

Original Research

Management Of The Upper Labial Frenum: A Comparison Of Conventional Surgical And Lasers On The Basis Of Visual Analogue Scale On Patients Perception

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ABSTRACT:

Background: A frenum that encroaches on the margin of the gingiva may interfere with plaque removal and cause tension.

Frenectomy is the complete removal of the frenum that can be made by scalpels or with soft tissue lasers. The aim of this article was to compare the degree of postoperative pain, such as discomfort and functional complications (eating and speech), experienced by patients after two frenectomy operation techniques.

Methods: Sixteen patients requiring frenectomy were randomly assigned to have treatment either with a conventional technique or with a diode laser. The

postoperative pain and functional complication ratings of each patient were recorded using a visual analogue scale on days 1 and 7.

Results: The results indicated patients treated with the diode laser had less postoperative pain and fewer functional complications ($P < 0.0001$ each) and required fewer analgesics ($P < 0.001$) compared to patients treated with the conventional scalpel technique.

Conclusions: This clinical study indicates that diode laser treatment used for frenectomy operations provides better patient perception in terms of postoperative pain and function than that obtained by the

scalpel technique.

KEYWORDS: Frenectomy, Lasers, diode lasers, conventional technique, visual analogue scale

INTRODUCTION:

The word frenum is derived from the Latin word “*fraenum*”. Frena, are triangle-shaped folds found in the maxillary and mandibular alveolar mucosa, and are located between the central incisors and canine premolar area.

The upper labial frenum is a normal anatomic structure in the oral cavity. The upper labial frenum is an oral mucosal membrane extending from the internal surface of the upper lip to its insertion on the midline of the attached inter-incisal gingival tissue of the upper maxilla. When the insertion point of the frena is at the gingival margin it may pose a problem (Corn 1964). This kind of abnormal insertion of the frenum may cause marginal recession of the gingiva. Abnormal frenal insertion can distend and retract the marginal gingiva or papilla away from the tooth when the lip is stretched. A frenum that encroaches on the margin of the gingiva may interfere with plaque removal, and tension on this frenum may tend to open the sulcus.^[1]

The terms frenectomy and frenotomy signify operations that differ in degree of surgical approach. Frenectomy is a complete removal of the frenum, including its attachment to the underlying bone, and may be required for correction of abnormal diastema between maxillary central incisors (Friedman 1957). Frenotomy is the incision and relocation of the frenal attachment.^[2]

INDICATIONS

The frenum is characterized as pathogenic and is

indicated for removal when:

An aberrant frenal attachment is present, which causes a midline diastema.

A flattened papilla with the frenum closely attached to the gingival margin is present, which causes a gingival recession and a hindrance in maintaining the oral hygiene.

An aberrant frenum with an inadequately attached gingiva and a shallow vestibule is seen.

The aberrant frena can be treated by *frenectomy* or by *frenotomy* procedures. *Frenectomy* is the complete removal of the frenum, including its attachment to the underlying bone, while *frenotomy* is the incision and the relocation of the frenal attachment.^[2]

Frenectomy can be accomplished either by the routine scalpel technique, electrosurgery or by using lasers. The conventional technique involves excision of the frenum by using a scalpel. However, it carries the routine risks of surgery like bleeding and patient compliance.

The use of electro surgery and lasers has also been proposed for frenectomy.^[3-8] Researchers have advocated the use of an electrocautery probe due to its efficacy and due to the safety of the procedure, the mild bleeding and the absence of postoperative complications. However, it is associated with certain complications which include burns, the risk of an explosion if combustible gases are used, interference with pacemakers and the production of surgical smoke. These complications have not been reported with the new improvement in the electro surgical techniques, like the Argon Beam Coagulation (ABC).^[3,4]

Recently, the use of a CO₂ laser in lingual frenectomies has been reported as a safe and

effective procedure with the advantages of a shorter duration of the surgery, simplicity of the procedure, the absence of postoperative infections, lesser pain, swelling and the presence of a small or no scar.^[3] A delayed healing as compared to that in the conventional scalpel techniques, a reduced surgical precision which results in an inadvertent laser-induced thermal necrosis and/or a photo acoustic injury, are some of the complications which are associated with lasers. The application of diode and Er:YAG lasers in labial frenectomies in infants^[5] and Er,Cr:YSGG lasers^[6] in labial frenectomies in the adolescent and the pre-pubescent populations have also been reported.

AIM

The aim of this study was to compare the effects of the DIODE laser and the conventional technique on the degree of postoperative pain experienced by patients after frenectomy operation.

MATERIALS AND METHODS

TYPE OF STUDY SUBJECT:

For this proposed study, subjects with abnormal frenal attachment in the maxillary anterior region were selected from the Out Patient Department of Periodontics, Swami Devi Dyal Hospital and Dental College, Barwala (Panchkula) Haryana,

India.

INCLUSION CRITERIA:

- Subjects within age group of 18 to 26 years.
- Good oral hygiene at the time of the surgery.
- Only maxillary anterior frena were included in this study.
- All subjects were systemically healthy

STUDY DESIGN:

A total of 16 subjects were selected, and divided into two groups randomly, Group A and Group B

Group A: 8 subjects were treated with conventional surgical technique. (As shown in Fig: 1,2,3,4)

Group B: 8 subjects were treated with laser technique. (As shown in Fig: 5, 6,7,8)

CONVENTIONAL SURIGAL TECHNIQUE:

The classical technique was introduced by Archer (1961) and Kruger (1964). For the conventional technique, the frenum was held with a pair of hemostats, and the whole band of tissue together with its alveolar attachment was excised with a #15 blade. After freeing any fibrous adhesions to the underlying periosteum, the wound was closed with sutures. The area was covered with a periodontal pack. The pack and the sutures were removed 1 week post-operatively.



•Fig 1: patient presenting with midline frenum



•Fig 2: intra operative



•Fig 3: Immediately after a frenectomy operation performed using scalpel technique with sutures in place.



Fig 4: post operative after 1 week.

FRENECTOMY WITH DIODE LASER:

- A DIODE surgical laser unit with a flexible hollow fiber delivery system and a non-contact, air-cooling hand-piece was used as the alternative frenectomy operation. Again the frenum was held with hemostats, and the non-contact focused beam at repeated super pulse mode (7 W, 0.8-mm spot size, 20 Hz, and 10 milliseconds) was applied for excision. The beam was also used to remove any adhesions to the periosteum, and the remnants of the ablated tissue were removed using sterile gauze dampened with saline. No sutures were placed after diode laser treatment.



Fig 5: patient presenting midline maxillary frenum.



•Fig 6: Intra operative



Fig 7: Immediately after frenectomy procedure with LASER.



Fig 8: After 1 week.

METHOD OF SCORING:

- The patients were asked to separately rate degree of pain on Visual Analogue Scale (VAS) by placing a vertical mark to assess position between the two endpoints as shown in Fig 8.
- The left endpoint of the pain scale was designated as "no pain," and the right endpoint was marked as "worst pain imaginable."

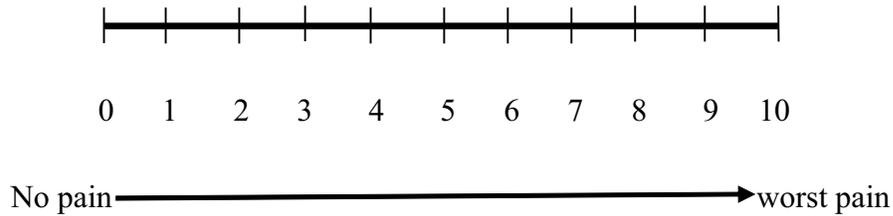


Fig 8: VAS scale

- The patients were asked to mark the position between the two endpoints that best described their personal perception of the degree of pain they had experienced on postoperative days 1 and 7. All patients were instructed to use the same analgesic containing paracetamol if needed, and they were also compared for their need of analgesics after the two techniques. Statistical analysis was done using Statistical Package for Social Sciences (SPSS) version 15.0. Mean difference in VAS scores of two groups was ordinal in nature and hence was

evaluated using Mann-Whitney U test whereas mean difference in analgesic use was evaluated using Independent Samples “t” test (Student “t”-test). The confidence level of the study was kept at 95%, hence a “p” value less than 0.05 indicated a statistically significant inter group difference.

RESULTS:

Results of the study are summarized in Table 1 and Figure 9.

TABLE 1: MEAN scores of patient perceptions after conventional and laser techniques.

	Group	N	Mean+/-SD	Statistical Significance
VAS on day 1	Scalpel	8	5.80+/-1.92	p=0.046 (S) ^a
	Laser	8	3.00+/-1.58	
VAS on day 7	Scalpel	8	3.60+/-2.30	p=0.138 (NS) ^a
	Laser	8	1.60+/-0.89	
No. of Analgesic tablets used	Scalpel	8	2.20+/-1.92	p=0.227 ^b
	Laser	8	1.00+/-0.71	

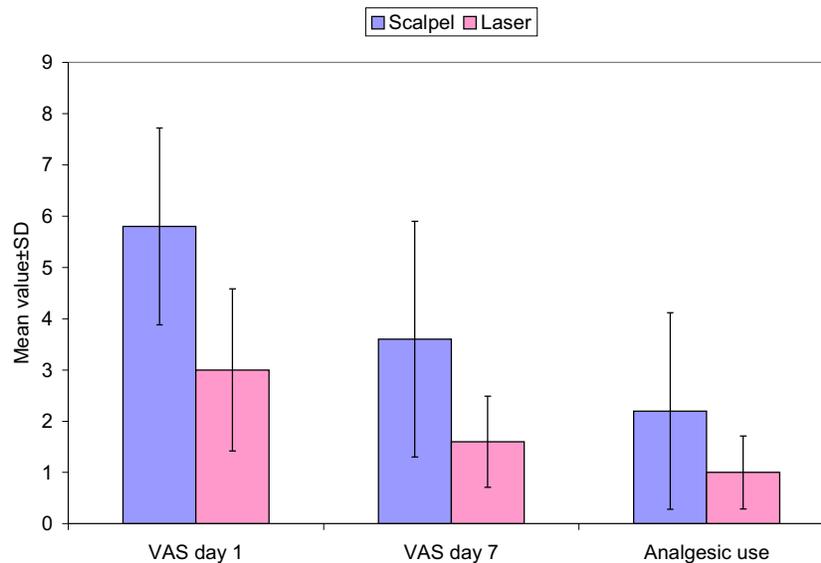


Fig 9: Comparison of the Scores of Postoperative Patient Perceptions after Conventional and DIODE Laser Techniques.

All 16 patients completed the study. Healing in cases treated with either conventional scalpel technique or LASERS was uneventful. Table 1 show the VAS scores of patient perceptions after conventional and laser techniques on both day 1 and day 7 and number of analgesic tablet used in these 7 days.

The study revealed, mean VAS score (both at day 1 and day 7) as well as number of analgesic tablets used was lower in Laser group as compared to Scalpel group, however, the difference between two groups was found to be significant only for VAS score at day 1 ($p=0.046$).

DISCUSSION:

The aim of this study was to compare the postoperative subjective effects of DIODE laser and conventional techniques after frenectomy surgery. The DIODE laser is now a viable alternative to the scalpel in soft tissue surgery. Because oral tissues are composed of >90% water, and considering the affinity of the DIODE laser for wet tissue, it is readily applicable for most intraoral soft tissue surgery, including frenectomies.^[10-15, 17-20] However, there are very few studies comparing the postoperative effects of laser and conventional techniques, which can justify the use of lasers

for intraoral soft tissue surgery.^[14,22-26]

In our study, patients treated with the DIODE laser had significantly less postoperative pain both on day 1 and day 7 compared to scalpel surgery as well as number of analgesics used was lower in Laser group.

Classically, a frenectomy procedure involves grasping the frenum with hemostats, incising above and below the hemostats, creating a large triangular-shaped wound, often with copious bleeding, and placing sutures. Patients often experience post-surgical bleeding and pain, and sutures can further increase bleeding and pain when they come into contact with food.

In addition, suture removal from gingival and labial tissues after 1 week can be painful because the sutures may be buried in the mucosa.^[9-11] To overcome these disadvantages, some clinicians use bioabsorbable sutures after oral surgery.

On the other hand, the laser technique offers some advantages, such as a relatively bloodless surgical and post-surgical event; the ability to precisely coagulate, vaporize, or cut tissue; sterilization of the wound site; minimal swelling and scarring; no suturing in most cases; little mechanical trauma; reduction of surgical time; decreased post-surgical

pain; and high patient acceptance.^[13,14,23-28] There is abundant evidence confirming markedly less bleeding particularly of highly vascular oral tissues, with laser surgery.^[24] Some reports suggest that laser-created wounds heal more quickly and produce less scar tissue than conventional scalpel surgery,^[25] although contrary evidence also exists.^[28-30] Postoperative pain from oral and otolaryngological surgical procedures has been claimed to be reduced in laser surgery.^[16, 26] It is theorized that this may be due to the protein coagulum that is formed on the wound surface, thereby acting as a biologic dressing and sealing the ends of the sensory nerves.^[16,25]

CONCLUSION:

To conclude with, the data of the present study with results showing significant P-value but for the VAS score at day 1 ($p=0.046$) than day 7, it suggests that certainly the postsurgical pain with conventional surgical procedure was significant on day 1 as compared with that of the use of the DIODE LASER. Hence the DIODE LASER procedure would always be more accepted Frenectomy procedure with minimal pain by the patients than the conventional one, even though considering the other advantages offered by the LASER technique like it may be relatively bloodless.

While comparing the two procedures, if both the procedures can be performed on two different locations or sites in the oral cavity of the same patient, that might be more informative or to conclude a significant VAS score. Further comparative studies are required for better understanding of the patient perception with respect to the other procedures involved like the routine scalpel technique, electro-surgery or by using lasers and remains to be elucidated.

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