraction of gingival tissue has become much more comfortable. However, the efficiency of these new materials in gingival displacement is less explored. Hence this study was aimed at evaluating the amount of gingival displacement done by these materials and comparison among these materials.

Materials & Methods: Three below-mentioned retraction system were selected for the study. Retraction cord (ultra-pack)) Magic foam (Colten) Racegel along with retraction cord (Septodont). Materials were manipulated according to manufacturer instructions and injected into selected, prepared anterior teeth. Impressions were made, and obtained models were evaluated under the electron microscope. Appropriate biostatic tests were applied for the analysis of data.

Results: The result of the study conclusions were drawn that all the three-retraction system used showed a highly significant amount of gingival displacement when compared with their pre-displacement state.

Conclusion: Knitted retraction cord impregnated with Racegel haemostatic agent showed maximum displacement and Magic Foam Cord showed the least amount of gingival displacement.

Keywords: Gingival displacement, gingival retraction system, oral hygiene.

INTRODUCTION

One of the most challenging aspects of crown and bridge is the management of the gingival tissues when making an impression¹. Harmony between restoration and the periodontium that surrounds the teeth is crucial to the success of a restorative procedure. Key to achieving such a relationship is an accurately made impression. Even though the entire procedure is done as carefully as possible, a restoration will never fit perfectly to the preparation margin²⁻³. Microscopically, there will

always be a gap of a few microns between the restoration and the tooth. Thus, displacement of the gingival tissue is essential for obtaining accurate impressions for the fabrication of fixed restorations, particularly when the finish line is at, or just within, the gingival sulcus⁴⁻⁵.

The mechanical widening achieved by inserting a dry cord, or a copper tube, or a ring-collar etc. between the cervical margins of the tooth and the

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free gingiva and the chemico-mechanical widening can be achieved by using a combination of the mechanical effect obtained through the placement in situ of a cord, and the vasoconstrictor, hemostatic and astringent effect of a chemical agent in which the cord is dipped prior to insertion. At the same time, surgical widening obtained by removing a superficial layer of the crevicular epithelium by means of electrosurgery with a surgical knife or a rotary curettage⁶.

Injectable materials into gingival sulcus were introduced lately as an alternative method of the traditional chemo-mechanical technique. With the advent of new materials (like expasyl, magic foam, racegel homeostatic agents) retraction of gingival tissue has become much easier. However, the efficiency of these new materials in gingival displacement is less explored. Hence this study was aimed at evaluating the amount of gingival displacement done by these materials and comparison among these materials.

MATERIALS AND METHOD

This in vivo study was conducted on patients requiring full coverage restoration who reported to the outpatient department of Prosthodontics, Rajasthan Dental College. The patient should not be less than 18 years of age, require restoration on upper anterior teeth and should have healthy gingiva and periodontium with thick bio-type.

Three below-mentioned retraction system was selected for the study:

Group A – Retraction cord (ultra-pack 00)

Group B- Magic foam (Colten)

Group C- Racegel along with retraction cord (Septodont)

Manipulation of retraction cord:

Retraction cord was removed from the box according to the required length and was looped around the preparation with a slight overlap. Then with a cord packer, it was gently tucked down beneath the shoulder of the gingiva. Cord was kept in the sulcus for 5 minutes. Before making a final impression, the cord was removed, and the impression was made.

Manipulation of Magic Foam Cord:



First of all, after preparation of tooth pre-fit Comprecap anatomic were selected for each preparation, then Magic Foam Cord was applied around the preparation by dispensing tip. After that, Comprecap was placed over the preparation and the patient was asked to bite down for 3 -5 minutes. (Fig-1)

Manipulation of Racegel along with retraction cord:

In this method, the retraction cord was impregnated with racegel and was tucked in the gingiva using the conventional method.

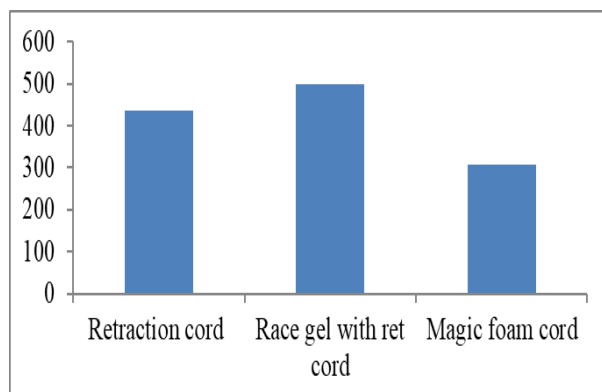
Collection of data

Twenty-eight (28) Subjects were prepared for metal-ceramic restoration in the anterior maxillary teeth with subgingival shoulder finish line. Before applying the retraction system, the impression was made by addition silicone elastomeric impression material using double mix single-stage technique. To check the pre-displacement and cast was poured and sectioned and die was obtained. Three impressions were made using three different retraction systems in the same patient in three appointments at the interval of seven days so that gingiva comes back to its original position after retraction. Impression devoid of any voids and the proper margin was selected for the study. The sectioned cast obtained before gingival retraction and after gingival retraction was observed under scanning electron microscope and data was obtained. These data were subjected to the biostatics analysis.

RESULT

All three gingival retraction system produced a highly significant amount of gingival retraction when compared to their pre-retraction state. The amount of lateral displacement of the three groups was analysed. It was found retraction cord used

along with racegel (group-II) produced maximum displacement (mean = 498.671) followed by retraction cord (mean = 437.425), whereas the minimum was seen with the Magic foam group (mean = 307.603).



Graph 1- Mean value of gingival displacement for different types of retraction system.

In the above graph maximum gingival displacement can be seen with the race gel with ret cord group (mean = 498.671) followed by retraction cord (mean = 437.425), whereas minimum can be seen with the Magic foam group (mean = 307.603).

After applying the One-Way ANOVA test (Table 1) between the group and within the group. It was found that the mean difference for gingival displacement between different types of retraction system is statistically highly significant (p-value = 0.001).

Table-1 One Way ANOVA test for statistical differences for gingival displacement between different types of retraction system.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	533042.107	2	266521.054	60.220	.001*
Within Groups	358488.019	81	4425.778		

* Mean difference is statistically highly significant

Unpaired t-test (Table 2) was applied between the groups and compared with each other, i.e. Group 1 (retraction cord) was compared with group 2 (retraction cord used along with racegel), group 1 was compared with group 3 (Magic Foamcord), and group 2 was compared with group 3 . This was

found that p-value <0.001 is statistically highly significant for group 2.

Table 2: Statistical difference in gingival displacement between different types of retraction systems (unpaired t-test)

Comparisons	T test	Df	P value
Group 1 and Group 2	-3.026	54	0.004*
Group 1 and Group 3	7.599	54	0.001**
Group 2 and Group 3	12.158	54	0.001**

* Mean difference is significant at 0.05 level **p-value <0.001 is statistically highly significant.

After biostatic analysis displaced and post a retraction, dies were subjected to electron microscope for optical analysis(Pic1-4)

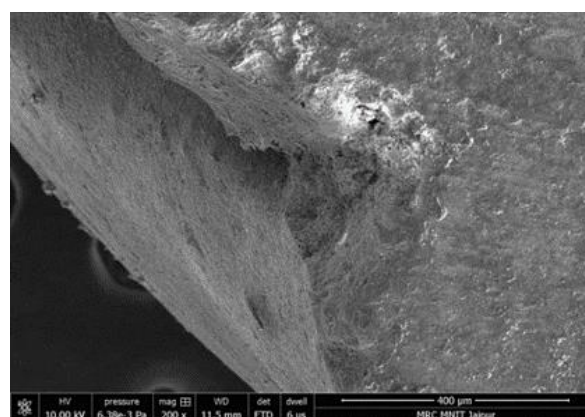


Fig 1: Displacement without retraction cord.

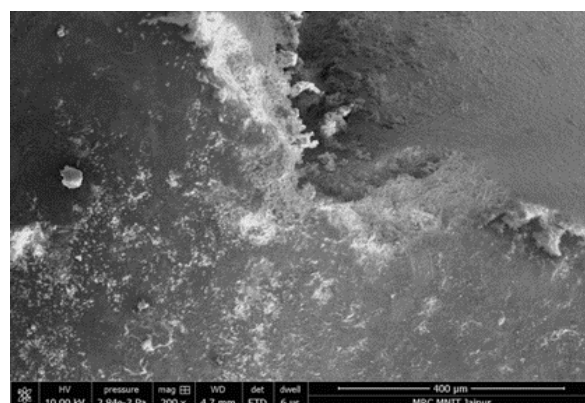


Fig 2: Displacement with magic foam cord.

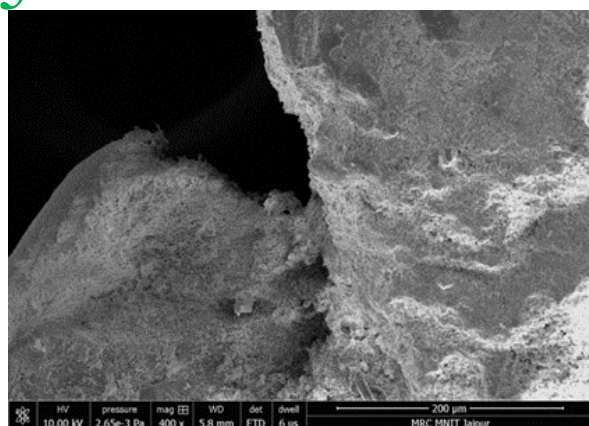


Fig 3: Displacement with retraction cord.

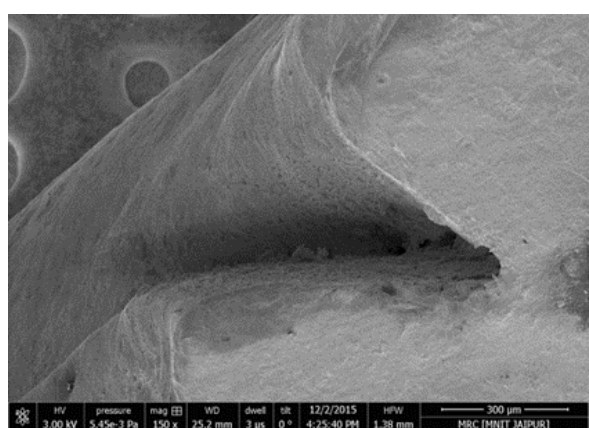


Fig 4: Displacement with Racegel cord.

DISCUSSION

There is a various method of gingival retraction, namely mechanical, mechanic-chemical and surgical or combination of these. Among the mentioned techniques, the chemo-mechanical technique of retraction using impregnated cord is the most widely used. Injectable materials into gingival sulcus were introduced lately as an alternative method of the traditional chemo-mechanical technique. The injectable matrix is hydrophilic and can be flushed away relatively easily from the gingival crevice⁷⁻⁸.

Magic Foam Cord is a polyvinylsiloxane material for gingival retraction was introduced in 2005. It is a non-haemostatic cordless retraction system and consists of foam and cartridges, mixing and intraoral tips, and comprecaps available in three sizes. It works by generating hydrogen, causing expansion of the material against the sulcus walls during setting. It does not cause any inflammation or irritation of the tissue. It is easy to place in the

sulcus and has no adverse effects. The drawbacks are that it may not improve the speed or quality of retraction obtained⁹⁻¹⁰.

Race gel is hemostatic agent that contains 25% aluminium chloride and control bleeding and absorb crevicular fluid prior to and during impression making. This product is liquid at room temperature and turns into a firm gel when placed in contact with oral tissue. For better result, it can be used along with retraction cord¹¹.

Result obtained after statistical analysis indicated that all the three gingival retraction system produced a highly significant amount of gingival retraction when compared to their pre-retraction state. It was found retraction card used along with racegel (group-II) produced maximum displacement (mean = 498.671) followed by retraction cord (mean = 437.425), whereas minimum can be seen with the Magic foam group (mean = 307.603).

CONCLUSION

This study was designed to assess and compare the amount of gingival displacement by three different retraction system. Through the result of the study, conclusions were drawn that all the three-retraction system used showed a highly significant amount of gingival displacement when compared with their pre-displacement state. Knitted retraction cord impregnated with Racegel haemostatic agent showed maximum displacement and Magic Foam Cord showed the least amount of gingival displacement.

CONFLICTS OF INTEREST

The authors declare they have no potential conflict of interests regarding this article.

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