

ORIGINAL RESEARCH

Comparative study of the Frenectomy Procedures Using Eryag Laser Versus The Conventional Scalpel Technique

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ABSTRACT

Aim- The aim of the study was to compare the outcomes of frenectomy procedures performed using Er:YAG laser technology versus the conventional scalpel technique.

Materials and Methods- The study aimed to compare the outcomes of frenectomy procedures using Er:YAG laser technology versus the conventional scalpel technique in patients aged 7.5 to 20 years. Data analysis was performed using SPSS software.

Results- The distance between the frenum attachment and papilla increased over time, with no significant difference between the conventional scalpel and laser groups at both time points.

Conclusion- Laser surgery in frenectomy procedures offers the advantages of being quicker and resulting in reduced bleeding, making it a favourable option for performing frenectomies.

Keywords- Laser, Frenectomy, Scalpel

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INTRODUCTION

Frenectomy involves the complete removal of the frenulum, including its attachments to the underlying alveolar process. Any abnormalities in the size and location of the frenulum can cause functional and esthetic problems which requires surgical excision.¹ The most common location for the development of frenum abnormalities are maxillary and mandibular central incisors and canine and premolar areas.² These abnormalities can result in gingival recession, development of midline diastema, and speech difficulties. Blanch test is the most commonly used method for the diagnosis of high frenum attachment.³ Labial frenectomy is a surgical procedure aimed to remove the frenulum along with its attachment to the underlying bone when necessary. It is indicated in cases where the frenulum attachment causes issues such as midline diastema, gingival recession, hindrance in maintaining oral hygiene, interference with lip movements, or for prosthetic needs.^{4, 5}

Various techniques can be used for labial frenectomy, such as the routine scalpel technique, electrocautery, and medical lasers including Nd:YAG, diode, CO₂,

Er:YAG, and Er, Cr:YSGG lasers. While the scalpel technique carries risks like bleeding and patient compliance, medical lasers provide excellent haemostasis, limited tissue damage, reduced scarring, less pain, and edema, leading to greater postoperative comfort.⁶ Medical lasers interact selectively and precisely with the injured tissue, making them valuable in oral surgery for procedures like gingivectomies, frenectomies, operculum removal, and benign lesion biopsies.⁷ The aim of the study was to compare the outcomes of frenectomy procedures performed using Er:YAG laser technology versus the conventional scalpel technique.

MATERIALS AND METHODS

The study aimed to compare the outcomes of frenectomy procedures using Er:YAG laser technology versus the conventional scalpel technique in patients aged 7.5 to 20 years. Exclusion criteria comprised severe general diseases, requirement for general anesthesia, and smoking. A randomization procedure using envelopes allocated patients to either the conventional scalpel group or the Er:YAG laser group. Before treatment, patients underwent a pre-

treatment procedure involving clinical examination, health history assessment, radiographs, and photography. Local anesthesia was administered, and the surgery was performed by the main researcher. The Er:YAG laser or scalpel technique was used, and surgical parameters were recorded. Post-treatment care instructions were provided to patients.

Patients were evaluated at 7 days, 14 days, and 2 months post-surgery. Wound healing, patient experiences, and outcomes were assessed during follow-up visits. Data on patient perceptions, bleeding

during surgery, and wound area were collected. Data analysis was performed using SPSS software.

RESULTS

Out of 40 patients invited to participate in the study, 30 met the inclusion criteria and were consecutively included after exclusions. The participants were then randomly assigned to either the conventional surgery group or the laser surgery group, with 15 patients in each group.

Table 1- Duration of the surgery, bleeding during the surgery, distance between frenum attachment and the highest point of the papilla, size of the midline diastema at surgery (Day 0) and after two months

Variable	Conventional surgery mean	Laser surgery mean	P value
Duration of surgery (s)	509.21	312.83	<0.002
Bleeding during surgery (ml)	1121	363	0.030
Distance frenum attachment—papilla (mm)			
0 days	1.89	1.27	
2 months	7.02	6.66	
Difference	5.13	5.39	0.056
Diastema (mm)			
0 days	2.56	2.12	
2 months	1.58	1.81	
Difference	-0.98	-0.31	0.012

Table 1 summarizes the findings related to the distance between the frenum attachment and the highest point of the papilla, as well as the size of midline diastema before treatment and at the 2-month follow-up. The distance between the frenum attachment and papilla increased over time, with no significant difference between the conventional scalpel and laser groups at both time points. The mean reduction in midline diastema was 0.98 mm in the conventional group and 0.31 mm in the laser group, with no statistically significant difference.

DISCUSSION

The type of attachment and the extent of the labial frenulum can help determine suitable cases for prophylactic frenectomy, especially when functional problems are present and are associated with pathologically modified midline interdental papillae.⁷ Traditional scalpel frenectomy, while commonly used, is known to be associated with postoperative pain and discomfort, requiring sutures that may result in increased patient discomfort and potential complications.⁸

In contrast, laser surgery presents a beneficial alternative to scalpel frenectomy. Laser treatment typically eliminates the need for sutures in most cases, leading to reduced surgical time, less postoperative pain, and discomfort, ultimately enhancing patient acceptance. The use of lasers in dental surgery has been widely recognized as an effective approach to minimize patient discomfort during and after surgical interventions, making it a favourable option for procedures like frenectomy.⁹

In our study it was seen that the distance between the frenum attachment and papilla increased over time, with no significant difference between the conventional scalpel and laser groups at both time points. The mean reduction in midline diastema was 0.98 mm in the conventional group and 0.31 mm in the laser group, with no statistically significant difference. Patients reported overall satisfaction with the surgical treatment, regardless of the method used, and did not find the experience to be notably unpleasant or painful. This finding contrasts with previous studies, such as those by Cervetto et al.,¹⁰ which indicated that patients experienced less discomfort following frenectomy procedures performed with laser surgery.

The use of laser technique consistently resulted in lower levels of bleeding during surgery compared to traditional surgical methods. This difference was observed in terms of both the average amount of bleeding and the frequency of bleeding among patients.^{11,12} The reduced bleeding associated with laser surgery can be attributed to the high-temperature coagulation of soft tissue proteins, which leads to decreased bleeding at the margins of the treated tissue. Additionally, the high temperatures from the laser can cause the blood vessel walls to narrow, promoting photothermal coagulation and further reducing bleeding.^{13, 14} Abullais SSet al evaluate patient's response to two different frenectomy technique, and oral hygiene maintenance before and after frenectomy. Twenty patients with high labial frenum were randomly selected from the outpatient department. Patients were divided into two groups according to the technique used. Each group

contained ten patients. One group was treated by “conventional scalpel technique” and other group by “new paralleling technique”. To evaluate patients response, visual analogue scale for pain and speech were taken at first postoperative day, 1-week and 1-month. In other part of the study the oral hygiene maintenance was evaluated by using plaque and gingival bleeding index at baseline before frenectomy, 1-week and 1-month after frenectomy. Results showed that new paralleling technique for frenectomy causes less postoperative discomfort and also there was significant improvement in the oral hygiene maintenance by the patient after frenectomy. High maxillary frenum causes hindrance in oral hygiene maintenance. Paralleling technique for frenectomy causes less discomfort to the patient during healing phase when compared with the conventional technique.¹⁵

CONCLUSION

Laser surgery in frenectomy procedures offers the advantages of being quicker and resulting in reduced bleeding, making it a favourable option for performing frenectomies.

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