

To compare Post-frenectomy Healing using Conventional Silk Sutures with N-butyl Cyanoacrylate Tissue Adhesive

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ABSTRACT

Aim: To compare post-frenectomy healing using conventional silk sutures with N-butyl cyanoacrylate (NBC) tissue adhesive.

Materials and methods: The sample size consisted of 20 subjects indicated for frenectomy having aberrant gingival type of frenum attachment. Following classical technique of frenectomy, subjects were randomly assigned to either of the groups. Group I consisted of wound closure using silk sutures and group II wound closure using NBC. The clinical parameters assessed were time taken for approximation, pain evaluated using verbal rating scale, and healing evaluated using the Wound Healing Index. The clinical parameters were assessed at 7, 14, and 21 days interval.

Results: There was a statistically significant difference between the time taken for approximation between the two groups, with lesser time recorded in group II. On the 7th day, group II showed statistically significant reduction in pain and healing as compared with group I. On the 21st day, there was no significant difference between groups I and II.

Conclusion: The study protocol consisted of assessing the following parameters: Pain, time taken for approximation, and healing. It was found that NBC showed better results at the 7th day post-frenectomy; however, on the 21st day, no significant difference was found in both the groups in all parameters.

Keywords: Aberrant frenum, Cyanoacrylate, Frenectomy, Healing, Polymerization, Silk sutures.

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INTRODUCTION

A frenum is a mucous membrane fold that contains muscle and connective tissue fibers that attach the lip and

the cheek to the alveolar mucosa, the gingiva, and the underlying periosteum.¹ A frenulum is a small frenum. There are several frena that are usually present in a normal oral cavity, most notably the maxillary labial frenum, the mandibular labial frenum, and the lingual frenum.² Their primary function is to provide stability of the upper and lower lip and the tongue. The labial frenal attachments have been classified as mucosal, gingival, papillary, and papilla penetrating by Placek et al.³

- Mucosal—when the frenal fibers are attached up to mucogingival junction;
- Gingival—when fibers are inserted within attached gingiva;
- Papillary—when fibers are extending into interdental papilla;
- Papilla penetrating—when the frenal fibers cross the alveolar process and extend up to palatine papilla.

NEED FOR FRENECTOMY

Miller has recommended that 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. When the two central incisors erupt widely separated, no bone is deposited inferior to the frenum. A V-shaped bony cleft between the two central incisors and an abnormal frenum attachment results Huang. The presence of an aberrant frenum is one of the etiological factors for the persistence of a midline diastema.⁴

Wound closure biomaterials are divided into three major categories:

1. Suture materials
2. Staplers/ligating clips
3. Tissue adhesives-like cyanoacrylate, fibrin glue, tissue glue

Braided silk is the most common suture used for closure of oral wounds. It has the phenomenon of “wicking,” which makes it a site for retention and ingress of bacteria into the tissues and thus a reservoir of secondary infection. It has been found that silk has maximum amount of inflammatory tissue response. Thus, in order to overcome these difficulties, a need for an alternative to sutures is always felt.²

Cyanoacrylates are tissue-adhesive materials that were synthesized in 1959 by Coover et al. The cyanoac-

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Fig. 1: Abnormal frenal attachment



Fig. 2: Hemostat in place and incision made

rylate materials have a chemical formula $H_2C=C(CN)COOR$, where R can be substituted for any alkyl group ranging from methyl to decyl. N-butyl cyanoacrylate is a biocompatible tissue adhesive and is hence, used for closure of wounds.⁵

AIM AND OBJECTIVE

The aim of this article is to compare post-frenectomy healing using conventional silk sutures with NBC tissue adhesive.

MATERIALS AND METHODS

Inclusion Criteria

- Subjects within age group of 18 to 26 years.
- Only maxillary anterior frena were included in this study
- All subjects were systemically healthy
- Subjects having gingival type of frenal attachment

Exclusion Criteria

- Pregnant and lactating patients

STUDY DESIGN

A total of 20 subjects with abnormal gingival type of frenum were randomly selected from the Department of Periodontics, Jaipur Dental College, India. Nature of study was explained to subjects and informed consent was taken from all the subjects prior to enrolling them into the study. The 20 subjects were divided randomly into two groups:

- *Group I:* Approximation using 3-0 silk sutures
- *Group II:* Approximation using NBC

The abnormal frena are detected visually by applying tension over the frenum to see the movement of



Fig. 3: N-butyl cyanoacrylate

the papillary tip or the blanch which is produced due to ischemia in the region (Fig. 1). Subjects were treated with conventional (classical) surgical technique. The classical technique was introduced by Archer⁶ and Kruger.⁷

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 (Fig. 2).⁷ After freeing any fibrous adhesions to the underlying periosteum, the wound was closed with sutures in group I while in group II wound was closed with NBC using a syringe (Figs 3 and 4). The area was covered with a periodontal pack. The pack and the sutures were removed 1 week postoperatively.

The clinical parameters assessed were time taken for approximation, pain evaluated using verbal rating scale (Fig. 5), and healing evaluated using the Wound Healing Index. Wound healing and other clinical parameters were assessed at 7, 14, and 21 days interval (Fig. 6).



Fig. 4: Placement of cyanoacrylate



Fig. 5: Verbal rating scale for pain



Fig. 6: Healing after 1 week

DISCUSSION

The present study was carried out to compare post-frenectomy healing using conventional silk sutures with NBC tissue adhesive. On the 7th day, group II showed statistically significant reduction in pain and healing as compared with group I. The result of the current study shows that there was a statistically significant difference between the time taken for approximation between the two groups, with lesser time recorded in group II. On the 14th and 21st days, there was no significant difference between groups I and II (Tables 1 to 3). Silk suture is the most commonly used means of fixing of tissues in periodontal surgeries. The suturing time could vary and may be dependent on the suturing technique, material used, surgeon's skill, as well as the area and access for suturing.⁸ The NBC and its isoform isobutyl cyanoacrylate are biocompatible tissue adhesives and have good working properties like flow and fast setting,

within 5 to 10 seconds. Tissue adhesion is by valence bonding and van der Waal's force. Cyanoacrylate sets by polymerization in the presence of moisture and even blood, with release of heat.⁹

The NBC is also a good hemostat¹⁰ and is found to be bacteriostatic, and reduced postoperative pain has been found in sites closed with NBC. Sutures on the contrary have been known to cause a stronger inflammatory response and tissue reaction Pini et al.¹¹ The material is degraded by breaking the C = C bond and is eliminated from the body through urine and feces. It has good bonding properties and strength to hold the tissue margins together.⁹

Table 1: Comparison of procedural time for groups using paired t-test

	Tcal	Degrees of freedom	p-value	Mean of differences
Groups I vs II	11.695	9	<0.05	315.2

Table 2: Comparison of pain (verbal rating scale) for groups using paired t-test

	Tcal	Degrees of freedom	p-value	Mean of differences
Pain index at day 7 for group I vs II	2.2361	9	<0.05	0.5
Pain index at day 14 for group I vs II	1	9	0.1717	0.1
Pain index at day 21 for group I vs group II	0	9	1	0

Table 3: Comparison of healing (wound healing index) for groups using paired t-test

	Tcal	Degrees of freedom	p-value	Mean of differences
Healing index at day 7 for group I vs healing index at day 7 for group II	4.5826	9	<0.05	0.7
Healing index at day 14 for group I vs healing index at day 14 for group II	1	9	0.1717	0.1
Healing index at day 21 for group I vs healing index at day 21 for group II	0.55709	9	0.5911	0.1

CONCLUSION

N-butyl cyanoacrylate is an effective alternative to sutures in approximation postperiodontal surgeries with prompt hemostasis, reduced pain, and faster healing. It has no reported adverse reactions or side effects and a better patient compliance and is biologically stable.

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