



CONVENTIONAL OR DIODE LASER FOR FRENECTOMY – WHICH WAY TO GO?

Dental Science

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ABSTRACT

INTRODUCTION: The presence of an aberrant frenum near the gingival margin, negatively impact the gingival health by interfering with effective plaque removal. Any tension on this frenum tends to pull the gingiva eventually leading to gingival recession and midline diastema. This can lead to fundamental problems in periodontal, orthodontic and prosthetic treatments, hence surgical removal of this aberrant frenum is advocated. Recently, diode laser has been successfully used for the removal of aberrant frenum. Thus, the aim of this study was to compare and evaluate three different techniques of frenectomy.

MATERIALS AND METHODS: 30 patients with aberrant frenum attachment; were allotted to three groups of 10 patients each i.e., GROUP A (Conventional Technique); GROUP B (Diode Laser assisted Technique); GROUP C (combination of Diode Laser assisted using Conventional Technique). The clinical parameters recorded were: Wound healing, Degree of pain and patient's satisfaction levels and number of analgesic taken post-operatively.

RESULTS: No post-operative complications were seen in all the groups. Intergroup comparison shows significant difference between the groups however, in Group C patients better wound healing was observed and also experience lesser pain.

Conclusion: Diode lasers can be desirable adjunctive and alternative to scalpel in terms of early wound healing, reduced operative time and pain perception for correction of frenal anomalies.

KEYWORDS

Frenectomy, Conventional Scalpel Technique, Laser Therapy.

INTRODUCTION

The presence of a midline diastema between the upper central incisors is often considered an esthetic problem. An Aberrant frenum affects the gingival health when it is attached to or near the gingival margin interfering with effective plaque removal, thereby creating a tension on this frenum which further tends to open the sulcus eventually leading to gingival recession and midline diastema. The frenum is an anatomic structure formed by a fold of mucous membrane along with connective tissue fibers that attach the lip and cheeks to the alveolar mucosa and gingiva and the underlying periosteum. In 1974 Placek et al classified four variants types of frenal attachment which are (1) mucosal, (2) gingival (3) papillary and (4) papillary penetrating.^{1,2}

The surgical removal of the unusual frenum is known as frenectomy, which include complete removal of frenum along with its fibrous bony attachment. Patient compliance and bleeding are the risks associated with surgical technique. Several technique has been described in the literature for the removal of these unusual frenum. However, patient are hesitant to undergo the procedure either because of pain, discomfort or presence of excessive blood.³⁻⁵

With the goal of establishing an efficient, safer technique for the removal of frenum with bloodless operative field, lesser pain, laser technique was developed. The first report on Laser therapy was given by **Maiman** in 1960. The leading laser demonstrated by **Robert N. Hall** in 1962 stayed a Diode laser. These are solid-state semiconductor laser that change electro-magnetic energy into heat energy. Certain advantages of laser treatment include hemostasis, increased visualization of the surgical sites, reduced post-operative pain and advance wound healing.^{6,7} The primary objective of this clinical trial is to compare and evaluate the soft tissue wound healing and the secondary objectives includes patient satisfaction and degree of postoperative pain levels following removal of aberrant maxillary labial frenal attachment.

MATERIALS AND METHODS

A randomized control clinical trial was conducted on 30 patients in the age groups 10-45 years with aberrant maxillary labial frenum attachment. Patients were selected from OPD of Department of Periodontology and Oral Implantology, ITS-CDSR. The inclusion criteria was as follows: systemically healthy patients with maxillary papillary or papillary penetrating type frenal attachment, complete

eruption of the upper permanent incisors and the existence of indication for surgical removal of maxillary labial frenulum from orthodontic, prosthetic, periodontal reasons or speech difficulties or aesthetic concern. Exclusion criteria included were: severe chronic systemic diseases, disorders or conditions accompanied with immunodeficiency and autoimmune disorders, smokers, patients who received antibiotics, analgesics or anti-inflammatory agents before the intervention, and patients with oral lesions in the region of interest were not included.

The subject were allotted to three groups with 10 patients each i.e., GROUP A (Conventional Scalpel Frenectomy Technique; Archer 1961 and Kruger 1964); GROUP B (Diode Laser assisted Frenectomy Technique); GROUP C (combination of Diode Laser assisted Frenectomy using Conventional Technique). Biolase epicX soft tissue diode laser (InGaAsP Semi-conductor diode, wavelength 940nm ± 10nm) was used for the laser groups.

The clinical parameters recorded were Wound healing^{8,9} (Grade 1-complete epithelization, Grade 2- Incomplete epithelization, Grade 3-Ulcer formation, Grade 4- presence of tissue defect or necrosis) on 7th, 15th and 30th day; Degree of pain levels - measured using VAS Scale and Analgesic taken post-operatively on 1st, 3rd and 7th day. The subjects were asked to rate the degree of pain during eating or speech, on a 10cm horizontal visual analog scale (VAS) by placing a vertical mark to assess position between the two endpoints. The left end point was nominated as "no pain," and the right end point was nominated as "worst pain." Patient satisfaction level were also recorded. In order to minimize the variation, all the technique were performed by a single operator and the clinical parameters were recorded by another periodontist.

CONVENTIONAL SCALPEL TECHNIQUE (Figure: 1)

For the conventional classical technique (Archer 1961 and Kruger 1964). The area was anesthetized using local anaesthesia (LOX 2% adrenaline). The frenum was held with a pair of hemostats and was inserted to the deepest depth of vestibule. Horizontal incision were made to separate the attached fibers with gradually blending of vestibular tissue placed on the upper and the under surface of the hemostat until the hemostat was free and the whole band of tissue along with its alveolar attachment was excised by using a no #15 Bard Parker blade. After removal of any remaining fibrous adhesions to the

underlying periosteum, the edges of the diamond shaped wound were closed with 4-0 silk interrupted sutures. The surgical site was then covered by using periodontal dressing (COE-PAK, GC American Inc., IL, and USA).



Figure 1: Group - A

LASERASSISTED (Figure: 2)

The area was anesthetized using local anaesthesia (LOX 2% adrenaline). The diode laser at power setting of 1.2 W fiber tip was used in a contact mode holding in perpendicular or oblique direction to the frenum and moved, in a brush stroke, from the base to the apex of the frenum. The incision was started with the frenum from the attached gingiva and interdental papilla on the labial surface between the central incisors extending to the depth of vestibule ending in a rhomboidal area, separating the fibers from the periosteum. Any remnant fibers over the periosteum was removed by gently sweeping the laser tip and was cleaned with gauze soaked in normal saline. The area was covered using periodontal dressing (COE-PAK, GC American Inc., USA).



Figure 2: Group - B

COMBINATION OF LASER ASSISTED FRENECTOMY USING CONVENTIONAL TECHNIQUE (Figure: 3)

The area was anesthetized using local anaesthesia (LOX 2% Adrenaline). The frenum was held with a pair of hemostats and was inserted to deepest depth of the vestibule. Horizontal incision were made using diode laser at power setting of 1.2 W fiber tip in a contact mode and incision was started to separate the attached fibers with gradually blending of vestibular tissue placed on the upper and the under surface of the hemostat until the hemostat was free and the whole band of tissue together with its alveolar attachment was excised. Any remnant fiber over the periosteum was removed by gently sweeping the laser tip and was cleaned with gauze soaked in normal saline. The area was covered with a periodontal dressing (COE-PAK, GC American Inc., USA).



Figure 3: Group - C

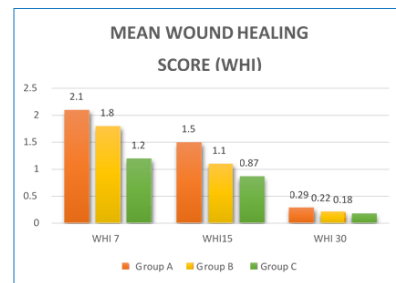
All the group received postoperative instructions. Proper oral hygiene instruction was given. Analgesic (Tab Paracetamol 500mg) was prescribed and advised to use if required. Telephone follow-up monitoring was done to attend any complain and discomfort regarding the surgical procedures.

STATISTICAL ANALYSIS

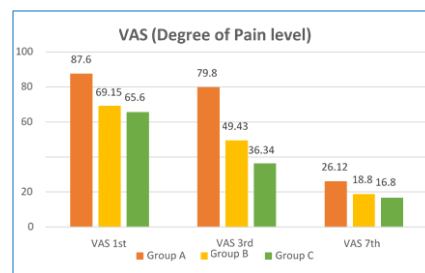
Statistical analysis was performed using IBM SPSS Inc. Version 20.0. The statistical significance of data for wound healing; pain and discomfort scores between the groups was determined by the paired t-test. Nonparametric tests were chosen for continuous variables because the data were not distributed normally. Comparisons between groups were applied using the Mann-Whitney U-test. P < 0.05 was considered significant.

RESULTS

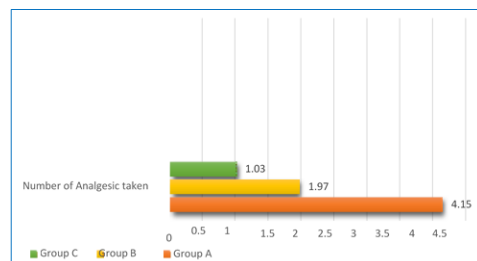
A total of 30 subjects were enrolled in the study and all of them have completed the follow-up on time. On intergroup comparison, analysis showed that there was a significant difference in the mean Wound Healing in all the three groups at 7th and 15th day, with Group C showing better healing of the wound, however on 30th day no significant difference was observed (Graph:1). On intragroup comparison of the mean difference for all the three groups, significant difference in wound healing was observed from 7th day to 15th day, 15th day to 30th day and 7th day to 30th day respectively. On intergroup comparison of the mean VAS score (degree of pain), Group C showed minimum pain and discomfort compared to the Group A and Group B on the 1st day and 3rd. day post-operative, however on the 7th day there was no significant difference in all the three groups (Graph: 2). Patients who were treated with Group C technique, reported of taking less analgesic when compared to that of Group A and Group B (Graph: 3). Patient's satisfaction data (on 1st, 3rd. and 7th days postoperatively) is illustrated and observed that the patients treated with Group C technique were more satisfied as compared to the other groups (Graph: 4).



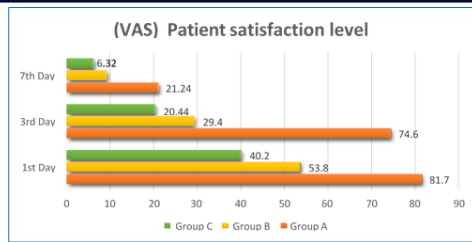
Graph 1: Mean difference of Wound healing score between Groups



Graph 2: Mean difference of Degree of pain between Groups.



Graph 3: Mean difference of Number of analgesic consume by the patients between Groups.



Graph 4: Mean difference of Patient satisfaction level between Groups

DISCUSSION

In this era of periodontal plastic surgery, techniques should be more conservative and specific to create more functional and aesthetic results. Patients who undergo conventional scalpel frenectomy procedures often experience postsurgical pain and discomfort. Lasers in dentistry bring a new perspective concerning the therapeutic approaches with better clinical outcomes. The Laser in dentistry are mainly used for incision, hemostasis, coagulation, and biostimulation. Lasers have shown to reduce inflammatory mediators, facilitate collagen synthesis, angiogenesis and stimulate the release of growth factors. There are however conflicting reports on the use of lasers as an adjunct to the surgical as well as nonsurgical treatment, with several systematic reviews showing no additional advantage.^{10,11}

In the present study 30 patients were selected and randomly divided into three groups i.e. Group A-Conventional Frenectomy technique, Group B- Diode Laser assisted Frenectomy technique and Group C-combination of Diode Laser and conventional Frenectomy technique. In our study, Group C had better wound healing, significantly less postoperative pain on 1st, 3rd and 7th days as compared to Group A and Group B procedures. Number of analgesics used were also lower in Group C. Aldelaimi et al¹², Haytac et al¹³ and Butchibabu et al¹⁴ suggested that soft tissue laser treatment used for frenectomy procedures provides better wound healing, less postoperative pain, higher satisfaction level than that obtained by the conventional technique. Awooda et al¹⁵ in their study observed a bloodless field during the surgery with no post-operative swelling or discomfort. According to the Medeiros et al¹⁶, using laser Frenectomy procedures, the need for suturing are eliminated and there is reduced bleeding as a result of the effect of hemostasis in the small superficial vessels, however, no statistically significant difference between laser treatment and conventional procedure in term of post-operative pain and functional recovery was observed. Patel et al¹⁷ in their study, found that subject treated with the diode laser had significantly less postoperative pain both on day 1 and day 7 and the number of analgesics used was lower in the laser group but the healing of laser wounds after the 7th day and 1 month was found to be delayed as compared to conventional scalpel wound.

In the present study, subjects treated with the combination of diode laser with conventional frenectomy technique showed significantly better wound healing, less bleeding and better patient's satisfaction than conventional scalpel frenectomy technique or Diode laser assisted frenectomy alone. It was also observed that conventional frenectomy technique and laser technique alone showed larger and deeper extend of wound and also leads to the scarring in the midline after wound healing. However in the laser assisted conventional scalpel frenectomy technique, a smaller diamond shaped wound was cut with deeper removal of the fibrous attachment and no scar formation was seen after healing of the wound

CONCLUSION

According to the present clinical study, all three methods can be used successfully to treat abnormal frenal attachment. As with conventional frenectomy technique, there was more intra-operative bleeding, delayed wound healing and post-operative pain. Diode Lasers combined with conventional technique provide better patient perception in terms of early wound healing, reduced operative time, pain, and discomfort than laser technique alone. Taking into consideration, the diode laser is a dependable alternative as it is an efficient, secure, and satisfactory option for soft tissue surgeries like Frenectomy.

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