

Comparative Evaluation of Amount of Gingival Retraction Using Different Materials and Techniques

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ABSTRACT

Background: The purpose of this study was to determine efficacy in terms of vertical and lateral displacement of the gingiva using four different retraction system, namely cords impregnated with two different chemicals i.e. 25% aluminium sulphate, 0.05% oxymetazoline hydrochloride and the cordless systems. To compare the cord system with the cordless system in terms of vertical and lateral displacement of the gingiva. To help the clinician select an appropriate retraction system to achieve adequate gingival displacement, better exposure of the finish line so as to fabricate a prosthesis with a clinically acceptable fit.

Keywords: Gingival Retraction, Aluminum Sulphate, Oxymetazoline chloride, magic foam, Expasyl.

INTRODUCTION

Today's era of increasing esthetic demands and improved patient's awareness have led fixed prosthodontics to play a vital role. The relationship between a fixed prosthesis and soft tissue should be considered crucial for the long term success. Several studies suggested that supragingival margins are preferable, nevertheless for esthetic demands, sensitivity, need for additional retention and existing subgingival caries and/or restorations placement of intracrevicular margins are indicated.

MATERIALS AND METHODS

Clinical efficacy of gingival retraction systems was studied for adequate vertical and lateral gingival displacement by indirect assessment of the sulcus dilation with four different retraction systems on the unprepared maxillary right and left central incisors of ten subjects. **Selection criteria** laid for the subjects are as follows –

- Age group of 19 – 25 years with healthy gingiva and free from any systemic disease.
- No signs of gingival inflammation, no sign of bleeding on probing.

A. Materials used for the study:

- B. Preparation of the diagnostic casts.
- C. Fabrication of custom trays.
- D. Making of pre-displacement impression and cast.
- E. Gingival displacement

AS – Knitted cord (size “00”) impregnated with 25% Aluminium sulphate.

OH – Knitted cord (size “00”) impregnated with 0.05% Oxymetazoline hydrochloride.

MF – MaEP – Expasyl paste system

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(i) Phase-I of the study (retraction cord with chemicals)

F. Making of the post-displacement impression

Materials used in the study

S.No.	MATERIALS USED FOR RETRACTION	CHEMICAL USED	MANUFACTURER	BATCH No.
1.	Retraction cord	(I) 25% Aluminium sulphate (II) 0.05% Oxymetazoline hydrochloride	Ultrapak, Ultradent products, USA Merck Ltd., India Nasivion, Merck Ltd.	B3T5V MB9M583398 901089013016
2.	Cordless systems (i) Expasyl paste system	Aluminium chloride + kaolin + water	Pierre Rolland, France	2184
	(ii) Magic foam cord	Polyvinyl siloxane	Coltene Whaledent, Switzerland	0130561

G. Making of the final cast

(ii) Phase II of the study (cordless system)

A sufficient quantity of paste was placed to completely fill the sulcus in order to obtain adequate displacement.

EP i.e Expasyl paste system was applied to left maxillary central incisor.

A sufficient quantity of paste was placed to completely fill the sulcus, which produced the blanching of the marginal gingiva. Expasyl was left in place for 2 minutes (as per manufacturer's instructions) after which it was thoroughly washed out with a jet of water. from a three-way syringe. Expasyl was completely removed before making of post-displacement impression.

H) Making of the post-displacement impression and final cast.

Post-displacement impression and final cast for phase-II were made in a similar manner as for the phase-I of the study (mentioned above).

I) Measurements

Post-displacement impressions were made immediately after the removal of retraction system with second set of custom trays and evaluated in a similar manner as pre-displacement.

The midpoint of both maxillary central incisors on casts were marked using digital callipers at cervical and coronal part, on the labial surfaces of both the teeth. The final cast was be sectioned by using rotary die cutting disc with mid line as a reference point, thus each tooth will have two equal halves and were used for measurement but in total there were three halves of one cast. Pre and post-displacement sulcus width were studied by placing the sectioned halves under a **Traveling microscope**³¹ (Fig 1) which has an accuracy of 0.001cm. Three points 'a', 'b' and 'c' were marked (Fig 2) on all the cut sections of the dies.

'a' – highest point on incisal edge of the tooth
'b' – perpendicular drawn from the point 'c' on labial aspect of the tooth
'c' – crest of marginal gingiva, pre-displacement
'c₁' - crest of marginal gingiva, post-displacement

The readings of the points a, b and c and c₁ were taken. For measuring the lateral displacement of the gingiva, pre and post-displaced values of points 'c' and 'c₁' were calculated by keeping point 'b' as constant and then subtracting the pre-displaced value of 'c' from the post-displaced value 'c₁' whereas for vertical displacement 'a' was kept constant and then the pre-displaced value of 'c' was subtracted from the post-displaced value of 'c₁'. In

this way vertical and lateral displacement of gingiva was calculated. After this, mean of all the four

groups were taken for both the vertical and lateral displacement and statistical analysis done.

Table 1: Amount of vertical displacement of individual subjects and their mean.

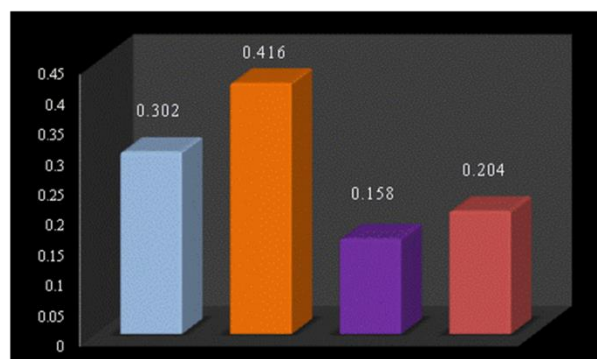
Serial no.	Knitted cord impregnated with 25% Aluminium Sulphate (AS)	Knitted cord impregnated with 0.05% Oxymetazoline hydrochloride (OH)	Magic foam cord Retraction system (MF)	Expasyl paste retraction system (EP)
No. of subjects				
1	0.28	0.44	0.10	0.24
2	0.30	0.40	0.22	0.20
3	0.30	0.50	0.16	0.22
4	0.31	0.40	0.20	0.20
5	0.30	0.38	0.14	0.22
6	0.28	0.40	0.10	0.20
7	0.30	0.40	0.20	0.20
8	0.32	0.40	0.10	0.18
9	0.31	0.44	0.16	0.18
10	0.32	0.40	0.20	0.20
Mean	0.302	0.416	0.158	0.204

Table 2: Mean vertical displacement for the cord system (CS).

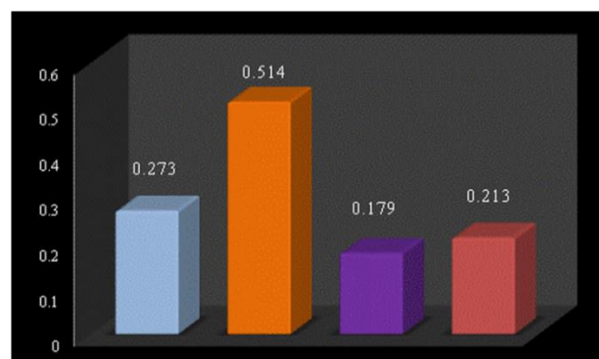
	AS	OH	Mean
CS	0.30	0.42	0.36
SD	0.01	0.04	

Table 3: Mean vertical displacement for the cordless system (CL).

	MF	EP	Mean
CL	0.16	0.20	0.18
SD	0.05	0.02	



Graph 1: Mean of Vertical Displacement of Materials studied.



Graph 2: Mean of Lateral Displacement of Materials studied.



Fig 1: Samples Cut for Measurement.



Fig 2: Traveling Microscope.

DISCUSSION

Nowadays, various atraumatic methods of gingival displacement are available and claim to be superior and comfortable than the conventional methods. Clinical efficacy of these newer methods is yet to be proved over the tested conventional methods.

In general, the choice of the chemical is based on its relative effectiveness in accomplishing the displacement and also on its systemic effect and the degree of tissue injury²². The amount of absorption of chemical will vary with exposure of the vascular bed, length and concentration of the impregnated cord, and the length of time of application¹⁸.

Results thus obtained indicated that all the four gingival retraction systems produced significant amount of gingival displacement when compared to their pre-displaced state.

When we compare the amount of vertical and lateral displacement between cord and cordless

system, the results of cord system are significantly better than cordless system³¹.

So, all the four retraction groups in the study produced greater amount of gingival displacement than the minimum amount of sulcus width required for the elastomeric impression material. According to ADA specification² no. 19 for elastomeric impression ma

Finally, these results will definitely help the clinician to select an appropriate retraction system to achieve adequate gingival displacement, better exposure of the finish line so as to fabricate a prosthesis with a clinically acceptable fit.

SUMMARY AND CONCLUSION

Gingival displacement, since years have played a vital role in attaining marginal integrity and emergence profile during fabrication of fixed prosthesis.

Thus, a clinical study was conducted to evaluate and compare their clinical efficacy in terms of creating vertical and lateral gingival displacement, by using four different retraction systems namely knitted cord impregnated with 25% aluminium sulphate, 0.05% oxymetazoline hydrochloride and the cordless systems using Magic foam cord retraction and Expasyl paste system.

Based on the results obtained and within the limitations of the study the following **conclusions** can be drawn–

- 1) Both cord system and cordless systems were clinically adequate for gingival displacement in both vertical and lateral direction.
- 2) Cords with chemicals were superior to cordless systems.
- 3) Cords impregnated with 0.05% Oxymetazoline hydrochloride were superior to all other methods studied in terms of vertical and lateral gingival displacement.
- 4) Lateral gingival displacement was comparable between both cordless systems, though Expasyl as compared to Magic Foam cord system was better in terms of vertical displacement.

CONFLICTS OF INTEREST

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

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