ORIGINAL RESEARCH

Assessment of Clinical Efficacy of Different Periodontal Dressing Materials on Wound Healing: A Comparative Study

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Abstract

Aim: The present study aims to assess the efficacy of different periodontal dressing materials on wound healing clinically.

Materials and methods: A total of 45 patients between the age group of 30–45 years, with chronic generalized periodontitis with loss of attachment of 3–6 mm, who require periodontal flap surgery, were screened to include in the study. Out of 45 subjects, 24 were males and 21 were females. The subjects were randomized into 3 groups as 15 in each. Group I: a collagen dressing, group II: light-cure dressing, and group III: non-eugenol-based dressing. The clinical parameters such as plaque index, vertical probing depth, pain, gingival index, and patient satisfaction were documented for all the three groups on the 7th and the 14th day. Visual analog scale (VAS) was used to score the pain severity. The SPSS 20 software was used to analyze the data. The significance level was set at 5%.

Results: The mean gingival index score reduced from 1.40 ± 0.14 to 1.10 ± 0.30 in group I, from 1.48 ± 0.01 to 1.26 ± 0.22 in group II, and from 1.58 ± 0.16 to 1.33 ± 0.10 in group III. The mean plaque index score reduced from 1.48 ± 0.56 to 1.18 ± 0.40 in group I, from 1.46 ± 0.01 to 1.24 ± 0.48 in group II, and from 1.42 ± 0.12 to 1.20 ± 0.20 in group III. There was a statistical difference found in all the three groups and between the groups from the plaque and gingival index scores. The probing depth comparison shows a significant difference in group I. Patient satisfaction was almost similar in all the groups. The pain index showed the reduction in the pain severity from the 7th day to the 14th day in all the subjects from all the three groups.

Conclusion: It can be concluded that the periodontal wound covered with a collagen dressing material showed significant evidence to provide symptomatic relief and better healing to the patients compared to that of light-cure and non-eugenol periodontal dressing material.

Keywords: Chronic periodontitis, Pain, Periodontal dressings, Surgical flaps.

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Introduction

Treatment for the periodontal disease triggers the hemorrhage, causing tissue injury which leads to the formation of the blood clot. To prevent the wound infection or colonization of bacteria, the blood clot is surrounded by inflammatory cells. The wound repair or regeneration happens following several subsequent healing events.[1] The oral cavity unlike the other parts of the body is repeatedly exposed to the harmful septic environment which may jeopardize the new connective tissue attachment's formation or maturation. It is important to note about the oral cavity is that it continuously undergoes chemical, thermal, and mechanical damages which may lead to failure of the treatment. As a precautionary measure against bacterial insult, periodontal dressing is used by the clinicians not only to isolate but also to protect the wound.[2]

Dr Ward introduced periodontal dressing for the first time in the year 1923 and insisted on using the dressing after periodontal surgery. The periodontists use the dressings for various purposes widely, though there are a few existing controversies related to its application post-periodontal surgery.[3]

The oral cavity consists of bacteria which are opportunistic and also pathogenic which may cause chronic or acute infections with the persistence of any wound or cut in the epithelium. The proper precautionary measures are necessary to control the activity of the microorganisms, and its regeneration, to prevent the failure of respective surgery.[4] The main reason to close the surgical site post-periodontal surgery using periodontal dressing is to reduce the pain. It has been proved that the periodontal packs help in reducing discomfort and pain postoperatively by shielding the site of surgery and without any therapeutic effects.[5]

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A periodontal dressing is considered as one of the most important factors which influence the surgical periodontal therapy outcome by the majority of the periodontists. The other

factors being prescribed are antibiotics, surgical techniques, and thoroughness of root planing. Periodontal dressings reduce the dead space underneath the periodontal flap yielding to comfort the patient postoperatively. This proves that the periodontal dressings were proved to protect and cover the wound surface from the external environment and used widely, although it is a matter of individual preference to apply it or not during the clinical practice.[6] Therefore, this study was conducted to know the efficacy of different periodontal dressing materials clinically during the process of wound healing.

Materials and Methods

Selection of Patients

A total of 45 patients between the age group of 30 years and 45 years, with chronic generalized periodontitis with loss of attachment of 3–6 mm, who require periodontal flap surgery, were screened to include in the study. Out of 45 subjects, 24 were males and 21 were females. The entire study process and design were explained to each patient. Systemically healthy subjects with no habit of alcohol and smoking were included. The patients with systemic diseases (uncontrolled diabetes mellitus, tuberculosis, and hypertension), lactating, and pregnant mothers all those that affect the study outcome were excluded from the study. A complete history, examination, and complete hemogram were taken from each patient. The subjects were randomized into three groups, each group had 15 subjects.

Group I: A Collagen Dressing (Colla Cote®)

All 15 subjects were administered with a solution of 0.12% of chlorhexidine gluconate to swish it for 30 seconds 1 hour before the surgery. The subject's surgical area was anesthetized with 2% of lidocaine having 1:80,000 adrenaline. A standard protocol was followed during the preparation of the site, incision, the reflection of the flap, and debridement of the tissues along with the complete process of flap surgery (Fig. 1). Bone contouring was kept minimal. The surgical site was closed using the 4-0 silk suturing material with a 3/8 circle reverse cutting needle (Fig. 2). The surgical wound was rinsed thoroughly, cleaned, and removed the excess fluid. The collagen dressing was placed above the wound and, using moderate pressure, it was kept in place.

Group II: Light-cure Dressing, i.e., Barricaid®

All 15 randomized subjects underwent surgery as mentioned above. The surgical site was dried and the light-cure dressing material was dispensed on the gingival margin and cervical third of the teeth through a syringe. Muscle molding and contouring of the material were done using finger pressure with lubricated gloved hands or with a plastic instrument. The material was light cured for 10 seconds per tooth per side and, if required, additional material was added and incrementally cured. The area was covered oppositely one by one, for example, from buccal/lingual to the opposing site.

Group III: Non-eugenol-based Dressing (Coe-Pak™)

The 15 randomized subjects underwent surgery as mentioned above. Equal lengths of the catalyst and base paste of the non-eugenol dressing material were dispensed on a glass slab and mixed as per the instruction manual from the manufacturer. The dressing material was applied and compressed well to close the embrasure spaces with a moist-gloved hand so that the material gets molded properly to the required contour (Fig. 3).

All the 45 subjects were instructed not to displace the material and to avoid consumption of hot beverages and food for a few days. Subjects were prescribed with amoxicillin capsule 500 mg and ibuprofen tablets 400 mg both thrice a day for 5 days.

Removal of Periodontal Dressings and Clinical Assessment

The periodontal dressing was removed in two parts, buccal and lingual, completely on the 7th day postsurgery using a blunt probe and a dental tweezer. Postoperatively, the clinical parameters such as plaque index, vertical probing depth, pain, gingival index, and patient satisfaction were documented for all the three groups on the 7th and the 14th day. VAS was used to score the pain severity. The score ranges from "0" no pain/discomfort to "10" most severe pain/discomfort.

Statistical Analysis

The SPSS 20 software was used for the analysis of data. The mean difference between the different groups was calculated using the analysis of variance (ANOVA) test and qualitative data were analyzed using the Fischer exact test. The level of significance was set at 5%.

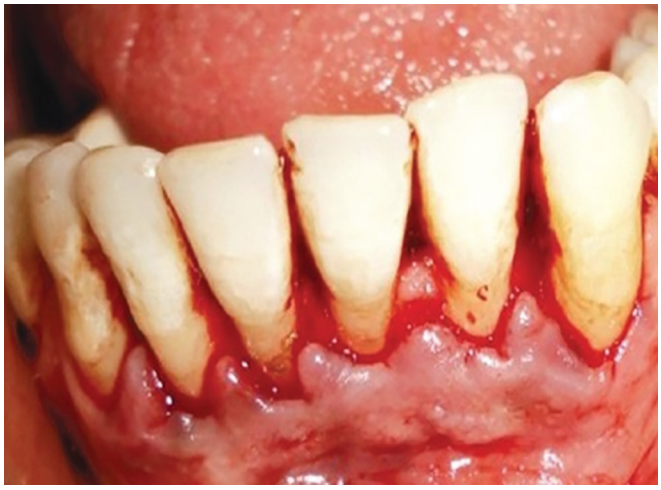

Fig. 1: Flap elevation and debridement done

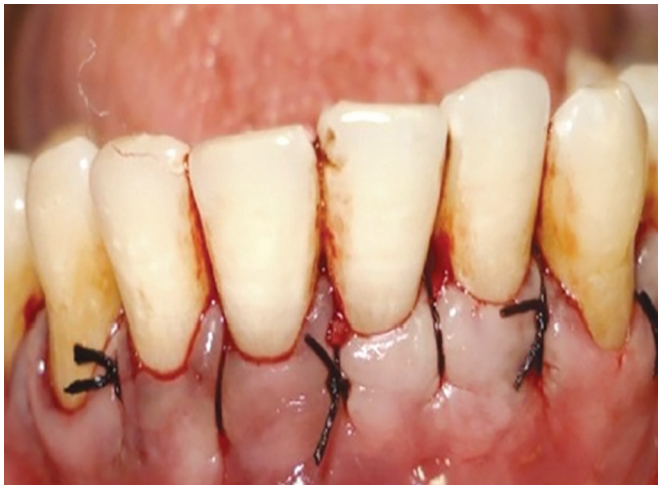

Fig. 2: The surgical site was closed with suturing material

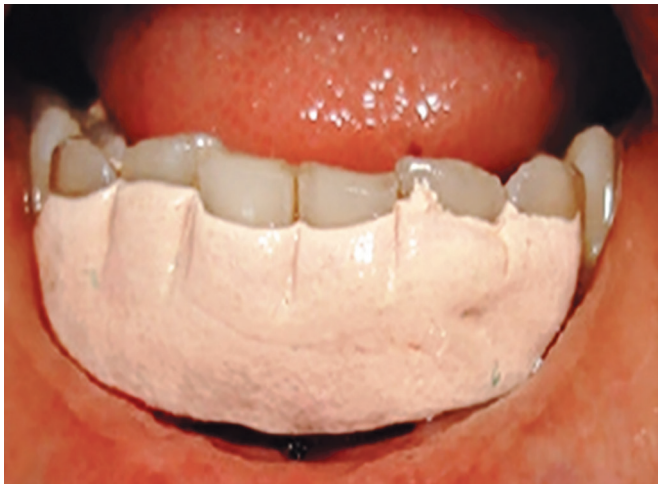

Fig. 3: Application of dressing material over the surgical site

Results

Table 1 shows the mean comparison of a gingival index at the 7th and the 14th day. The mean gingival index score at the 7th day in group I was 1.40 ± 0.14, compared to groups II and III, it was 1.48 ± 0.01 and 1.58 ± 0.16, respectively. On the 14th day, the score drastically reduced in group I was 1.10 ± 0.30, compared to groups II and III, it was 1.26 ± 0.22 and 1.33 ± 0.10, respectively. Therefore, a significant statistical difference was found between all the groups.

Table 2 shows the mean comparison of the plaque index at the 7th and the 14th day. The mean gingival index score at the 7th day in group I was 1.48 ± 0.56, compared to groups II and III, it was 1.46 ± 0.01 and 1.42 ± 0.12, respectively. On the 14th day, the score drastically reduced in group I was 1.18 ± 0.40, compared to groups II and III, it was 1.24 ± 0.48 and 1.20 ± 0.20, respectively. Therefore, a significant statistical difference between all the groups was found in a different time interval.

Table 3 shows the mean comparison of vertical probing depth recorded at the 7th and the 14th day. The mean gingival index score at the 7th day in group I was 5.68 ± 0.19, compared to groups II and III, it was 5.86 ± 0.01 and 5.84 ± 0.36, respectively. On the 14th day, the score reduced in group I was 4.90 ± 0.76, compared to groups II and III, it was 5.02 ± 0.11 and 5.14 ± 0.34, respectively. A significant reduction in probing depth was found in group I.

Table 4 shows the results of patient satisfaction scale graded by the subjects postsurgery. The results showed almost similar satisfaction in the entire group without any difference statistically.

Table 1: Mean value comparison of the gingival index at the 7th day and the 14th day

	Groups		*Mean ± SD*	*F value*	*p value*
Gingival index	Group I	7th day	1.40 ± 0.14	6.140	0.001
		14th day	1.10 ± 0.30		
	Group II	7th day	1.48 ± 0.01	8.138	0.001
		14th day	1.26 ± 0.22		
	Group III	7th day	1.58 ± 0.16	7.112	0.001
		14th day	1.33 ± 0.10		

Table 2: Mean value comparison of the plaque index at the 7th day and the 14th day

	Groups		*Mean ± SD*	*F value*	*p value*
Plaque index	Group I	7th day	1.48 ± 0.56	9.120	0.001
		14th day	1.18 ± 0.40		
	Group II	7th day	1.46 ± 0.01	7.223	0.001
		14th day	1.24 ± 0.48		
	Group III	7th day	1.42 ± 0.12	6.734	0.001
		14th day	1.20 ± 0.20		

Table 3: Mean value comparison of the vertical probing depth at the 7th day and the 14th day

	Groups		*Mean ± SD*	*F value*	*p value*
Vertical probing depth	Group I	7th day	5.68 ± 0.19	8.160	0.02
		14th day	4.90 ± 0.76		
	Group II	7th day	5.86 ± 0.01	7.108	0.06
		14th day	5.02 ± 0.11		
	Group III	7th day	5.84 ± 0.36	7.348	0.08
		14th day	5.14 ± 0.34		

Table 4: Assessment of patient's satisfaction

Patient satisfaction grade	*Group I (n = 15)*	*Group II (n = 15)*	*Group III (n = 15)*	*p value*
Very satisfied	4 (26.6%)	3 (20.0%)	2 (13.4%)	0.342
Fairly satisfied	8 (53.4%)	7 (46.6%)	7 (46.6%)	
Fairly unsatisfied	3 (20.0%)	5 (33.4%)	6 (40.0%)	
Very unsatisfied	0	0	0	

Table 5: Evaluation of burning sensation/pain (VAS)

Duration and groups		*No pain*	*Mild pain*	*Moderate pain*	*Severe pain*	*Fischer exact test*
7th day	Group I	0	7	5	3	$\chi^2 = 4.162, p = 0.314$
	Group II	0	6	5	4	
	Group III	0	6	5	4	
14th day	Group I	0	10	4	1	$\chi^2 = 6.148, p = 0.158$
	Group II	0	9	5	1	
	Group III	0	9	5	1	

Table 5 shows the VAS score depicting the severity of pain/burning sensation. There was no statistical difference between the groups in reduction from the 7th to the 14th day, but severe pain was seen in most of the patients under groups II and III. The reduction in the pain severity of the subjects in all the three groups was seen from the 7th day to the 14th day.

Discussion

Blood clot stabilization and protection of wound are the main intention for the application of the periodontal dressing because wound healing can happen only when the wound is stable. The pressure of the dressing material over the healing site enhances the adhesion of the soft tissue to the bone/root surface to avoid bacterial infiltration and, thus, helping the wound healing process, maintaining the stability along with tissue rebound minimization.[7] The potential advantageous properties include a significant reduction in the sensitivity of the root and formation of plaque at the wound site.[8]

Freedman and Stassen[9] explain other benefits of periodontal dressing for minimizing the risk of postoperative complications such as bleeding and wound infection, increased tissue healing by preventing physical trauma during speech and mastication, and reducing the formation of granulation tissue.

In this study, light-cure dressing material (Barricaid) had better results compared to that of the non-eugenol dressing material (Coe-Pak™).

This result was in contrast to the study done by Garg et al.,[10] stating that the slight more discomfort present at Barricaid-treated sites might be because of the uncured residual monomer beneath the cured surface at deeper strata. This was justified previously by Gilbert et al.[11] on the effect of light-cured periodontal dressing material on gingival cells. This problem can be countersink by raising the curing time up to 20 seconds especially in the interproximal area where it was thickest after placement. Furthermore, Coe-Pak is a non-eugenol dressing that might exert local anesthetic effect leading to slight discomfort to the patient [mainly Coe-Pak contains base tube: contains cellulose, rosin, natural gums (for cohesiveness) and fatty acids, waxes, chlorothymol (bacteriostatic agent), alcohol, zinc acetate. Accelerator tube contains zinc oxide, chlorothymol, vegetable oil (for plasticity), silica, synthetic resin, magnesium oxide, coumarin lorothidol.

Since a long time, Coe-Pak was used as periodontal dressing; however, it is justified and the reasoning for placement is still questionable. Angwan et al.[12] revealed that the application of Barricaid light-cure dressing material shows more acceptable and superior results as compared to standard periodontal dressings, especially for the anterior region. It is tinted for superior esthetics, appealing appearance, offers protection, and commonly used in the anterior region. It contains mainly polyether urethane dimethacrylate resin, silanated silica, visible light cure (VLC) photoinitiator and accelerator, stabilizer, and colorant.

The collagen dressing in the present study showed a less significant score in gingival index, plaque index, vertical probing depth, and pain reduction compared to that of the other dressing materials. These results were similar to the study results conducted by Jorkjend and Skoglund[13] which showed that greater pain was associated with Coe-Pak dressings. The reduced pain sensation is due to the dampening of the collagen during the acute inflammatory process of healing. Though Coe-Pak is non-eugenol based, the material led to the pain with associated inflammation, which had a very minimal biological effect on the tissues of the palate. CollaCote is a type 1 collagen, which is derived from the bovine Achilles tendon. Collagen is the natural extracellular matrix substrate that has a chemotactic effect on many types of cells such as fibroblasts, osteoblast, and endothelial cells.[14] Therefore, collagen dressing would have been contributed to reducing the process of inflammation occurring during the process of healing. The inflammation of a lesser degree may directly lead to the reduction of pain and sensation of burning as observed in this group.

All the patients were instructed to grade the treatment through patient satisfaction grade scale on the 14th day. The patients who were treated with collagen dressing had better satisfaction followed by light-cure and non-eugenol periodontal dressings. These results were comparable to the results of the study conducted by Madan et al.[15] who advocated Barricaid as a material with the biocompatible property. There was a minor reduction in the adhesion and retention in the Coe-Pak sites when compared with Barricaid sites, although embrasure and interproximal areas were properly adapted. The difference was found to be statistically insignificant as per the solubility property of both the dressing materials.

In the present study, a collagen dressing group showed comparatively reduced pain at the 7th and the 14th day. To reduce postsurgical pain is the main reasons for clinicians to cover the surgical site with dressing. These are similar to the study done by Ghanbari et al.[16] who confirmed pain reduction following the use of periodontal dressing, whereas Bae et al.[17] reported the degree of postsurgical pain to be equal in patients with and without periodontal dressing.

Other important factors which influence the outcome of the study were the operator in the terms of operating, manipulating, and handling of the material as well as the working time of each periodontal dressing material. The light cure consists of a single paste which reduces the time for mixing as that of the non-eugenol dressing material. However, the cross-infection may happen with the direct-application technique when syringe once used is not discarded every time after the procedure. The light cure has the advantage of having complete control over the placement of the material, incremental addition, and setting time, whereas non-eugenol material has a fixed setting time which reduces the working

time. During manipulation, moistened gloves should be used for both the materials; however, after polymerization, the light cure has an advantage of turning into firm whereas non-eugenol material becomes brittle. Hence, the patient's acceptance and the clinician's preference equally matter in selecting the periodontal dressing material for a specific clinical situation. The clinical performance of the periodontal dressing materials such as plaque, bleeding score, and healing was found to be acceptable.[18] A large sample study can yield more accurate evidence and nature of plaque can be more specifically analyzed microbially.

Conclusion

In conclusion, the periodontal wound covered with the collagen dressing showed evidence of better healing and provided better symptomatic relief to the patients when compared to those covered with a light-cured and non-eugenol dressing.

Clinical Significance

A periodontal dressing is really beneficial in some cases. To protect the wound from the mechanical trauma and to maintain the stability of the surgical site while healing, it is more important to use periodontal dressing material after surgery.

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