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Frenectomy: With and Without Suturing

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Abstract

Background and objectives: Any variations in the frenulum's size and location could cause functional and cosmetic issues that call for surgical removal. Wound healing is a comprehensive and ever-changing procedure that involves the restoration of cellular structures and tissue layers. This study aimed to compare wound healing outcomes in frenectomy procedures performed with and without sutures.

Methods: A randomized clinical trial with 40 patients that had high frenal attachments (15 males, 25 females, ages 18-60) from Khanzad Training Center, Erbil ran from March 2023 to January 2024. Patients were split into two groups: first group (study group) had frenectomy with sutures and a periodontal pack, while the second group (control group) had frenectomy without sutures but with periodontal pack. Wound size, pain, analgesics use, and redness assessed over three weekly visits.

Results: The study found no significant difference in wound size (P=0.338) or visual analogue score (VAS) (P=0.163) scores between the study and control groups at the first visit. However, redness (P=0.042) was significantly different. By the second visit, the control group had improved wound size outcomes (P=0.04), while the study group had better analgesics intake (P=0.01). By the third visit, analgesic consumption favored the study group, but there was no significant difference in wound size or redness P=0.331 and P=0.186 respectively.

Conclusion: Appropriate suturing might speed up the healing of the wound. The control group consumed more analgesic pills even though there was no statistically significant difference in their visual analogue score records.

Keywords: Frenectomy, Periodontal health, Sutures, Visual Analogue Scale, Wound healing

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Introduction

The alveolar process in the middle of the upper and lower jaws is connected to the lip by a fibrous tissue fold called the frenum, which is made of collagen. Any variations in the frenulum's size and location could cause functional and cosmetic issues that call for surgical removal.[1] The frenum is a pliable tissue that envelops the alveolar process and exhibits variability in both size and position among individuals, an abnormality occurs when the frenum attaches to the gingival tissue in a manner that causes the gingival margin to recede, leads to the formation of gaps between teeth, or restricts lip movement.[2] There are four different types of frenal attachment: mucosal, gingival, papillary, and papillary penetrating.[3] The mucosal frenum attaches up to the mucogingival junction but does not extend into the attached gingiva. It is connected to the gingiva without reaching the base of the midline papilla. The gingival frenum remains linked to the gingiva and does not extend coronal to the midline papilla base. No blanching or extension towards the palate is observed when the frenum is pulled. Conversely, a papillary penetrating frenum extends coronal to the midline papilla base and may show blanching on the palatal aspect or incisive papilla under tension.[4] Additional varieties of the regular frenal attachment are the bifid labial frenum, the simple frenum with an appendix, the simple frenum with a nodule, the double frenum, and the broader frenum.[5] The Blanch test is the predominant technique employed for diagnosing high frenum attachment. The process entails applying stress to the frenum by pulling it and visually seeing the movement of the papillary tip or any resulting blanching. Several techniques have been employed for the surgical removal of the frenum, such as the use of a scalpel and electrocautery. and most recently lasers such as CO2, erbium (Er): yttrium aluminum garnet (YAG), and neodymium-doped YAG (Nd:YAG).[6] During the excision procedure, a small, elliptical incision down to the periosteum is made around the frenal region. The edges of the wound are undermined and then reconnected after carefully separating the fibrous frenum from underlying tissues. The frenum is removed if it is pathogenic, which includes cases where it causes gaps between front teeth, results in gingival recession due to tight attachment, or when there is insufficiently attached gingival tissue and a shallow mouth space.[2] Wound healing is a comprehensive and ever-changing procedure that involves the restoration of cellular structures and tissue layers. The biological process can be categorized into three main phases: inflammatory, proliferative, and remodeling.[7] A periodontal dressing acts as a barrier between the tissues and wounds, preventing the force of chewing and enabling the healing process to take place.[8] Although the periodontal dressing cannot treat wounds, it can hasten their recovery by protecting the incision and lowering the risk of infection and bleeding after surgery.[9] Over time, the composition of these dressings has changed and is now divided into three categories: those that contain both zinc oxide and eugenol, those that contain zinc oxide but do not contain eugenol, and those that do not contain either of these ingredients.[10] In the realm of dentistry, zinc oxide non-eugenol is frequently used as a periodontal dressing, it is appropriate for wound protection because of the antibacterial properties of the fatty acids and metal oxide it contains.[11] The objective of this study was to conduct a comparative analysis of wound healing outcomes in frenectomy procedures performed with sutures versus those executed without sutures. By examining and contrasting these two approaches, the study aims to provide insights into their relative effectiveness and implications for optimal post-operative recovery.

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Patients and methods

This study is randomized clinical trial carried out from March 2023 to January 2024 in Erbil. Forty subjects were selected from the diagnosis and periodontics departments in Khanzad training center, Erbil. Inclusion criteria include patients with high frenal attachment, systemically healthy patients, patients with good oral hygiene, and patients that are willing to comply to the instructions given and willing to comply to the scheduled follow-up visits needed. The exclusion criteria include those with uncontrolled local or systemic diseases that may render periodontal plastic surgery inadvisable, individuals who smoke, pregnant or lactating women, those with a severe gagging reflex, and individuals who are unable or unwilling to offer informed consent. Samples size was 40 patients as calculated by a statistician. The samples were divided into two equal groups, in the first group, (control group), frenectomy was performed in simple excision technique with simple interrupted sutures and then coated with periodontal pack, in the second group (study group), frenectomy was performed without suturing but coated with periodontal pack only. The Visual Analogue Scale (VAS) was used to measure and record pain every day for a week. The VAS ranges from 0 to 10, with 0 denoting no pain, 1 minimal pain, 5 moderate pain, and 10 severe pains. During the recall visit, each patient was asked how many analgesics they had consumed during the healing phase.[12] On the day of surgery, the size of the wound was measured using a digital vernier, and the wound was traced on days 7 and 14, respectively.[13] Redness of the wound area was scored by naked eye (0: bright red, 1: moderate red, 2: dark red), a sole operator, specifically trained for this purpose, conducted the entire scoring process. The pre-surgical phase involves the thorough removal of plaque and calculus from both above and below the gingival line using an ultrasonic device. The patients are provided with precise instructions on proper oral hygiene, which include brushing their teeth twice a day using a soft toothbrush. It was recommended to use mouthwash containing 0.12% chlorhexidine twice a day for a week as a chemical plaque control. The frenectomy technique, carried out in accordance with the standard manner, initiates the Surgical Phase.[14] A hemostat that was put into the vestibule's depth and had an incision on its top end and underneath engaged the frenum. A blunt dissection in which the fibrous connection is released from the bone. The dissection starts from the vestibule to the gingival margin. Then in the suturing phase, in control group the edges of diamond-shaped wound sutured with interrupted sutures (3-0 silk. The area not to be covered with a periodontal pack. The patients were recalled, the sutures were taken out to assess the wound's healing, and they were called back for more evaluations. In the study group after the surgery, suture was not placed and the wound was packed with periodontal pack, then the patient was recalled for follow up.[1] The Postsurgical Protocol entails advising the patient to consume Paracetamol 500mg on an as-needed basis and to keep track of the quantity of tablets consumed. This is done to indirectly assess pain levels by calculating the average consumption of analgesics (in milligrams). For two weeks after the procedure, patients were told to rinse their mouths twice a day for one minute using an antiseptic mouthwash containing 0.12% chlorhexidine. For three weeks, patients were instructed to avoid vigorous brushing and any other activity that would injure the surgical site. A week after the procedure, the first group's sutures were taken out. Informed consent was obtained from the patients. The Ethical approval code is 2551 obtained from the scientific committee of the Kurdistan Higher Council of Medical Specialties. Data was analyzed using Statistical package for

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social sciences (SPSS) software version 25. The SPSS software was employed for data analysis. Descriptive statistics, including the mean, standard deviation, frequency, and percentage, were calculated to provide a summary of the characteristics of the sample. Paired t-test was used to analyze the statistical difference between the two testing groups. A statistically significant result was defined as a p value of less than 0.05.

Results

The study included 40 frenectomy cases. Among that, males were 15 (37.5%) and females were 25 (62.5%), the age of the patients ranged from 18-60 years. In the control group the wound size significantly decreased from the first visit (8 ± 1.7) to the second visit (2.1 ± 1.57) and further reduced by the third visit (0.05 ± 0.2), this indicates a gradual healing process. For the redness scores, the initial score was (2) during the first visit but showed a marked reduction by the second visit (1.3 ± 0.73) and almost disappeared by the third visit (0.05 ± 0.2). There was no reported pain during the first visit (Visual Analogue Score (VAS) = 0), however, pain increased by the second visit (6.3 ± 3.49) before dropping back to zero by the third visit, this suggests that the pain peaked during the second visit and resolved by the third visit. No analgesics were consumed during the first visit (0), however, there was significant consumption by the second visit (12.4 ± 4.67), possibly due to the peak in pain, by the third visit, analgesic use had reduced back to zero, indicating that pain management was no longer required as shown in Table (1). For the study group, the wound size started slightly larger (8.4 ± 1.3) compared to the control group, decreased by the second visit (3.1 ± 0.8), and further reduced to almost negligible by the third visit (0.05 ± 0.3). Redness was also present during the first visit (1.6 ± 0.8) but reduced by the second visit (1.1 ± 0.3) and continued to decrease by the third visit (0.2 ± 0.4), showing a gradual resolution similar to the control group. There was a slight pain reported during the first visit (Visual Analogue Score (VAS) = 0.5 ± 1.5), which increased during the second visit (5 ± 2.29) but returned to zero by the third visit, mirroring the pain trend observed in the control group. No analgesics were consumed during the first visit, but there was moderate consumption by the second visit (8.1 ± 5.97), by the third visit, analgesic use was again zero, indicating resolution of pain as shown in Table (2).

Table (1): The mean differences between first, second and third visits of Control group in terms of wound size, redness, VAS, and analgesic consumption

	Wound size	Redness	VAS	Analgesics
First visit	8±1.7	2	0	0
Second visit	2.1±1.57	1.3±0.73	6.3±3.49	12.4±4.67
Third visit	0.05±0.2	0.05±0.2	0	0

Table (2): The mean differences between first, second and third visits of study group in terms of wound size, redness, VAS, and analgesic consumption

	Wound size	Redness	VAS	Analgesics
First visit	8.4±1.3	1.6±0.8	0.5±1.5	0
Second visit	3.1±0.8	1.1±0.3	5±2.29	8.1±5.97
Third visit	0.05±0.3	0.2±0.4	0	0

The findings indicated that there was no significant difference in wound size scores (P=0.338), visual analogue (VAS) scores (P=0.163) between the study group and the control group at the first visit, but there was a significant difference between the groups when comparing redness scores at the first visit (P=0.042) as shown in Table (3).

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Table (3): Comparison of wound size, redness, VAS, and analgesics scores between the control and the study groups in the first visit.

	Mean Difference	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Wound size	-.400	1.818	.407	-1.251	.451	-.984	19	.338
Redness	.400	.821	.184	.016	.784	2.179	19	.042
VAS	-.500	1.539	.344	-1.220	.220	-1.453	19	.163

*By paired T-test.

While at the second visit, the was a significant difference in wound size scores (P=0.04) with the control group performing better, and the analgesics consumption (P=0.01) favoring the study group. But during the second visit, there was no significant difference observed between the groups in terms of redness and VAS (Visual Analogue Scale) P=0.214 and P=0.148 respectively as shown Table (4).

Table (4): Comparison of the wound size, VAS, and analgesics scores between the control and the study groups in second visit.

	Mean Difference	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Wound Size	-.975	1.977	.442	-1.900	-.050			
Redness	.200	.696	.156	-.126	.526	1.285	19	.214
VAS	1.300	3.854	.862	-.504	3.104	1.509	19	.148
Analgesic	4.300	6.783	1.517	1.125	7.475	2.835	19	.011

*By paired T-test.

On the third visit, there was a significant difference in the analgesic consumption that favored the study group but no significant difference in wound size or redness scores between the study and control groups P=0.331 and P=0.186 respectively as shown in Table (5).

Table (5): Comparison of the wound size, and redness scores in the control and the study groups in third visit

	Mean Difference	Std. Deviation	Std. Error Mean	Lower	Upper	t	df	Sig. (2-tailed)
Wound Size	-.053	.229	.053	-.163	.058	-1.000	18	.331
Redness	-.150	.489	.109	-.379	.079	-1.371	19	.186

*By paired T-test.

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Discussion

Dentistry has been advancing by incorporating less intrusive procedures to reduce patient pain and discomfort during and after surgeries.[15] This study examined the wound healing results of the Frenectomy procedure with sutures versus without sutures. Suturing improved wound healing in the control group compared to the study group, which did not receive suturing, during the second and third visits, this is related to demographic varieties between the selected samples and the level of education. Our finding for wound healing coincides with a retrospective study by Zaaba et al., of 51 frenectomy samples which also showed improved primary healing.[16] Analgesic consumption and VAS scores were higher in the control group during the first follow up after the surgery visit. Redness was lower in the study group during the second visit but higher during the third visit. A scalpel frenectomy is a more invasive operation that may be linked to heightened pain sensitivity in patients. As a result, there is more blood loss, a large surgical wound at the location, and the need for sutures. The classical procedure for frenectomy involves using hemostats to hold the frenum and making incisions above and below the hemostats. This results in a sizable triangle wound that typically involves significant bleeding. Patients commonly suffer from bleeding and pain after surgery, and sutures can exacerbate pain and bleeding when they touch food.[17] In a study conducted by Sarmadi et al., it was discovered that pain levels were slightly higher during the first follow-up after surgery compared to the subsequent follow-ups. The researchers confirmed this by documenting the use of pain relievers, as reported by the patients in a questionnaire. These findings align with our own observations, which show that the level of discomfort is greater during the initial visit after surgery.[18] The impact of periodontal dressing on pain levels and the quantity of analgesics consumed by the patient has been a part in our research. A study found no statistically significant variations in the number of analgesics taken by patients between the dressing and non-dressing groups, except from the surgical method. However, this conclusion has not been verified by an additional investigation. In their study, Haugan et al. found that patients in the Eugenol-free dressing group experienced considerably higher levels of pain, edema, and inflammation compared to those using a different commercially available dressing. However, other investigations did not demonstrate significant changes in these aspects.[10] It has been discovered that the weakness of zinc oxide non-eugenol is its higher toxicity to fibroblasts and osteoblasts. According to an in vitro study, zinc oxide non-eugenol containing rosin can enhance inflammatory reactions by increasing the number of polymorphonuclear neutrophilic leukocytes (PMN).[9] It has been shown that using zinc oxide non-eugenol causes inflammation that can last up to seven days, which impedes the healing process of wounds.[19,20] Madan et al. state that when zinc oxide non-eugenol is used, it exhibits rigid physical properties that, due to size variations, can trap food particles and build up plaque. This can lead to the infiltration of germs into the wound, causing inflammation as a protective response to prevent the bacteria and endotoxins from spreading to other tissues because of the high toxicity of zinc oxide non-eugenol on osteoblasts and gingival fibroblasts, hemolysis in mucosal tissue may result in inflammation. The results of a study conducted by Budisidharta et al, coincides with our results in the terms of poor healing of the wound covered with non-eugenol-based dressing on the follow up visit after surgery, and perfect healing results in visit after, this is regarded to that on the seventh day of wound healing, the processes of

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epithelialization, angiogenesis, and matrix formation are still ongoing, these activities can be hampered by interruptions in oxygen delivery; for example, wounds sealed with zinc oxide non-eugenol for seven days may have disruptions in oxygen delivery.[11] As a matter of disagreement, their results revealed a higher redness score than ours. Oxygen is essential for angiogenesis, fibroblast function, collagen synthesis, growth factor creation, reactive oxygen species (ROS) formation, and the prevention of anaerobic bacterial infections brought on by plaque building.[11] Consequently, the results of this study are expected to help practitioners choose an appropriate surgical technique and an appropriate dressing material, and a combination of proper suturing and an beneficial dressing material to enhance the results and outcomes of their surgery.

Conclusion

Within the limitations of this study, it can be concluded that appropriate suturing might speed up wound healing and reduce consumption of analgesics in frenectomy surgery.

Conflicts of Interest

There are no conflicts of interest.

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