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Frenectomy- An Overview of Surgical Techniques: Case Series

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Abstract

Frenum is a fold of mucous membrane, usually with enclosed muscle fibers that attaches the lips and cheeks to the alveolar mucosa and/or gingiva and underlying periosteum. According to Miller, the frenum should be characterized as pathogenic when it is unusually wide or there is no apparent zone of attached gingiva along the midline or the interdental papilla shifts when the frenum is extended. The management of abnormal frenum includes frenectomy or frenotomy. Electrocautery and lasers are currently becoming popular in the field of Periodontology and provide alternatives to conventional scalpel procedures. In recent years, lasers such as CO_2, Neodymium doped yttrium aluminium garnet, Erbium-doped yttrium aluminium garnet, and diode have been used for frenectomy. Therefore, a compilation of three cases is made, providing a brief overview about the frenum, with a focus on indications, contraindications, advantages and disadvantages of frenectomy procedures using conventional technique, electrocautery and diode laser.

Keywords: Fold, Mucous, Membrane, Electrocautery, Diode

Introduction

The frenum or frenulum is a mucous membrane fold that attaches the lip and the cheek to the alveolar mucosa, the gingiva, and the underlying periosteum.[1]

Placek *et al.*(1974)[2] have classified frenum depending on the extension of attachment of fibers, (1) Mucosal: when the frenal fibers are attached up to mucogingival junction, (2) Gingival: when fibers are inserted within attached gingiva, (3) Papillary: when fibers are extending into interdental papilla, and (4) Papilla penetrating: when the frenal fibers cross the alveolar process and extend up to palatine papilla.

According to Miller,[3] the frenum should be characterized as pathogenic when it is unusually wide or there is no apparent zone of attached gingiva along the midline or the interdental papilla shifts when the frenum is extended. These pathogenic frenum can lead to midline diastema, gingival recession, interference with retention of denture, and compromised gingival health because of poor plaque control. The management of such abnormal frenum includes frenectomy or frenotomy.

Frenum is categorized in two for maxillary and mandibular. Frenectomy involves the complete removal of the frenulum, including its attachment 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.[4] The most common location for the development of frenum abnormalities are maxillary and mandibular central incisors and canine and premolar areas.[5] 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.[6] It involves application of tension over the frenum by pulling it and visually detecting the movement of papillary tip or any blanching produced. Various methods have been used for surgical excision of frenum including scalpel, electro cautery, and most recently lasers such as CO2, erbium (Er): yttrium aluminum garnet (YAG), and neodymium-doped YAG (Nd:YAG).[7] Choice of the method depends on the efficiency, effectiveness, and affordability.

The conventional technique comprises excision of the frenum by using a scalpel. Conversely, it carries the routine risks of surgery like bleeding and patient compliance with favourable healing.

Electrosurgery has been used since 1928 in dentistry for soft tissue procedures. The main advantage of the electrocautery is the coagulative effect that provides bloodless area and clear view of the operative field. Electrocautery creates thermal energy to cut or ablate tissue, heat may be dissipated by diffusion into adjacent tissues (conduction), or into the circulating blood (convection). The resulting lateral thermal injury to tissues may result in delayed healing and increased risk of wound dehiscence.[8][9]

The role of laser in dentistry has been well-established in traditional management of oral diseases.[10] The leading laser was first demonstrated by Robert N. Hall in 1962 (a diode laser), which is a solid-state semiconductor laser that classically uses a combination of Gallium (Ga), Arsenide (Ar), and supplementary elements, such as Aluminium (Al) and Indium (In), to change electro-magnetic energy into heat. The conversion of electromagnetic energy to heat effects in target tissue can only be deemed predictable if unwanted change through conductive thermal spread is prevented. Thermal relaxation rates are proportional to the area of tissue exposed and inversely proportional to the absorption coefficient of the tissues. It is usually operated in contact mode by means of a flexible fibre optic delivery system that emits in continuous- wave or gated-chopped modes.[11] Diode lasers are highly absorbable by melanin and haemoglobin allows soft-tissue manipulations such as gingival recontouring, operculectomy, or frenectomy

accompanied by improved epithelization and wound healing Diode laser with the wavelength of 980nm has been used for the surgical management of soft tissues, such as incisional and excisional biopsies, ulcer treatment, gingivectomies, and frenectomy. It provides the advantage of good hemostasis and postoperative comfort [12]. These advantages of diode laser are well documented in literature, but there are a very few studies which compared this laser technique with the conventional method for frenectomy.

Therefore, a compilation of three cases is made, providing a brief overview about the frenum, with a focus on indications, contraindications, advantages and disadvantages of frenectomy procedures using conventional technique, electrocautery and diode laser.

Case Reports

Case I: A 36-year-old male patient undergoing fixed orthodontic treatment for spacing in the maxillary anterior teeth was referred for the evaluation of maxillary labial frenum. On intraoral examination, Angles class I molar relation was diagnosed along with midline diastema and presence of papillary type of frenal attachment. Also, the labial frenum was thick and wide [Figure 1]. So, according to first school of thought, the patient was advised for frenectomy. After detailed explanation of procedure, written consent was obtained from the patient.

Procedure

The conventional classical technique used in this case was introduced by Archer [1961] and Kruger [1964]).[13] For the conventional classical technique, the area was anaesthetized, using 2% lignocaine with 1:80000 adrenalines. The frenum was engaged with a hemostat which was inserted into the depth of the vestibule and incisions with a #15 blade were placed on the upper and the under surface of the hemostat until the hemostat was free. The triangular resected portion of the frenum with the hemostat was removed. A blunt dissection was done to relieve the fibrous attachment. The edges of the diamond shaped wound were sutured using 4-0 black silk with simple interrupted sutures. Patient was recalled after 1 week for suture removal and after 1 month for follow-up.(mention about antibiotics and analgesics).

Figure 1

Case II: A 45-year-old female patient undergoing prosthodontic treatment was referred to the Department of Periodontology for the evaluation of maxillary labial frenum. On intraoral examination, midline diastema and high frenal attachment were seen. Also, the labial frenum was thick and wide [Figure 2]. The patient was advised for frenectomy. After detailed explanation of procedure, written consent was obtained from the patient.

Procedure

For the electrocautery technique, the area was anesthetized with 2% lignocaine with 1:80,000 adrenaline. Hemostat was used to elevate tissue, hold it tight and was inserted into the depth of the vestibule. The ART-E1 electrosurgery unit (Bonart Co. Ltd, Taipei country, Taiwan) was used. Two incisions using the electrode were given. The tissue was irrigated with saline while using the electrocautery to prevent dessication. The triangular tissue of labial frenum was then removed with the hemostat, and it was made free. Patient was recalled after 1 week and after 1 month for follow-up.

Figure 2

Case III: A 35-year-old male patient after the completion of orthodontic treatment was referred to the department of periodontology for the evaluation of maxillary labial

frenum. On intraoral examination, class 1 molar relation, midline diastema and high frenal attachment were evident. Also, the labial frenum was thick and wide [Figure 3]. The patient was advised for frenectomy. After detailed explanation of procedure, written consent was obtained from the patient.

Procedure

For the diode laser technique, the area was anesthetized with 2% lignocaine with 1:80,000 adrenaline.

Dr. Smile Simpler LA7D0 001.3 (Lambda SpA, Italy) diode laser was used. A diode laser using the wavelength of 980 nm was used and was activated before performing the procedure. Surgical tip at 400 μm was used with a power of 8 W and was applied in contact mode. The incision was started with the frenum from the attached gingiva and interdental papilla on the labial surface between the central incisors extending upward from inner side of upper lip to the depth of vestibule ending in a rhomboidal area causing separation of the fibers. Hemostasis was optimal and no sutures were given. Safety measures were taken for the dentist, assistance, and the patient by wearing the protective goggles. Patient was recalled after 1 week and after 1 month for follow-up.

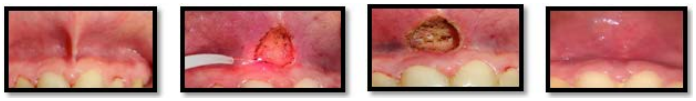

Figure 3

All patients were given verbal instructions to avoid taking hot and spicy food for a few days and to maintain meticulous oral hygiene. Postoperative analgesics were given to the patients. After 2 weeks of follow-up, significant healing was noted and after 1month, complete healing of the surgical site with normal mucosal type of frenal attachment was reported.

Methods of Scoring

The severity of bleeding was recorded (1: None, 2: Slight, 3: Moderate, 4: Severe) [13] and pain during the procedure, at postoperative day and on 7th and 15th day. The subjects were asked to rate the degree of pain during eating or speech, on a 10-cm horizontal visual analogue 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 imaginable.”

On the post-operative day, 1st, 3rd, & 7th day swelling (0: No swelling, 1: Mild swelling, 2: Moderate swelling, 3: Severe swelling) was assessed. Wound healing (1: Inadequate, 2: Nearly entire wound, 3: Good) was assessed after 1 month and infection (0: No infection, 1: Infection present) was assessed on 1st, 2nd and 7th day. After the 1st month, the re-evaluation of wound healing was performed using same indices [13] for all the groups.

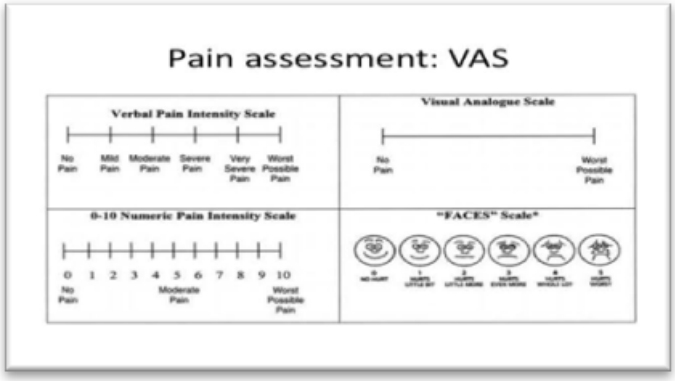

Figure 4

Discussion

In the era of periodontal plastic surgery, more conservative and precise techniques are being adopted to create more functional and aesthetic results. The presence of an aberrant frenum being one of the etiological factors for the persistence of a midline diastema, the focus on the frenum has become essential. The aberrant frenum can be treated by frenectomy or by frenotomy procedures.[14],[15] Frenectomy can be performed using various techniques like conventional scalpel technique, with electrocautery or with lasers. The soft tissue laser is now a viable alternative to the scalpel in soft tissue

surgery[16]. In the present study, diode laser, which characteristically uses a blend of gallium, arsenide, and other elements such as aluminium and indium, was used. According to Gandhi et al. [17], there are some advantages of lasers for soft tissue cutting: 1) their use requires minimal or no anesthetic; 2) they do not harm dental hard tissues; 3) their judicious use does not injure the dental pulp; 4) because of low or no heat production, they can be used around dental implants; 5) they are antimicrobial; 6) they remove endotoxins from root surfaces; 7) there is growing evidence that laser use may be positive therapy for periodontal disease; 8) laser technology is considered state of the art by the lay public, so patients are more accepting of its use in their treatment than of electrosurgery.

In the present study, subjects treated with the DIODE laser had significantly less postoperative pain both on day 1 and day 7 as compared to scalpel surgery as well as the number of analgesics used were lower in the laser group. These findings were consistent with the studies carried out by Haytac *et al.*[18] and Butchibabu *et al.*[19] wherein they suggested that soft tissue laser treatment used for frenectomy surgeries provides better patient perception in terms of postoperative pain and function than that obtained by the scalpel technique. It is theorized that decreased pain perception after the use of laser 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.[20]

There are two basic types of electrosurgical units used in dentistry: 1) Monopolar is one in which a single electrode exists and the current travels from the unit down in a single wire to the surgical site. 2) Bipolar is one in which two electrodes are placed in very close proximity to each other. Bipolar units are more expensive than diode lasers and the electrical current flows from one electrode to the other, thus eliminating the need for grounding pad. Bipolar units, because of the two wires, create less of a precise cut than the monopolar or diode laser[21]. David et al. [22] compared mucosal incisions made by scalpel, CO2 Laser, electrocautery, he concluded that, on subjective evaluation of ease of use, constant-voltage electrosurgery scored highest ($p < 0.05$) on a scale of 0 to 4, followed by the CO2 laser. The speed of incisions and excisions, measured in seconds, was faster for electrosurgery unit as compared to CO2 laser. The tissue damage was less in electrocautery group as compared to laser. Elecrocautery require no safety glasses and can remove large amounts of tissue quickly [23]. In electrocautery heat is produced when the electrode contacts the tissue and due to this pain is produced, anesthetic must be used. It may also cause burns, the risk of an explosion if combustible gases are used, interference with pacemakers and the production of surgical smoke.

In the present study, patients were treated with the scalpel, DIODE laser, & electrocautery. Patient treated with scalpel and electrocautery had more post-operative pain compared to laser. With the use of scalpel, there was more intra-operative bleeding. With laser, there was minimal swelling and scarring; no suturing in most cases; little mechanical trauma; reduction of surgical time; decreased post-surgical pain; and high patient acceptance [24-27]. Swelling was more in patients treated with electocautery. There is abundant evidence confirming markedly less bleeding particularly of highly vascular oral tissues, with laser and electro surgery. Some reports suggest that laser-created wounds heal more quickly and produce less scar tissue than conventional scalpel surgery [28], although contrary evidence also exists [29,30]. Though laser utilization is not simple and operators must attend to theoretical and practical training as well as to observe the safety procedures. Patient treated with electrocautery had

prolonged healing period and takes more time for epithelization.

The increased pain perception associated with the scalpel frenectomy might be attributed to the fact that it is a more intrusive surgical procedure involving blood loss, wide surgical wound and suturing. The sutures also contribute to the discomfort postoperatively since they interfere with regular functions such as speech and intake of food.[14],[19].

There is abundant evidence confirming markedly less bleeding particularly of highly vascular oral tissues, with laser surgery. The laser technique offers some advantages, such as a relatively bloodless surgical and postsurgical 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 postsurgical pain; and high patient acceptance.[31-33] In the present study, subjects treated with the DIODE laser had significantly relatively less bleeding and was easy to perform than conventional scalpel surgery or electrocautery.

Conclusion

According to present clinical study, all 3 methods can be used successfully to treat abnormal frenal attachment. As with scalpel technique, there was more intra-operative bleeding and reduced operative time. post-operative pain was noted. With the use of electro-cautery, swelling, delayed healing period was noted. Diode laser provide better patient comfort in terms of minimal intra-operative bleeding, pain, swelling, epithelization, infection.

References

1. Newman M, Takei H, Klokkevold P, Carranza F. Periodontal plastic and esthetic surgery. In: Carranza FA, editor. Carranza's Clinical Periodontology. 10th ed. MO: Saunders: St. Louis, Missouri: An Imprint of Elsevier Science; 2006. p. 1023-4.
2. Placek M, Miroslav S, Mrklas L. Significance of the labial frenal attachment in periodontal disease in man. Part 1; Classification and epidemiology of the labial frenum attachment. J Periodontol 1974;45:891-4.
3. Miller PD Jr. The frenectomy combined with a laterally positioned pedicle graft. Functional and esthetic considerations. J Periodontol 1985;56:102-6.
4. Takei HH, Azzi RA. Periodontal plastic and esthetic surgery. In: Newman MG, Carranza FA, editors. Carranza's Clinical Periodontology. London: W.B. Saunders; 2002. p. 870-1.
5. Whinston GJ. Frenectomy and mucobuccal fold resection used in periodontal therapy. N Y Dent J 1956;22:495.
6. Huang WJ, Creath CJ. The midline diastema: A review of its etiology and treatment. Pediatr Dent 1995;17:171-9.
7. Cohen RE, Ammons WF; Research, Science and Therapy Committee of the American Academy of Periodontology. Lasers in periodontics. J Periodontol 2002;73:1231-9.
8. Silverman EB, Read RW, Boyle CR, Cooper R, Miller WW, McLaughlin RM. Histologic comparison of canine skin biopsies collected using monopolar electrosurgery, CO2 laser, radiowave radiosurgery, skin biopsy punch, and scalpel. Vet Surg 2007;36:50-6.
9. Funde S, Baburaj MD, Pimpale SK. Comparison between Laser, Electrocautery and Scalpel in the Treatment of Drug-Induced Gingival Overgrowth: A Case Report. IJSS Case Reports and Reviews 2015;1(10):27-30.
10. Khalid W, Sheeja VS, Sankari M, Jayakumar. The lightsaber is mightier than the sword!-a case of frenectomy using diode laser. Unique Journal of

Medical and Dental Sciences. 2015, 03 (01): Page 22-24.

11. Kafas P, Stavrianos C, Jerjes W, Upile T, Vourvachis M, Theodoridis M, Stavrianou I. Upper-lip laser frenectomy without infiltrated anaesthesia in a paediatric patient: a case report. Cases Journal 2009, 2:7138. 1-3.
12. Singh P, Gulati RK, Agarwal RR, Khan F Laser assisted frenectomy—A case report. Ann Dent Specialty 2016;4: 18-9.
13. Devishree et al. Frenectomy: A review with the reports of surgical techniques. J Clin Diagn Res. 2012 November; 6(9): 1587–92.
14. Fiorotti RC, Bertolini MM, Nicola JH, Nicola EM. Early lingual frenectomy assisted by CO2 laser helps prevention and treatment of functional alterations caused by ankyloglossia. Int J Orofacial Myology 2004;30:64-71.
15. Pick RM, Colvard MD. Current status of lasers in soft tissue dental surgery. J Periodontol 1993;64:589-602.
16. Patel RM, Varma S, Suragimath G, Zope SA, Kale V.Comparison of labial frenectomy procedure with conventional surgical technique and diode laser. 2015;9:94-9.
17. Gandhi D and Gandhi P. Comparison of healing period after frenectomy using scalpel, electrocautery and diode laser. BJMR,2017;21(12):1-9.
18. Haytac MC, Ozcelik O. Evaluation of patient perceptions after frenectomy operations: A comparison of carbon dioxide laser and scalpel techniques. J Periodontol 2006;77:1815-9.
19. Butchibabu K, Koppolu P, Mishra A, Pandey R, Swapna LA, Uppada UK. Evaluation of patient perceptions after labial frenectomy procedure: A comparison of diode laser and scalpel techniques. Eur J Gen Dent 2014;3:129-33.
20. Fisher SE, Frame JW, Browne RM, Tranter RM. A comparative histological study of wound healing following CO2 laser and conventional surgical excision of canine buccal mucosa. Arch Oral Biol 1983;28:287-91.
21. Bashetty K, Nadig G, Kapoor S. Electrosurgery in aesthetic and restorative dentistry: A literature review and case reports. J Conserv Dent 2009;12(4):139-44.
22. Genovese MD, Olivi G. Laser in paediatric dentistry: Patient acceptance of hard and soft tissue therapy. Eur J Paediatr Dent. 2008;9(1):13-17.
23. Kravitz ND, Kusnoto B. Soft-tissue lasers in orthodontics: An overview. Am J Orthod Dentofacial Orthop 2008;133(4 suppl): S110-S114.
24. American Academy of Periodontology. Lasers in periodontics (position paper). J Periodontol. 2002;73:1231-1239.
25. Schuller DE. Use of the laser in the oral cavity. Otolaryngol Clin North Am. 1990; 23:31-42.
26. Pogrel MA, McCracken KJ, Daniels TE. Histologic evaluation of the width of soft tissue necrosis adjacent to carbon dioxide laser incisions. Oral Surg Oral Med Oral Pathol. 1990;70:564- 568.
27. Kaplan L, Raif J. The Sharplan carbon dioxide laser in clinical surgery: 7 years experience. In: goldman L, ed. The Biomedical Laser. New York: Springer-Verlag. 1981;89-97.
28. RMD. A comparative histological study of wound healing following CO2 laser and conventional surgical excision of canine buccal mucosa. Arch Oral Biol. 1983;28: 287-291.
29. Abt E. CO2 laser treatment for gingivectomies reduces hemorrhaging, post-op pain. Clin Laser Mon. 1992;10:8- 12.
30. Hobbs ER, Bailin PL, Wheeland RG, Ratz JL. Superpulsed lasers: Minimizing thermal damage with

short duration, high irradiance pulses. J Dermatol Surg Oncol. 1987;13:955-964.

31. 31. Frame JW. Removal of oral soft tissue pathology with the CO2 laser. J Oral Maxillofac Surg 1985;43:850-5.
32. Buell BR, Schuller DE. Comparison of tensile strength in CO2 laser and scalpel skin incisions. Arch Otolaryngol 1983;109:465-7.
33. Kaur P, Dev YP, Kaushal S, Bhatia A, Vaid R, Sharma R. Management of the upper labial frenum: A comparison of conventional surgical and lasers on the basis of visual analogue scale on patients perception. J Periodontal Med Clin Pract 2014;01:38-46.