An Evaluation of the Efficacy and Effect on Soft Tissues of Different Commercially Available Gingival Displacement Systems - An In Vivo Study

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Abstract: Background & Objective: Gingival-displacement is carried out for successful clinical outcome of the restoration; hence the objective of the study is to investigate the clinical outcome of 3 different gingival-displacement systems in terms of (1) the amount of displacement and (2) the presence of gingival recession 14 days post-displacement, if any. Methods: 20 completely dentate male and female individuals with healthy periodontium were selected. Gingival displacement was done using Ultrapak (gingival-displacement Cord), Expasyl (15% aluminium chloride paste), and Merocel (polyvinyl acetate strips) on selected teeth as per manufacturer's instructions. Impressions were made with Monophase addition silicone immediately before gingival-displacement, immediately after gingival-displacement and on 14th day post-displacement. Evaluation was done under a 3-D microscope, by comparing the samples of (1) before and after group, and (2) before and 14th day post-displacement group. Results and Interpretation: Tukey's Post Hoc test revealed statistically significant results for Merocel when compared with Expasyl and Ultrapak with difference in mean value being 0.455, 0.273, and 0.286mm respectively (p-value<0.001). There was no statistically significant difference between Expasyl and Ultrapak, also between the samples of before and 14th day post-displacement group. Thus there was no trauma to gingiva as observed in 14th day post-displacement group. Conclusion: Merocel produced the maximum amount of gingival-displacement than Expasyl and Ultrapak, and also all the materials used did not affect the gingival health adversely. [Shivangini Z NJIRM 2017; 8(2):62-64]

Key Words: Gingival-displacement, displacement cord, 15% aluminium chloride, polyvinyl acetate strips.

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Introduction: The long term clinical success of an indirect restoration depends on many factors. Maintenance of gingival health is one of the factor to be considered before, during and after the restorative treatment is accomplished.

Gingival-displacement is defined as the deflection of the marginal gingiva away from the tooth. [1] It is carried out to have adequate vertical and horizontal room between the prepared finish-line and the gingival tissue to assure adequate bulk of the impression material is flowed into the expanded gingival sulcus.

There are various surgical and no-surgical methods of gingival-displacement out of which impregnated gingival-displacement cord is used conventionally since many years due to its effectiveness and safety compared to other methods of displacement. However, displacement cord if manipulated inappropriately may lead to pain and trauma to the gingiva. [2] Thus cordless gingival-displacement systems evolved to overcome the problems of gingival-displacement cord. Expasyl is one such cordless gingival-displacement system, composed of 15% aluminium chloride and kaolin which is used in the study. Another material named Merocel which is a polyvinyl acetate strip, though not popular due to lack of clinical evidence is used in the study as there are very few studies comparing the clinical outcome of all the materials together.

The purpose of the study is to compare the three different gingival-displacement methods and evaluate their effectiveness in producing adequate displacement and to explore clinical outcome of the soft tissues after 14 days.

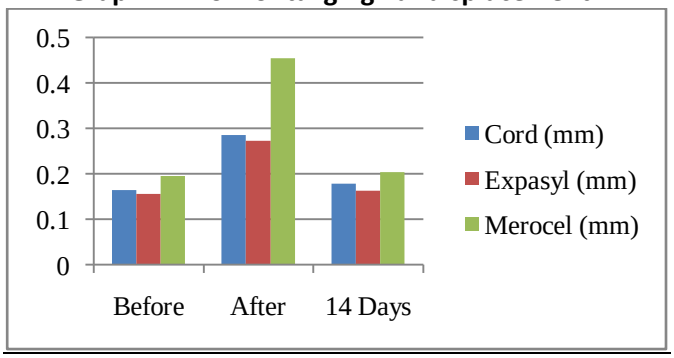
Methods: The study was carried out in the Department of Prosthodontics, Crown & Bridgework and Implantology. Approval from the ethical committee was obtained prior to commencement of the study. A total of 20 healthy male/female individuals in the age group of 18 to 25 years were selected. All the individuals were checked by two periodontist to assess the gingival health and oral prophylaxis was carried out. The assessors were unaware of the purpose of the study. An informed consent was taken from all the participants. Three different gingival-displacement materials namely Expasyl (Kerr Corporation, Orange, CA, United States), Retraction cord (Ultrapak, Ultradent Products, South

Jordan, United States), and Merocel (Merocel Co, Mystic, Conn, United States) were selected for the study. It was decided that the soft tissues around the maxillary left, right and mandibular left first premolar be displaced by gingival-displacement material E, R and M respectively. Impressions were made in custom trays with monophase addition silicon material - before, immediately after and on 14th day of gingival displacement. The duration of gingival-displacement was 2, 4 and 10 minutes for the materials E, R and M respectively. [2]

Type IV dental stone (Kalrock, Kalabhai, Mumbai, India) was used to obtain casts. The centre of the selected tooth was marked from the mesio-distal aspect on the buccal surface by vernier calliper with an accuracy of 0.01mm. The tooth was then sectioned using a disc. The evaluation of the sectioned tooth was done under a 3-D microscope (Mitutoyo, quick scope vision measuring machine, Japan) with an accuracy of 0.0001mm, to check for the amount of gingival displacement (vertical and horizontal) and gingival recession if any, from the evaluation of the samples of 14th day.

Result: Paired t-test was carried out for the evaluation of the amount of gingival-displacement and gingival recession on 14th day for the individual group (Graph 1 and 2)

Graph 1 – horizontal gingival-displacement



One way ANOVA (Analysis Of Variance) was carried out for the inter-material. Statistically significant difference (p-value<0.001) was found only with the horizontal gingival-displacement. Thus, Tukey's Post Hoc test was done only for horizontal gingival-displacement group (Table 1). Statistically significant difference was found with Material M (mean value of horizontal gingival-displacement – 0.455mm) when compared with material E (0.273mm) and R (0.286mm). No statistically significant difference was found when comparison was done between material E and R, and also for the before and 14th day group of all the three materials.

Graph 2 – vertical gingival-displacement

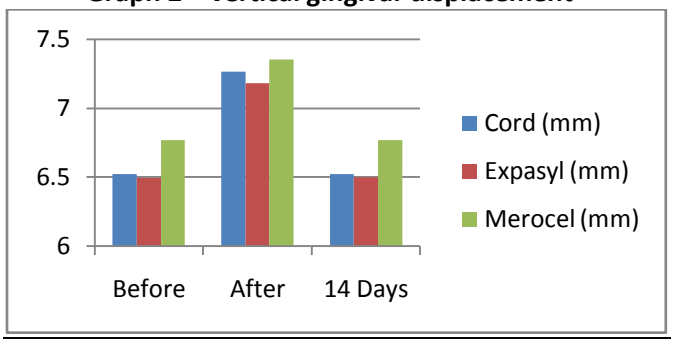


Table: 1 Tukey's Post Hoc Test for multiple comparisons

Dependent variable	Material		Mean difference	Standard Error	p value
Before	R	E	0.008	0.017	0.889
		M	-0.031	0.017	0.182
	E	M	-0.039	0.017	0.071
After	R	E	0.014	0.025	0.846
		M	-0.169	0.025	<0.001
	E	M	-0.183	0.025	<0.001
14th day	R	E	-0.002	0.802	0.443
		M	-0.025	0.802.	0.999
	E	M	0.023	0.802	0.461

Discussion: Fixed prosthodontic treatment involves the restoration and replacement of natural teeth by the artificial ones, to improve and maintain the oral heath and appearance of the patient. Impression should be recorded accurately for the longevity of the restorations and this is possible only when minimum amount of gingival displacement (0.2mm)[1] is achieved so that the impression material can flow into the sulcus and record the fine details. Thus gingiva-displacement is an important step for the final outcome of the restoration. This study was carried out to evaluate the effectiveness of the two cordless gingival-displacement systems namely Expasyl and Merocel in comparison with the conventionally used gingival-displacement cord. The number of the subjects selected was based on the pilot study performed previously. Patients with healthy periodontium were selected as inflamed gingiva may take more time to return to normal condition which might alter the results of the study adversely.

In this study the evaluation method of the sectioned tooth was similar to that used by Bowels WK et al. [3] As the minimal amount of displacement required in human gingiva has been reported to be 0.2 mm, digital measurement of the amount of displacement was followed in this study which gave measurement with a least count of 0.0001mm.

All the groups produced clinically acceptable gingival-displacement, though Merocel has the highest amount of horizontal gingival-displacement. This is adequate for making impression according to Donovan T and Winston W. [4] The results of the study are similar to that of the studies done previously. [5,6,7,8]

A recent study done by Chandra S et al[9] evaluated the concluded that the clinical appearance of the gingiva was reversed to normal within 14 days which was in accordance to the studies done previously. [10,11,12] Thus it was decided to have the evaluation of gingival recession at the 14th day of gingival-displacement.

Conclusion: Within the limitations of the study it can be concluded that: (1) all the displacement systems showed statistically significant difference for the amount of horizontal displacement, with the Merocel being the most significant of all, (2) there was no statistically significant difference for the evaluation of gingival recession suggesting no gross trauma to the gingiva.

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