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Comparative Evaluation of Healing After Periodontal Flap Surgery Using Silk Sutures and Sutureless Technique:A Split-Mouth Clinical Study

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ABSTRACT

Several studies have shown that different surgical periodontal procedures result in distinct healing patterns, making the monitoring of wound healing post-surgery essential. Adhesive materials like cyanoacrylate have appeared as potential alternatives to traditional sutures in periodontal procedures.

Aim: This study aims to evaluate tissue-bonding cyanoacrylate with sutures concerning healing and post-surgical risks.

Methodology: Ten patients requiring flap surgery (probing depth ≥5mm) were identified. A split-mouth study was adopted, with one side receiving sutures (Group I) and the other cyanoacrylate surgical sealant (Group II). Periodontal probing depth was assessed before surgery and at 6 weeks and 3 months post-surgery. The early healing index (Wachtel et al.) was measured at 1- and 2-weeks post-surgery. Both objective (debris, redness, suture loss) and subjective (discomfort, pain/itching, aesthetics) criteria were recorded. Follow-up visits occurred at 2-, 6 weeks, and 3 months.

Results: There were no marked differences observed between the groups about periodontal probing depth ($p > 0.05$). Both groups showed comparable improvement in subjective and objective parameters after 3 months. However, Group II demonstrated superior healing outcomes, particularly after 6 weeks.

Conclusion: Both interventions improved periodontal health, but Group II may offer added benefits in comfort, healing, and patient satisfaction. Additional research involving larger sample sizes is necessary to validate these findings.

Keywords: *Periodontal flap surgery; wound healing; cyanoacrylate tissue adhesive; sutures.*

1. INTRODUCTION

Periodontal disease is commonly attributed to the formation of gum pockets, and the effectiveness of periodontal treatment is frequently evaluated by the reduction in pocket depth. Numerous studies indicate that surgical intervention offers significant advantages in minimizing pocket depth and altering the microbial profile, particularly in cases involving angular bone defects, posterior regions, and furcation areas.[1]

In periodontal surgical procedures, suturing is the most frequently employed technique for wound closure. The main goals of using sutures include stabilizing the wound and maintaining tissue placement in the intended position. Sutures aid in repositioning tissues to either their initial or a new location, managing alveolar bone exudate, and protecting the blood clot within the extraction site from being dislodged. However, braided silk sutures can exhibit a 'wicking' effect, where bacteria may travel along or through the multiple strands, potentially increasing the risk of secondary infection.[2] Moreover, improper control of force during tissue handling and needle insertion may result in tissue tears, wound dehiscence, or compromised blood flow to the flap. Such issues can lead to infections or flap necrosis, ultimately hindering the healing process and complicating post-operative recovery. Due to these suture-related complications, alternative methods for flap closure have been explored. Among these, tissue adhesives have appeared as a promising option to address the limitations linked to

conventional suturing techniques.[3]

Coover[4] and colleagues first identified the adhesive qualities of cyanoacrylate in 1959 and suggested its use in surgical settings. Today, cyanoacrylate stands as the most commonly used tissue adhesive in clinical practice. Its strong tensile properties, fast polymerization, compatibility with biological tissues, ability to promote immediate hemostasis, user-friendly application, bacteriostatic effects, and support for enhanced healing make it particularly suitable for oral surgical procedures. Although it is non-resorbable, it naturally detaches from the oral mucosa within 7 to 10 days.[3]

The present study evaluates and compares the effectiveness of sutures and cyanoacrylate adhesive during the healing phase in those subjected to periodontal operations

2. METHODOLOGY

A sample of 10 patients diagnosed with periodontitis (probing depth (PD) ≥5 mm) were identified from the outpatient section of the Department of Periodontics at Malabar Dental College and Research, Edappal, Kerala, based on their need for periodontal flap surgery. Inclusion criteria were moderate to severe periodontitis (probing depth ≥5 mm and radiographic bone loss ≥50%) in at least three consecutive teeth across two quadrants individuals between 25 and 55 years of age and those with acceptable oral hygiene prior to the surgical procedure. Exclusion criteria included patients with any systemic conditions or medications that could interfere with wound healing, known drug allergies, smokers, tobacco users, individuals with habits that could influence disease progression or treatment, as well as pregnant or lactating women. All participants provided informed written consent.

After completing phase I therapy, subjects were scheduled for baseline measurements four weeks later. Surgery was performed on patients whose inflammation had subsided. A detailed case history, including periodontal probing depth, was recorded before surgery. Periodontal probing depth was reassessed at 6 weeks then 3 months following surgery, and Wachtel et al.'s Early wound Healing Index was recorded at 1- and 2-weeks post-surgery.

A standard local anesthetic solution (2% lignocaine with epinephrine 1:100,000) was administered, followed by a sulcular incision for each tooth. A traditional mucoperiosteal flap without displacement was elevated on the region's surrounding the teeth. Local irritants and unhealthy granulation tissue were excised. Following thorough debridement, the flaps were shaped and repositioned to ensure optimal interproximal closure.

The surgical site was allocated into two groups at random, designated as Group I and Group II.

- **Group I:** Re approximation of flap using 3-0 silk sutures
- **Group II:** Re approximation of flap using N-Butyl-2-Cyanoacrylate adhesive (Figure 1).

On one side, the flap tissue was secured using silk suture material with single sutures as needed. No periodontal dressing was used. On the lower region, a thin layer of N-Butyl-2-Cyanoacrylate was applied along the flap margin and allowed to solidify. No periodontal pack was used. Post-surgical care instructions were provided, and sutures were removed after one week (Figure 2).

Both objective criteria (such as debris, redness, and suture loss) and subjective criteria (such as discomfort, pain/itching, and aesthetics) were recorded in percentage. Patients were recalled for monitoring over period of 2-, 6 weeks, and 3 months following surgery. All postoperative parameters were assessed and documented at both sites. Then, statistical analysis was conducted.

Figure 1: a) N-Butyl-2-Cyanoacrylate tissue adhesive

b) Application of N-Butyl-2-Cyanoacrylate over flap border.

Figure 2: Suturing done on upper arch and N-Butyl-2-Cyanoacrylate tissue adhesive applied on lower arch after periodontal flap surgery.

3. RESULT

The mean presurgical probing depth was identical in both groups (5.3 ± 0.823 vs. 5.3 ± 0.483, p = 1.000). (Table 1) At 6 weeks and 3 months, probing depth reductions remained comparable, with no Considerable variations between groups (p > 0.05), indicating same periodontal healing outcomes. (Figure 3)

Periodontal probing depth	Group I		Group II		Independent sample t test	
	Mean	SD	Mean	SD	t	p
Presurgical	5.3	0.823	5.3	0.483	0.000	1.000
6 week	4.7	0.483	4.8	0.422	0.493	0.628
3 months	4.4	0.516	4.3	0.483	0.447	0.660

Table 1: Comparison of periodontal probing depth between groups

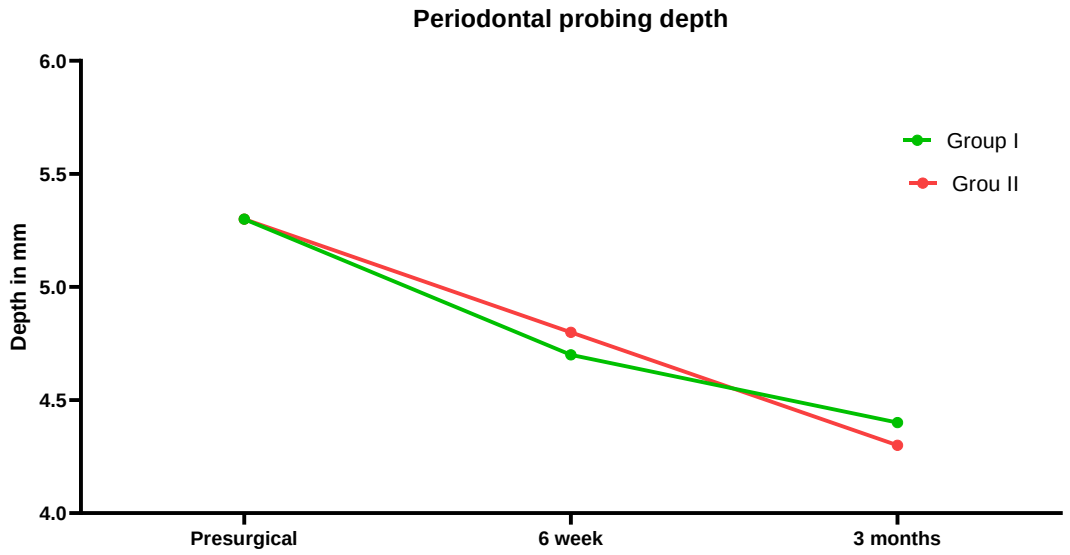

Figure 3: Comparison of periodontal probing depth between groups

The Early Healing Index was evaluated during the first- and second-weeks post-intervention. At the first week, Group II demonstrated significantly better healing (1 ± 0) compared to Group I (1.5 ± 0.5), with the variation being statistically relevant (p = 0.01). By second week, both groups exhibited identical healing scores (1 ± 0), indicating comparable healing progress at this stage. These results suggest that while Group II demonstrated faster initial healing, the long-term healing outcomes were similar between the groups. (Figure 4)

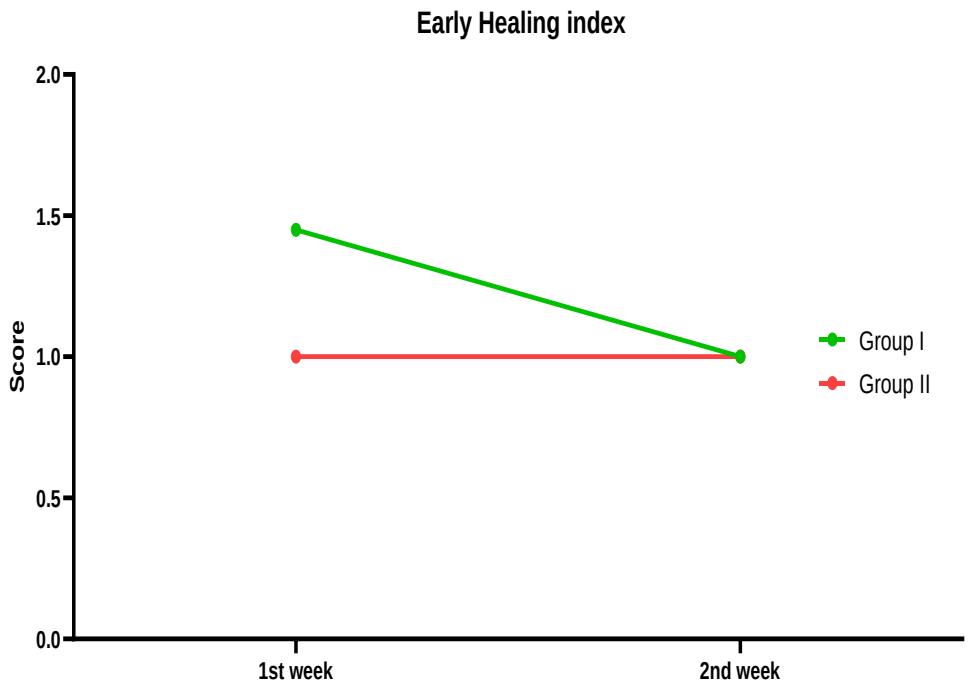

Figure 4: The comparison between Group I and Group II of early healing index at 1 week and 2 weeks.

Group I experienced significantly higher discomfort, debris accumulation, and redness compared to Group II, which showed superior esthetic outcomes and minimal postoperative issues. While pain/itching and suture loss in Group I did not reach statistical significance, the absence of these complications in Group II suggests a clinical advantage. (Table 2) These findings indicate that adhesive glue provides better patient comfort, esthetics and healing with fewer postoperative concerns than sutures. (Figure 5)

	Group I		**Group II**		**Independent sample t test**	
	Mean	SD	Mean	SD	t	p
Discomfort	51	11	0	0	14.66	0.001
Pain/itching	2	4.2	0	0	1.5	0.151
Esthetic	0	0	100	0	-	-
Debris	99	3.2	0	0	99	0.001
Redness	27	8.2	0	0	10.37	0.001
Suture loss	3	4.8	0	0	1.96	0.065

Table 2: The comparison between subjective and objective parameters of Group I and Group II

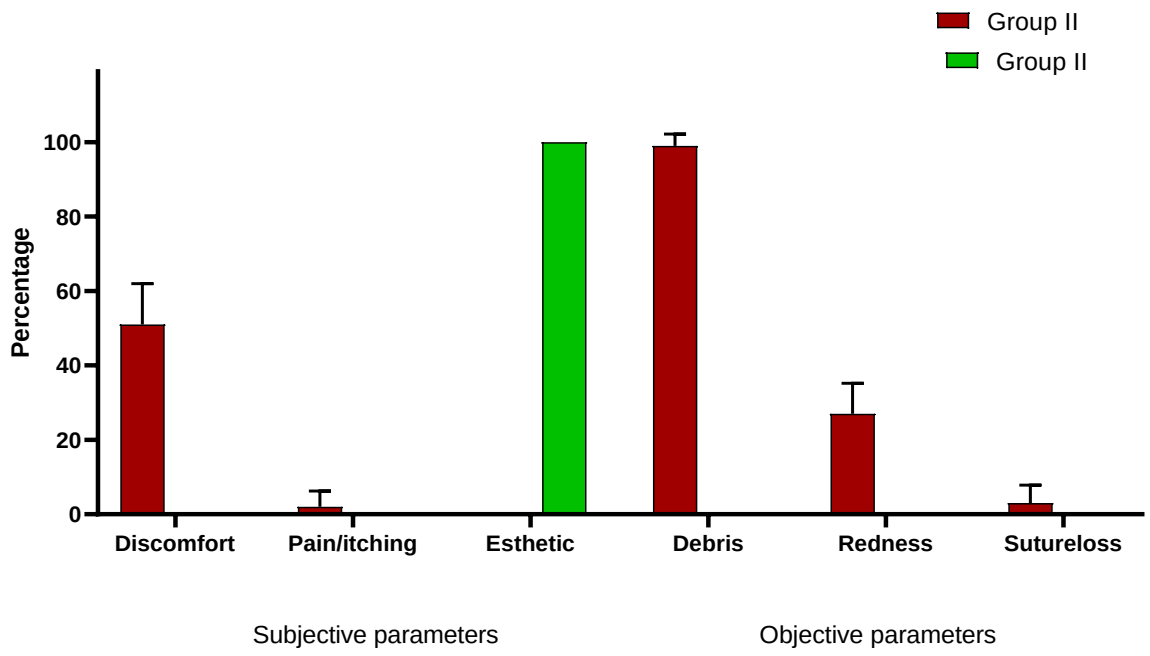

Figure 5: The comparison of subjective and objective parameters between Group I and Group II.

The findings of this study highlight significant differences between Group I and Group II in certain parameters, particularly in subjective experiences such as discomfort and esthetics and objective measures like debris and redness. Group II consistently outperformed Group I in these aspects, reflecting better post-intervention outcomes. However, in terms of clinical markers such as periodontal probing depth and overall improvement percentages, both groups achieved comparable results. These findings suggest that while both interventions are effective in improving periodontal health, the approach used in Group II may offer additional benefits regarding comfort, Recovery process and patient contentment.

4. DISCUSSION

The current research seeks to analyze the efficacy of cyanoacrylate adhesives in periodontal flap surgery in comparison to sutures. The results indicate that cyanoacrylate adhesive contributes to a reduction in both subjective and objective symptoms when compared to sutures. Despite this, no statistically significant variation was detected in the early healing index and pocket depth at 3 months post-surgery.

Successful wound healing after surgery relies on precisely aligning the wound edges and protecting the site from bacterial contamination. Infection and inflammation can hinder epithelialization, slow the healing process, and increase the patient's pain and discomfort. To ensure optimal healing of periodontal tissue following surgery, the use of sutures or tissue adhesives is essential.[5]

Khurana et al. evaluated the early healing index and found that, during the first week, the healing rate was higher in the case group. However, by the second week after operation, no significant variation was observed among the control and case groups.[6] *Kulkarni et al*. conducted a clinical and histological analysis to evaluate the healing process following periodontal flap surgery. Their findings showed superior healing in the cyanoacrylate group, both clinically and histologically. By assessing healing rates and inflammatory indices through biopsy samples taken from the surgical site, they found that, in the first week post-surgery, inflammation was lower in the cyanoacrylate group. However, by 21 days and 6 weeks after surgery, both groups exhibited similar healing patterns. The study concluded that cyanoacrylate tissue adhesive contributes to improved early-stage healing.[7]

In 2020, *Escobar et al.* published a systematic review evaluating the influence of cyanoacrylate tissue adhesive (CTA) on post-surgical palatal pain control. The review concluded that CTA demonstrated promising effectiveness in managing postoperative pain after Free Gingival tissue Graft (FGG), although no clear benefit was observed for Connective Tissue Grafts (CTG). Based on the low certainty of the evidence, the study suggested that cyanoacrylate tissue adhesive may result in reduced postoperative discomfort and reduced analgesic intake compared to wet gauze and sutures in FGG procedures.[8]

A study by Saquib et al. highlighted that cyanoacrylate has strong bonding properties that help to hold tissue margins together.[9] In recent research, Gautam et al. concluded that isoamyl 2-cyanoacrylate could serve as an alternative to traditional silk sutures, as it reduces postoperative pain and discomfort.[10]

A notable difference was seen in the presence of debris, redness, suture loss, discomfort, pain/itching, and aesthetics following 1 week between Group I and Group II in the present study. The site treated with cyanoacrylate adhesive showed no debris, redness, or discomfort. A statistically significant difference was noted in terms of redness, crater development at the apex of the papillae, suture loss, and the accumulation of materia alba in a study conducted by *Khurana et al*.[6]

5. CONCLUSION

The study yields essential information on effectiveness of the interventions, with Group II showing significant benefits across several key parameters. These results may inform clinical decision-making, especially when prioritizing patient-centered outcomes like comfort and aesthetics. Additional studies involving more sample sizes and longer follow-up durations are required to validate these results.

REFERENCES

[1] Donos N. The periodontal pocket. Periodontology 2000. 2018 Feb;76(1):7-15.

[2] Moore RL, Hill M. Suturing techniques for periodontal plastic surgery. Periodontology 2000. 1996 Jun;11(1):103-11.

[3] Santmartí-Oliver M, Bazal-Bonelli S, Sánchez-Labrador L, Beca-Campoy T, Pérez-González F, Cobo-Vázquez CM, Martínez-Pereda CM, Meniz-García C. Cyanoacrylate versus suture as flap closure methods in mandibular third molar surgery: A split-mouth randomized controlled clinical study. Medicina Oral, Patología Oral y Cirugía Bucal. 2024;29(4):e458.

[4] Coover HW, Dreifus DW, O'connor JT. Cyanoacrylate adhesives. In: Handbook of adhesives. 1990. p. 463-477. Boston, MA: Springer US.

[5] Kumar MS, Natta S, Shankar G, Reddy SH, Visalakshi D, Seshiah GV. Comparison between silk sutures and cyanoacrylate adhesive in human mucosa-a clinical and histological study. J Int Oral Health. 2013 Oct;5(5):95.

[6] Khurana JV, Mali AM, Mali RS, Chaudhari AU. Comparative evaluation of healing after periodontal flap surgery using isoamyl 2-cyanoacrylate (bioadhesive material) and silk sutures: A split-mouth clinical study. J Indian Soc Periodontol. 2016 Jul 1;20(4):417-22.

[7] Kulkarni S, Dodwad V, Chava V. Healing of periodontal flaps when closed with silk sutures and N-butyl cyanoacrylate: a clinical and histological study. Indian J Dent Res. 2007 Apr 1;18(2):72-7.

[8] Escobar M, Pauletto P, Benfatti CA, Cruz AC, Flores-Mir C, Henriques BA. Effect of cyanoacrylate tissue adhesive in postoperative palatal pain management: a systematic review. Clin Oral Investig. 2021 Jun;25:3609-22.

[9] Saquib AS, Chavan A, Dani NH, Al-Qahtani NA, Al-Qahtani SM, Priyanka N. Comparative Evaluation of N-Butyl Cyanoacrylate and Silk Sutures on Healing of Periodontal Flaps: A Clinico Histological Evaluation. Kathmandu Univ Med J (KUMJ). 2018 Jul 1;16(63):253-8.

[10] Gautam J, Sood A, Chaudhry S, Ghumman S, Chopra A. Beyond the Needle: A Comparative Evaluation of Silk Sutures and Cyanoacrylate for Periodontal Flap Closure. Cureus. 2024 Mar;16(3)..