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Comparitive evaluation of healing after periodontal flap surgery using isoamyl-2-cyanoacrylate and silk sutures

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Abstract

Tissue adhesives have been developed to overcome these problems such as cyanoacrylate. The study aims to compare healing after periodontal flap surgery using isoamyl 2-cyanoacrylate and silk sutures at the end of 2weeks, 1month and 3rd month with parameters such as plaque index, bleeding index, modified gingival index and periodontal probing depth. Early inflammatory reaction was seen with cyanoacrylate during the 2nd week when compared with sutures. However, significant difference in healing was seen at 3month when both the materials were compared and concluded that cyanoacrylate aids in early initial healing.

Keywords: Isoamyl 2-cyanoacrylate, Periodontal flap surgery, Suturing alternative, Healing

Introduction

Proper stabilization of flap margin after periodontal flap surgery in its desired position after debridement is a very much important factor that influence the success of the surgical outcome. Wound healing is achieved by a series of coordinated efforts by inflammatory cells, keratinocytes, fibroblasts and endothelial cells responding to a complex array of signals. The use of tissue adhesives as an alternative to sutures in wound closure has long been an area of clinical interest. It

provides painless, fast wound closure. This study compared the healing after periodontal flap surgery using isoamyl 2-cyanoacrylates and silk sutures in minimizing post-treatment discomfort and encourage wound healing.

Materials and methods

In total, 20 patients (14 males and 6 females) were reported to the Department of Periodontology, Daswani Dental College and Research Centre, Kota, Rajasthan with moderate to severe periodontitis assessed by clinical criteria (probing depth ≥5mm) was selected for study with informed consent. Patient who are medically healthy within 20-60 years of age with moderate to severe periodontitis were selected. Patient who had uncontrolled systemic conditions and mentally challenged were excluded from the study.

After 1week post-completion of phase 1 therapy baseline measurements were taken. The conventional non-displaced muco-periosteal flap surgery was done. After hemostasis is achieved, the surgical area to be treated was randomly selected into two areas**.** The flap was sutured with silk suture using interrupted/Figure of eight suturing technique on one side (Group A Control) and Isoamyl-2-cyanoacrylate (Group B Test) on other side. Post-surgical instructions were given. Sutures were removed after 1 week and subjects were recalled for checkup at 2weeks, 1 month and 3rd month post operatively and clinical parameters such as plaque index, bleeding index and modified gingival index were recorded in each visit.

Results

The mean value of Plaque index, Gingival index and Bleeding index in Group A and Group B was almost similar at baseline. At 2week – An improvement in plaque index was relatively good in test group (0.89 ± 0.5) than control group (1.08 ± 0.4), modified gingival index improvement was relatively good in control group (1.52 ± 0.4) than test group (1.60 ± 0.4) and improvement in sulcus bleeding index was relatively good in test group (1.65 ± 0.4) than control group (1.91 ± 0.8). At 1month, Improvement in plaque index in test (0.71 ± 0.6) than control (0.79 ± 0.2) group and modified gingival index improvement in test (0.89 ± 0.5) than control (1.02 ± 0.3) group and improvement in sulcus bleeding index in test (1.54 ± 0.7) than control (1.68 ± 0.5) group as compared to 2week was evident. At 3month, A similar improvement in plaque index, modified gingival index and sulcus bleeding index of 3month as compared to 1month is evident in both groups.

Discussion

Increased plaque index at 2weeks postoperatively in control site is due to patient's difficulty in maintaining hygiene at surgical site due to sutures causing irritation and trauma, also acts as anchoring agent of plaque and harboring pathogenic bacteria, this phenomenon is called 'wicking' [1]. A significant reduction of plaque index was seen in test group compared to control group at 1month and 3month. A statistically significant improvement of modified gingival index in the control group (Sutures) than test group (Adhesive) was evident 2 weeks postoperatively, which signifies that cyanoacrylate tissue adhesive present in the tissue provoked inflammatory response with marked neutrophil recruitment, angiogenesis and presence of some eosinophils and giant cells during the first week [2]. There was a significant improvement in the gingival index of test group (Adhesive) than control group (Sutures) seen at 1month and 3month, because of formation of neo-capillaries was higher in the healing tissue with collagen and fiber formation in cyanoacrylate

site than sutured site [3]. A statistically significant reduction of sulcus bleeding index was seen in test group as compared to control group from baseline, 2weeks, 1month and 3month, which signifies Cyanoacrylate showed a better healing with good bonding properties and strength, as the adhesive polymerizes the moment it comes in contact with moisture and even blood and forms long and stable chain through covalent bonds and Van Der Waals force [4]. Due to this property, it can hold the approximated tissue in position together and hence a good hemostatic agent compared to silk sutures [5]. From the result of the study, it is clear that the healing after 1month was better in the site where cyanoacrylate was applied compared to the sutured site. Thus, looking at these aspects isoamyl 2-cyanoacrylate can be easily, routinely, and conveniently used for closure after periodontal flap surgery.

Figures and tables

Figure 1: baseline

Figure 2: Incision

Figure 3: elevation and debridement

Figure 4: isoamyl 2-cyanoacrylate (amycrylate)

Figure 5: suture placement in

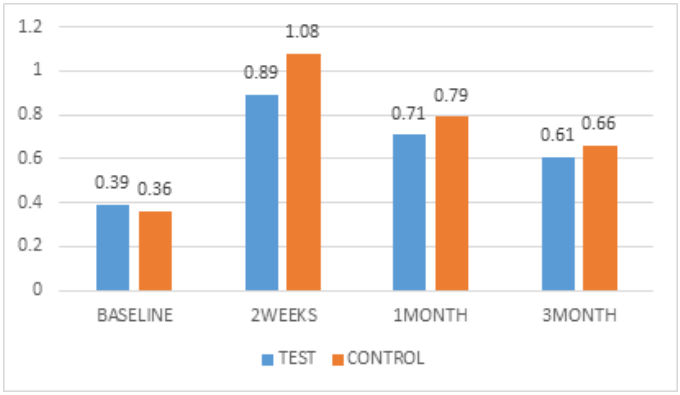
Figure 6: cyanoacrylate placement

Figure 7: two weeks postop image

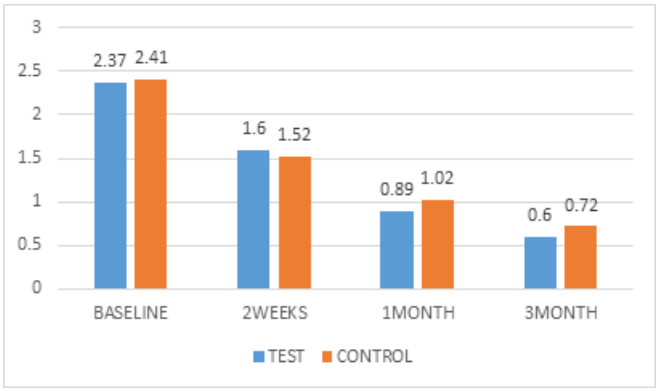
Figure 8: one-month postop image

Figure 9: three-month postop image

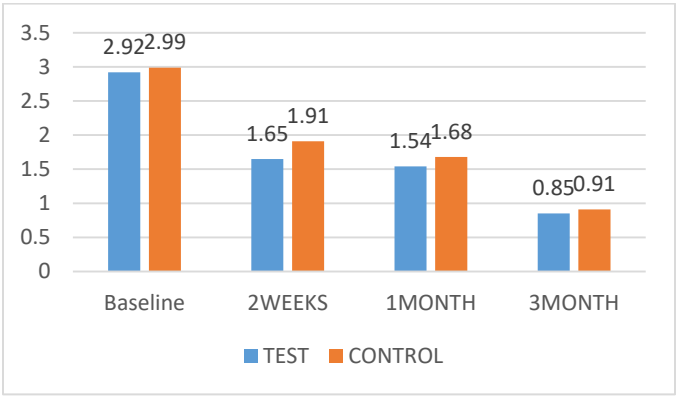
Graph



Graph 1 : mean modified plaque index



Graph 2 : mean modified gingival index



Graph 3: mean sulcus bleeding index

Tables

Plaque index

Table 1: Comparison of mean plaque index score between test group (Cyanoacrylate tissue adhesive) and control group (Suture materials) at various time periods.

Parameters	Time Period	Group	Mean	Standard Deviation	p-value*
Plaque index	Baseline	Test	0.39	0.172	0.706
		Control	0.36	0.168	
	2 Weeks	Test	0.89	0.490	0.052
		Control	1.08	0.399	
	1 Month	Test	0.71	0.669	0.166
		Control	0.79	0.218	
	3 Month	Test	0.61	0.412	0.015*
		Control	0.66	0.222	

*p<0.05 – statistically significant

Modified gingival index

Table 2: Comparison of mean modified gingival index score between test group (Cyanoacrylate tissue adhesive) and control group (Suture materials) at various time periods

Parameters	Time Period	Group	Mean	Standard Deviation	p-value*
Modified gingival index	Baseline	Test	2.37	0.476	0.253
		Control	2.41	0.438	
	2 Weeks	Test	1.60	0.454	0.095
		Control	1.52	0.444	
	1 Month	Test	0.89	0.479	0.137
		Control	1.02	0.348	
	3 Month	Test	0.60	0.305	0.023*
		Control	0.72	0.518	

*p<0.05 – statistically significant

Sulcus bleeding index

Table 3: comparison of mean sulcus bleeding index score between test group (cyanoacrylate tissue adhesive) and control group (suture materials) at various time periods

Parameters	Time Period	Group	Mean	Standard Deviation	p-value*
Sulcus bleeding index	Baseline	Test	2.92	0.569	0.536
		Control	2.99	0.525	
	2 Weeks	Test	1.65	0.408	0.790
		Control	1.91	0.822	

	1 Month	Test	1.54	0.678	0.387
		Control	1.68	0.547	
	3 Month	Test	0.85	0.554	0.339
		Control	0.91	0.378	

*p<0.05 – statistically significant

Conclusion

From the results of the present study, we arrive at the following conclusion, Cyanoacrylate tissue adhesive is clinically effective in stabilization of flap and can be used as an excellent alternative to non-resorbable silk sutures. Improvement in plaque index, modified gingival index and sulcus bleeding index were found to be favorable in test group (Cyanoacrylate tissue adhesive) than control group (non-resorbable suture). Isoamyl-2-cyanoacrylate tissue adhesive was safe to use, without causing any immunologic or antigenic reactions in any of the patients

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