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Comparative evaluation of the effect of parallel incision and diode laser assisted frenectomy on oral hygiene and patients prospective: A randomized clinical trial

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***Abstract*---**Introduction: Aberrant frenum causes various problems in function and aesthetics. The management of abnormal frenal attachment is accomplished by performing the frenectomy procedure. Different techniques for frenectomy were proposed in past literatures. Laser and paralleling technique accounted as conservative method and patients' compliance among the other methods, but the literature regarding the effect of both techniques is scarce. Aim and Objectives: To evaluate either parallel incision or diode laser assisted frenectomy

technique in the maxillary central incisors is efficient for oral hygiene maintenance and patients prospective. Methodology: 30 patients were divided into two equal groups i.e., group 1 (treated with parallel incision frenectomy) and group 2 (treated with laser assisted frenectomy). Plaque index, gingival index, pain and speech difficulty experienced by patients on VAS score, no. of analgesics consumed were evaluated post-operatively at different intervals. Data values were obtained and subjected to statistical analysis. Result and conclusion: The laser assisted frenectomy was good option as in terms of oral hygiene maintenance and patients prospective in comparison to parallel incision frenectomy.

***Keywords*---**comparative evaluation, parallel incision, laser assisted Frenectomy, hygiene.

Introduction

Peace begins with the beautiful smile. Anything which comes in the way to create a smile seeks dental treatment. Abnormal or aberrant frenum is very common and causes various problems in function and aesthetics. Frenum is a fold of mucous membrane, usually with enclosed muscle fibres that attaches the lips and cheeks to the alveolar mucosa and/or gingiva and underlying periosteum.[1] Placek et al (1974) classified frenal attachments as mucosal, gingival, papillary and papilla penetrating.[2] Papillary and papilla penetrating frenum are considered to be pathological/abnormal.[3] This aberrant frenum jeopardise the gingival health when they are attached too closely to the gingival margin, either due to an interference in the plaque control or due to the muscle pull.[4,5] In addition to this maxillary frenum present aesthetic problems or compromise the orthodontic result in the midline diastema cases, thus causing a recurrence after the treatment.[6] The flattened papilla with the frenum closely attached to the gingival margin causes gingival recession and a hindrance in proper placement of tooth brush thereby compromising the oral hygiene maintenance[7] as well as speech difficulty.[8] The management of abnormal frenal attachment is accomplished by performing the frenectomy procedure. Different authors proposed various techniques for frenectomy such as, conventional, electro-cautery assisted frenectomy, diode laser and frenectomy with free gingival graft etc.[9] In recent years diode lasers have gain their popularity in the field of dentistry as an alternative conventional scalpel procedure because they are less invasive, a more relaxed appointment and less post-operative discomfort etc.[10] Abullais et al in 2016 modified the conventional scalpel technique into a more conservative and precise technique to get primary closure during healing called as parallel technique for frenectomy.[11] The laser and paralleling technique for frenectomy have their own advantages and disadvantages, but the literature regarding randomised clinical trial of the effect of diode laser and paralleling technique frenectomy on clinical and patients prospective is scarce. Therefore, the present randomised clinical trial was conducted to comparatively evaluate the effect of parallel incision and diode laser assisted frenectomy on oral hygiene maintenance and patients prospective.

Material and Methods

Patients having maxillary pathological frenal attachment with age range between 18-35 years irrespective of gender, social and religion consideration was considered in the study. A total of 30 patients were selected randomly. They were divided into two groups. In group 1, 15 patients were treated with scalpel assisted parallel incision upper labial frenectomy and in group 2, 15 patients were treated with 940 nm diode laser assisted frenectomy. After taking detail medical, dental history and consent, frenectomy surgery was performed. Patients were recalled after seven days of complete oral prophylaxis for surgical procedure i.e., scalpel assisted parallel incision frenectomy (n=15) and laser assisted frenectomy (n=15). Under strict aseptic conditions, infiltration of 2% local anesthesia lignocaine with adrenaline was injected before parallel incision frenectomy. First parallel incision was made with the help of 11 no. surgical blade 1-2 mm either side of the frenal band starting from the most apical area to the coronal part of its attachment on the interdental papilla till bone with the releasing on both the ends.[11] All attachments and tissue tags were removed and thorough irrigation was done with normal saline. Surgical site was approximated with 4-0 silk suture to get primary healing of the wound.

In laser assisted frenectomy only topical local anesthesia lidocaine (LOX 10%) was applied with soaked gauze pieces for approx. 30-40 seconds prior to surgery. After proper retraction of upper lip, a 400µm, 3-watt power set activated laser tip (white colour) was used to ablate the frenum and its attachment in continuous mode and brushing motion. Intermittent cooling of the operated area was done using saline soaked gauzes. All charred tissues were removed using wet gauzes followed by through irrigation with normal saline. Post-operative instructions were given. Oral hygiene maintenance (plaque index by Turesky et al, 1970 and gingival index by Silness and Loe, 1963) was evaluated at baseline and 1 month post operatively; no. of analgesics consumed if any was evaluated on 1st, 2nd and 3rd day; intensity of pain, discomfort and speech difficulty were evaluated using VAS score on 1st, 7th and 30th day post operatively in both the samples.

Results

Oral hygiene maintenance was recorded by pre and post operative gingival and plaque index. Visual analogue scale was used to evaluate pain, discomfort and speech difficulty. No. of analgesics taken post operatively were also recorded in this study. All values obtained from respective parameters, were entered in standard performa drawn for this study. The value obtained were subjected to statistical analysis. On inter group comparison in plaque index, the mean difference was observed to be statistically significant ($p<0.05$) whereas at 1-month post operatively inter group comparison showed statistically insignificant difference ($p>0.05$). (Graph 1, Table 1) On inter group comparison in gingival index, pre-operatively statistically insignificant difference ($p>0.05$) was found. But 1-month post operatively showed statistically significant difference ($p<0.05$).

Inter group comparison of mean plaque index scores pre and post operatively

Time	Group	Mean	Std. Deviation	t value	p value
Pre - OP	1	1.68	0.50	-5.048	<0.01*
	2	2.64	0.55		
Post - OP	1	1.14	0.49	1.435	.162
	2	0.92	0.36		

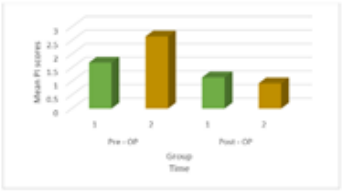


Table 1, Graph 1

Inter group comparison of mean gingival index scores pre and post operatively

Time	Group	Mean	Std. Deviation	t value	p value
Pre - OP	1	3.17	1.27	1.989	.057
	2	2.49	0.38		
Post - OP	1	1.81	0.79	5.066	<0.01*
	2	0.72	0.26		

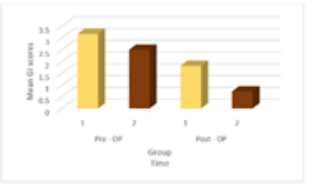
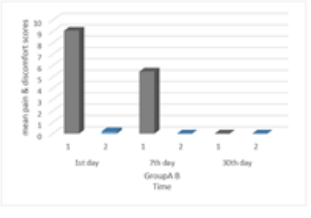


Table 2, Graph 2

On comparing pain, discomfort and speech difficulty statistically significant difference ($p<0.05$) was observed 1st day and 7th day post operatively between group 1 and 2.

Inter group comparison of mean pain & discomfort scores at different time intervals

Time	Group	Mean	Std. Deviation	t value	p value
1st day	1	9.07	0.80	38.167	<0.01*
	2	0.20	0.41		
7th day	1	5.47	0.64	33.085	<0.01*
	2	0.00	0.00		
30th day	1	0.00	.0000a	NA	NA
	2	0.00	.0000a		

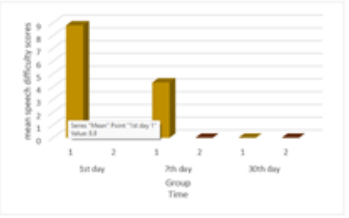


Inter group comparison of mean speech difficulty scores at different time intervals

Table 2 and Graph 2

Inter group comparison of mean speech difficulty scores at different time intervals

Time	Group	Mean	Std. Deviation	t value	p value
1st day	1	8.80	0.94	33.407	<0.01*
	2	0.13	0.35		
7th day	1	4.33	0.62	27.191	<0.01*
	2	0.00	0.00		
30th day	1	0.00	.0000a	NA	NA
	2	0.00	.0000a		



Inter group comparison of mean number of analgesics consumed at different time interval post operatively

Table 2 and Graph 2

But statistical results showed no change at 30 day as there was no mean difference among both the groups. (Graph 3,4 and Table 3,4). In group 1 and 2 the mean difference reduced from 1st day to 7th day to 30th day post-operatively. In group 2, there was marked difference recorded from day 1 to day 7 post-operatively. No. of analgesics taken only by group 1 patients and group 2 patients did not take any medication post operatively.

Discussion

The frenum is one of the very interesting folds of skin or mucous membrane yet often misunderstood anatomical structure in the oral cavity. It is dynamic and changeable structure during different stages of growth and development. The tectolabial frenum of the fetus forms abnormal frenum of the post-natal life.[12] For past years clinicians have concluded that the thick superior labial frenum attached on papilla or papillary penetrating are pathological and can be an

etiological factor for midline diastema.[13,14] To rectify the abnormal frenal attachment frenectomy is advised by different techniques such as Conventional, Electrocautery assisted frenectomy, diode laser, frenectomy with free gingival grafting etc.

This study was conducted to compare the laser assisted frenectomy and parallel frenectomy technique claimed to be better conservative approaches for the frenectomy in terms of oral hygiene maintenance and patients prospective. Microbial dental plaque accumulation and inadequate personal oral hygiene are counted as major risk factors for periodontal diseases and removal of microbial dental plaque is critical for successful periodontal therapy. As the high frenal attachment causes inability to remove plaque causing plaque accumulation, we evaluated oral hygiene using plaque index and the gingival index at baseline and one-month post-operatively.**[15]** On intra group comparison for plaque index, it can be stated that effective plaque removal and reduced plaque accumulation after frenectomy among both the groups. But the plaque index showed insignificant difference between group 1 and group 2, which suggests that frenectomy performed by both the techniques has similar influence on plaque control.

A marked reduction of mean gingival index was observed among patients of both the groups after treatment. Laser assisted frenectomy was more effective with respect to gingival health than parallel incision frenectomy as the mean significant difference was observed between both the groups post-operatively. This may be due to placement of sutures among the patients treated with parallel incision frenectomy which interferes with the plaque removal. In terms of patient's prospective including pain, discomfort, significant reduction was observed after one week but with no pain at one month among parallel incision frenectomy patients (group 1) which was in accordance with study conducted by Abullais[11] et al (2016). We observed that patients treated with diode laser experienced less pain and discomfort when compared to group 1. In group 2 laser assisted frenectomy the decreased pain and discomfort might be ascribed to the protein coagulum formed over the wound which acts like a biological dressing, aids in sealing of the sensory nerves.[10] In the present study, though consumption of analgesics was left to the patient's discretion, analysis among both the groups was done at 1st, 2nd and 3rd day of the frenectomy procedure. None of the patients treated with diode laser (group 2) consumed analgesic post-operatively, whereas patients treated with parallel incision frenectomy consumed analgesics at all the time intervals.

On accordance to our observation, speech difficulty was reduced in both the groups after one month post-operatively, but when both the groups were compared it was noticed that laser assisted frenectomy showed no speech difficulty one day after the surgery but in case of parallel incision frenectomy there was gradual reduction in the speech difficulty from day one to one month post-operatively, this may be the reason due to presence of suture below the lip. In our patients, laser assisted frenectomy was performed under topical local anaesthesia as given in studies by Kafas[16] et. al (2009) and Butchibabu[10] et. al (2014). We observed excellent patient's compliance and satisfaction as the fear of injectable local anaesthesia was eliminated in laser assisted frenectomy. Also, the laser assisted frenectomy was good option as it was time saving for both the operator and the patient. Although the present study evaluated the oral hygiene

maintenance and patients prospective after laser and parallel technique frenectomy more studies are needed to be conducted on large sample size to conclude regarding the same.

Conclusion

The results presented in this study support the use of 940 nm diode lasers in periodontal plastic procedures like frenectomy. This comparative study concludes that diode laser treatment for frenectomy provides good oral hygiene maintenance and better patient prospective in terms of pain, discomfort and speech difficulty compared to parallel incision frenectomy technique. Still further longitudinal studies with larger sample size are needed to establish the exact efficacy of diode laser technique over parallel incision frenectomy technique.

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