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A Study on Clinical Comparison Between Expasyl Retraction System and Medicated Retraction Cord on Gingival Retraction.

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Keywords
Gingival displacement, Gingival retraction, Sulcus depth.

Abstract
Aim: This study is done to evaluate clinical efficacy of Expasyl and medicated retraction in subgingivally prepared teeth. This is done by evaluating vertical displacement of gingiva. Method: In the present study, total 30 subjects were selected. Clinical efficacy of Expasyl retraction system and medicated cord retraction system were studied for adequate vertical gingival displacement by direct assessment of the sulcus dilation on the prepared teeth with help of flexible measuring strip pre and post retraction, which includes paired abutments of any one segment of either maxillary or mandibular arch. Statistical analysis was done to compare two systems.
Result: Expasyl retraction technique was more effective in vertical gingival retraction (mean- 0.32 mm) than medicated retraction cord technique (mean-0.30mm) with a t value at 1.175 and P - value of 0.25 mm. conclusion: The amount of vertical gingival retraction obtained by Expasyl and medicated cord was significantly similar but Expasyl retraction system is not cost effective when compared with cord system.

Introduction:

A poor margin results in the failure of a fixed dental prosthesis, so margins are one of the most crucial and weakest links in the success of the restoration. [1]. The positioning of the finish line and the accuracy of the finish line record directly influence the restoration's ability to be manufasctured and its

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final success. [2-4]. Gingival tissue must be placed away for better record of finish line. [5,6]

Gingival retraction techniques are classified as mechanical, chemicomechanical, electrosurgical and rotary curettage, or a combination of these techniques [7]. A commonly used technique to provide space between the gingiva and the prepared tooth is chemicomechanical method using medicated retraction cord[8]. The cordless technique includes gingival retraction pastes which physically displaces the tissue with or no pressure and leave a dry field free of blood, ready for making impression [9].

The purpose of the present study is to chemically evaluating the efficacy of two different mechanochemical methods, one is Expasyl retraction system (cordless system) and the other is medicated retraction cords on the basis of vertical gingival retraction.

Aim: The aim of this study was to carry out subjective analysis of clinical efficacy of Expasyl and medicated retraction cord in term of vertical displacement of gingiva in sub gingivally prepared teeth.

Material and methodology:

Materialsused:

In this study, following materials were used,

1. Gingival retraction cords (Ultrapak from Ultra dent Products, Inc.USA.) (Figure - 1)

Ultrapak cord is made of 100% cotton, knitted into thousands of tiny loops to form long, interlocking chains[10].

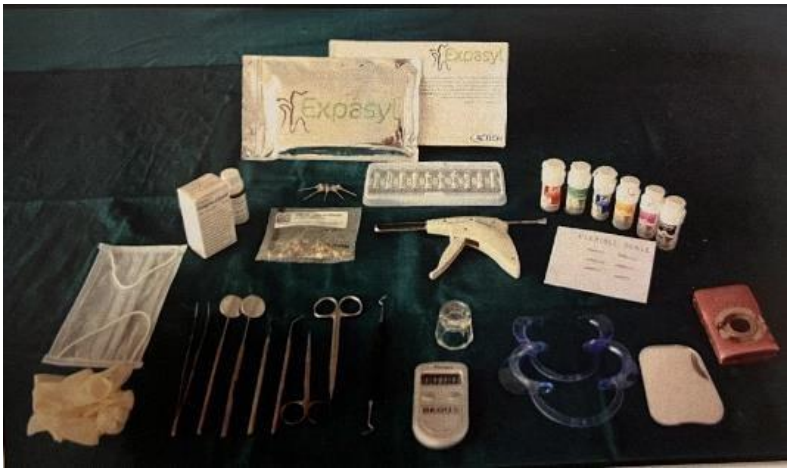
Ultrapak Knitted retraction cord #000, #00, #0, #1, #2, #3

2. Gingival retraction paste (Expasyl - Satelec ACTEON group) (Figure- 1)

Expasyl is a paste used for cordless gingival retraction.

3. Medicament

Aluminium chloride haemostatic solution 10% (Roeko gingival fluid- Coltene Whaledent, Switzerland) (Figure- 1)



Methods:

***Selection of subjects*:**

Inclusion criteria: Subjects with

1. Above 18 years of age.

2. Pair of abutment prepared for full coverage restoration.

3. Abutment tooth with ideal gingival and periodontal health.

4. Abutment tooth without any developmental disturbances or age related changes.

Exclusion criteria:

Subjects with

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1. Systemic diseases like; Cardiovascular disorders, diabetes, hyperthyroidism or hypertension.

2. Periodontally compromised abutment.

3. Abutment tooth with rotation and tilting.

Written informed consent was obtained from those who agreed to participate voluntarily and the ethical clearance was obtained from the ethical committee.

Preparation of subjects:

Abutments were made with subgingival margins for full coverage restoration, taking care to protect the nearby gingival tissues.

Preparation of flexible scales: (Figure 2)

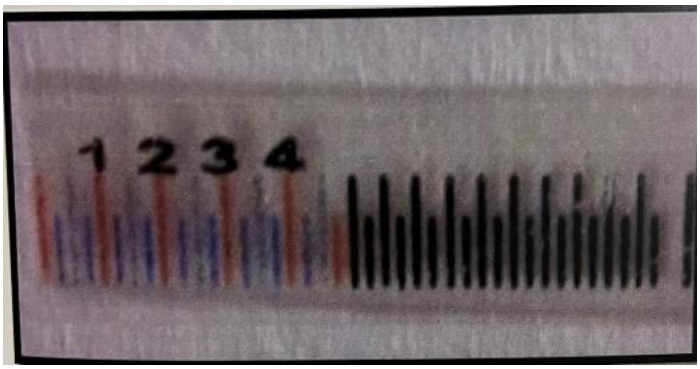

Figure: 2 flexible measuring strip

The flexible scales were fabricated by printing scale marking on transparent sheets to the accuracy of 0.25 mm, colour coding of the each marking with each mm.

***Preparation of medicated retraction cord*:** Plain knitted retraction cord (Ultrapak) was soaked for 20 minutes in a sterile container of aluminium chloride haemostatic agent (Roeko gingival liquid) to create medicated retraction cord.

Recording the sulcus depth before gingival retraction: Sulcus depth (mesiobuccal, midbuccal, distobuccal) of both abutment teeth recording was done before the application of any retraction technique was done. For this Flexible scale was used. (Figure 3,4,5).

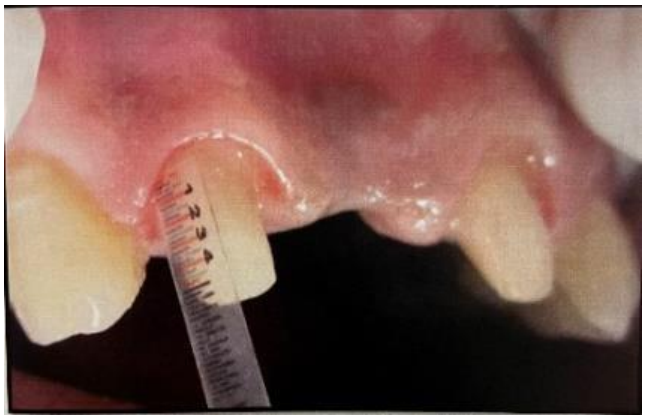

Figure: 3 sulcus depth on mesiobuccal region

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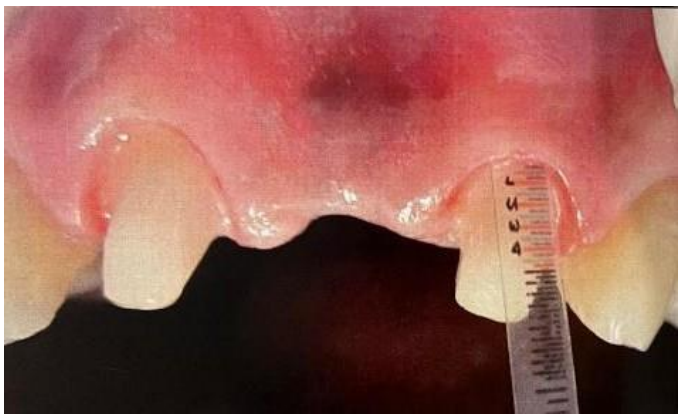

Figure: 4 Sulcus depth on mid buccal region

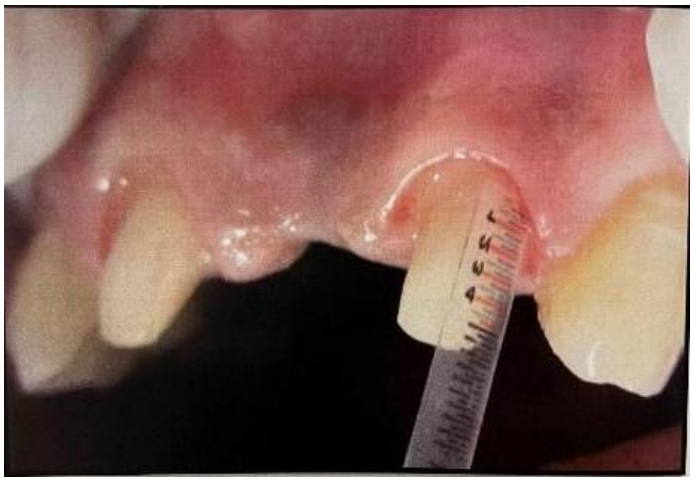

Figure: 5 Sulcus depth on distobuccal region

Expasyl retraction system and Medicated retraction cord technique were used on two different abutment teeth. (Figure 6).

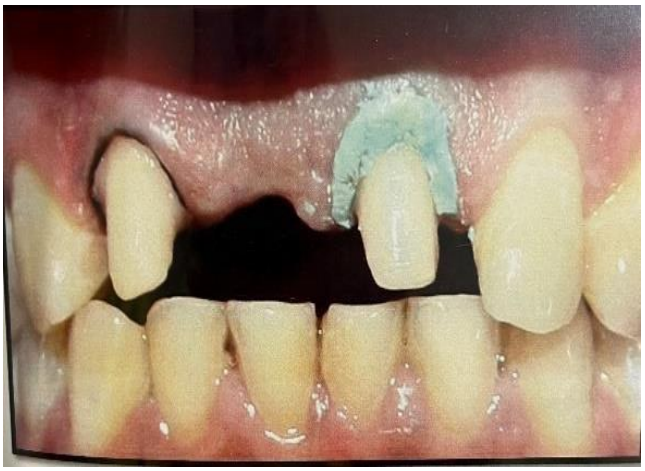

Figure: 6 medicated retraction cord and Expasyl paste in sulcus

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***Application of Medicated Retraction Cord and post retraction reading of one abutment*:**

Selection of medicated retraction cord of apropriate size was done based on the clinical situation (thickness of the gingiva and depth of the sulcus). Beginning at the mesial interproximal region, the cord was gently pushed into the sulcus. (Figure 7,8,9) After being placed in the sulcus for five minutes, the cord was carefully pulled out. Using a flexible scale, sulcus depth (mesiobuccal, midbuccal, distobuccal) measurement of both abutment teeth was done.

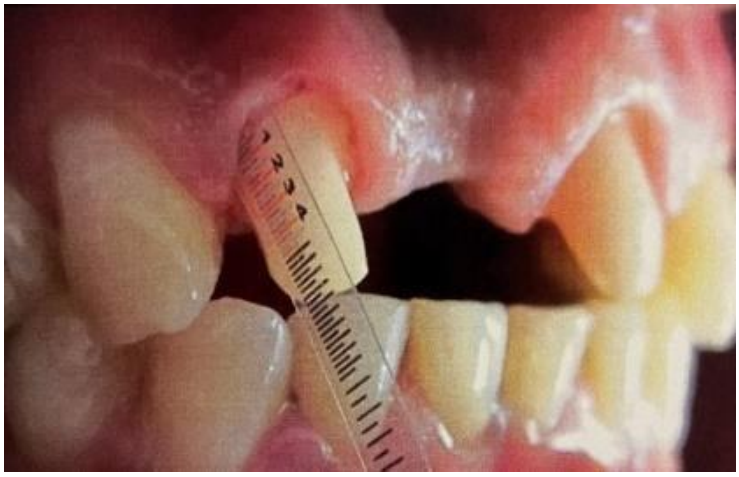

Figure7: sulcus depth at mesio buccal region after retraction with retraction cord

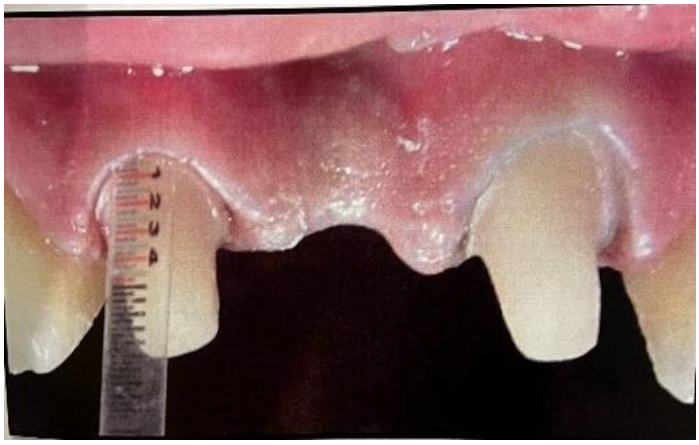

Figure: 8 sulcus depth at mid buccal region after retraction with retraction cord

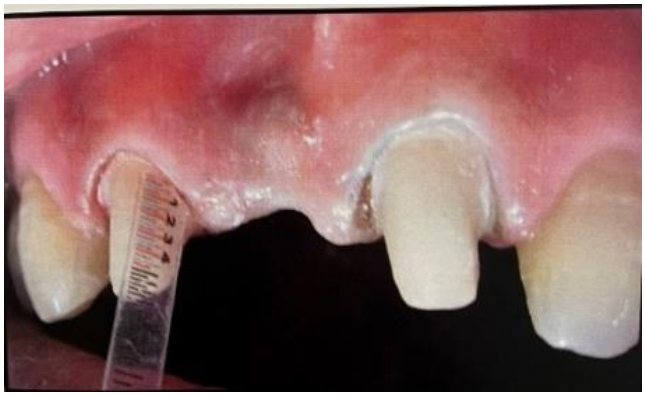

Figure: 9 sulcus depth at mid buccal region after retraction with retraction cord

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Application of Expasyl Retraction System and post retraction reading of one abutment:

With the tip parallel to the long axis of the teeth, the paste was gradually injected into the sulcus at a rate of 2 mm per second. The cannula was handled with care to prevent applying pressure to the gingiva. The paste was applied in a sufficient amount to completely fill the sulcus and achieve a suitable retraction. It is retained in the gingival sulcus depending on the tonicity of gingiva. Using a flexible scale, sulcus depth (mesiobuccal, midbuccal, distobuccal) measurement was done. (Figure 10,11,12).

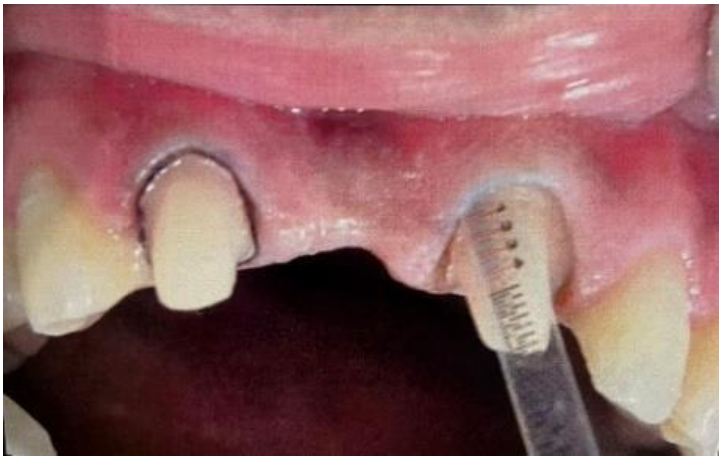

Figure: 10 sulcus depth at mesio buccal region after retraction with Expasyl paste

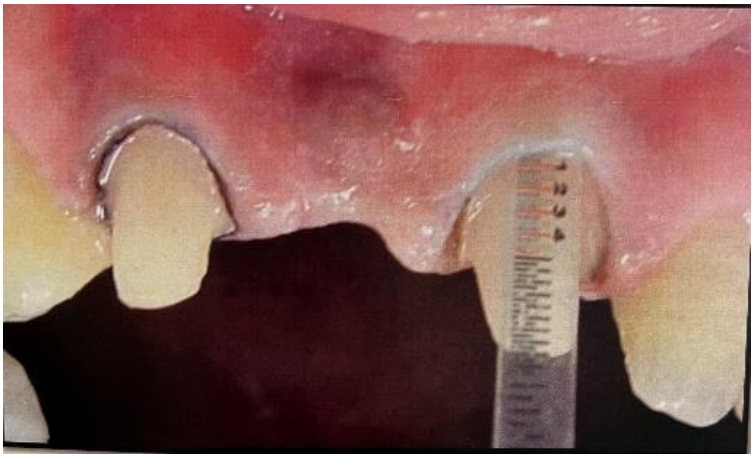

Figure11: sulcus depth at mid buccal region after retraction with Expasyl paste

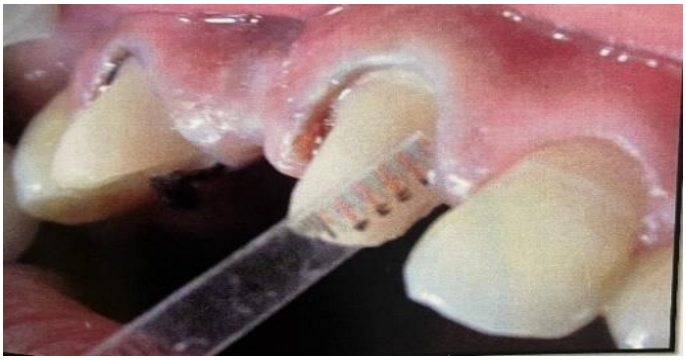

Figure 12: sulcus depth at mid buccal region after retraction with Expasyl paste

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Method for statistical analysis:

The SPSS statistical programme was used to analyse the data (PC version 12.0, SPSS Inc., Chicago, IL).A paired "t" test was used to compare vertical gingival retraction between the Expasyl retraction technique and the medicated retraction cord technique with p value less than 0.05 is considered as significant.

Results: Total 30 subjects were selected for this study. All the subjects having at least one pair of abutment at any one segment intra orally. Abutment in which gingival retraction was done using Expasyl retraction system is considered AE, and Abutment in which retraction was done by using medicated retraction cord is considered as AC.

Table 1 - It shows subjects divided in four age groups along with sex wise distribution of each group. With mean age of 37.77 years (range 22-52 years) who required full coverage restoration with minimum of two abutment teeth.

Table 1: Age and sex distribution of study group.

AGE IN YEARS	SEX		TOTAL
	MALE	FEMALE	
19-28	3 (10.0%)	1 (3.3%)	4 (13.3%)
29-38	0 (0.0%)	15 (50.0%)	15 (50.0%)
39-48	3 (10.0%)	4 (13.3%)	7 (23.3%)
49-58	3 (10.0%)	1 (3.3%)	4 (13.3%)
TOTAL	9 (30.0%)	21 (70.0%)	30 (100.0%)

Table 2: Comparison of mean vertical gingival retraction in each retraction technique.

Technique	Mean ± SD	t-value	p-value	Interference
Expasyl	0.32 ± 0.09	1.175	0.250	Non-significant
Cord	0.30 ± 0.07			

Table 3: Comparison of mean vertical gingival retraction technique at different locations.

Technique	Mean ± SD	t-value	p-value	Interference
Expasyl/ mesio buccal region	0.32 ± 0.15	0.465	0.645	Non significant
Cord/ mesiobuccal region	0.33 ± 0.17			
Expasyl/ mid buccal region	0.32 ± 0.16	1.649	0.110	Non significant
Cord/ midbuccal region	0.27 ± 0.11			

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Expasyl/ disto buccal region	0.33 ± 0.19	0.421	0.667	Non significant
Cord/ disto buccal region	0.31 ± 0.17			

Table 4: comparison of mean vertical gingival retraction in each retraction technique between upper lower anterior and posterior teeth.

Region	Technique	Mean ± SD	t-value	p-value	Interference
Upper	Expasyl	0.36 ± 0.10	1.865	0.089	Non-significant
	Cord	0.31± 0.07			
Lower	Expasyl	0.29±0.08	0.154	0.88	Non-significant
	Cord	0.29±0.06			
Anterior	Expasyl	0.40± 0.11	2.138	0.099	Non significant
	Cord	0.33 ± 0.08			
Posterior	Expasyl	0.33 ± 0.08	0.606	0.550	Non significant
	Cord	0.29±0.06			

Table 2 Expasyl retraction technique was more effective in vertical gingival retraction (mean- 0.32 mm) than medicated retraction cord technique (mean-0.30mm) with a t value at 1.175 and P - value of 0.25 mm.Therefore, even at a 5% level of significance (P > 0.05), which shows that the means are statistically insignificant, the equality of means hypothesis is accepted. Graph 1 also shows these results as a plot.

Table 3 - It shows With the Expasyl retraction technique, the mean vertical gingival retraction at the mesio-buccal location was 0.32 mm, at the mid-buccal location was 0.32 mm, and at the disto-buccal location was 0.33 mm. With the medicated retraction cord technique, the mean vertical gingival retraction at the mesio-buccal location was 0.33 mm, at the mid-buccal location was 0. Therefore, even at a 5% level of significance (P 0.05), which denotes that the means are statistically insignificant, the equality of means hypothesis is accepted. Graph 2 also displays these results as a plot.

Table 4 shows 1) Mean vertical gingival retraction was 0.31 mm in the upper arch and 0.29 mm in the lower arch when using the Expasyl retraction technique and the medicated retraction cord technique, respectively. Expasyl and the medicated cord retraction technique had a t-value of 1.865 and a P value of 0.08 in the upper arch. Therefore, even at a 5% level of significance (P > 0.05), which denotes that the means are statistically insignificant, the equality of means hypothesis is accepted. In the lower arch, the t-value between Expasyl and the medicated cord retraction approach was 0.154, with a P value of 0.88. Therefore, even at the 5% level of significance (P > 0.05), which denotes that the means are statistically insignificant, the equality of means hypothesis is accepted.

2) Mean vertical gingival retraction was 0.33 mm in the anterior arch and 0.29 mm for the posterior arch while using the Expasyl retraction technique and medicated retraction cord technique, respectively. Expasyl and the medicated cord retraction technique had a t-value of 2.138 and a P value of 0.09 in the anterior arch. As a result, even at the 5% level of non-significance (P > 0.05), the equality of means hypothesis is accepted, showing that the means are statistically significant. In the posterior arch, the t-value between Expasyl and the medicated cord retraction approach was 0.606 with a P value of 0.55. Therefore, even at a 5% level of significance (P > 0.05), which signifies that the means are statistically insignificant, the equality of means hypothesis is accepted.

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Discussion:

This study is done to evaluate clinical efficacy of Expasyl and medicated retraction in subgingivally prepared teeth. This is done by evaluating vertical displacement of gingiva Two different retraction systems, knitted cord impregnated with 10% aluminium chloride and Expasyl- cordless paste system as they both come under the category of mechanochemical method of gingival retraction were compared in present study.

The method of gingival tissue retraction most frequently employed is chemically impregnated cords.[11-13]. The use of plain cotton cord, according to Pelzner et al. [14], is contraindicated since it did not effectively control haemorrhage, requiring the need to take new impressions for almost 60% of the impressions.

Dr. Lesagel created and developed a new technique of gingival sulcus dilation for impression making. He used Expasyl, a paste containing kaolin, aluminium chloride 15% and water. Aluminium chloride produces astringent effect and kaolin provides consistency to the paste and results in its mechanic-chemical action. Expasyl is used with controlled pressure in this study to avoid damage to epithelial attachment and to create adequate diplacement.

The most effective and safe method of gingival retraction is said to involve using cord soaked with aluminium chloride (5 to 10%) [15-17]. Roeko, a 10% solution of aluminium chloride, functions as an astringent and hemostatic. It has the ability to extract fluid from tissues, precipitate protein, and constrict blood vessels [18]. Aluminium chloride is soluble in alcohol, water and in glycerine [19]. When used in lower concentrations, aluminium chloride has few side effects and no contraindications [20].

Runyan et al. [19] studied fluid absorbency of retraction cords soaked with solution of aluminium chloride which did not reduce fluid absorbing capacity of the cord. Soaking aluminium chloride solution is a useful technique due to its haemostatic effect.

Shaw et al [21] found that 0.033% aluminium chloride showed no detectable inflammatory response whereas concentrated aluminium chloride (60%) resulted in inflammation that subsided in a span of 14 days. For the present study lower concentration of aluminium chloride was used to avoid any harmful effect to gingival tissue.

The chemical agents show haemostatic effect and also shrinks gingival tissues, gingival tissue is displaced by retraction cord and moisture in the gingival sulcus is absorbed. The interlocking loops of the Ultrapak cord also carry about 2.5 times as much hemostatic fluid as standard cords [22].

Expasyl paste retraction system showed good gingival displacement. by kaolin causing physical displacement due to its viscous consistency, aluminium chloride by its haemostatic effect and crevicular seepage. Other retraction procedures, such as the double cord technique, were not taken into consideration; only the single retraction cord approach was used in every case. The study did not take into account the effect of the gingiva's capacity to distend, its thickness, or the variation in sulcus depth on gingival retraction. Additionally, sulcus depth (soft tissue) was assessed using flexible scales, which may have caused some differences in the results. However, to minimize errors, we have taken good care as team of three persons has verified all the observations which were taken during the study to eliminate subjective errors.

De Gennaro [23] et al., Feng et al. [24] studied the effects of different retraction techniques on the effectiveness of vertical gingival displacement and did not test gingival and periodontal health. Utilization of Ultrapak increased the depth of the probe (about 0.1mm in 1 day and about 0.2mm after 7 days). Such a increase could have clinical significance because it could suggest gingival recession. It can have happened as a result of minor trauma caused on by the impaction of foreign objects (retraction cord) on the gingival tissue. Mechanical methods that directly harm the gingiva frequently result in visible and abrupt changes.

Ruel et al. [25] reported 0.2-0.1mm gingival recession after eight days healing of the junctional epithelium with gingival retraction with cord. According to Yang et al. [26], reported the use of epinephrine-impregnated cord more effective than cordless techniques in gingival recession.

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Conclusion:

The amount of vertical gingival retraction obtained by Expasyl and medicated cord was significantly similar but Expasyl retraction system is not cost effective when compared with cord system. Expasyl retraction system is haemostatic with less time require for application, and easy to place within the limitations of the study. The quantity of horizontal retraction obtained with various retraction systems has to be investigated in more comprehensive studies with a larger sample size.

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