

Effect of a Chlorhexidine Dressing on the Healing After Periodontal Surgery

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INTRODUCTION

HISTOLOGIC AND BACTERIOLOGIC studies have indicated that periodontal dressings used post-surgically do not prevent bacterial colonization on the teeth and gingiva during the time the dressings are in situ.¹⁻⁵

The continuous presence of bacteria on a wound surface has been found to enhance inflammation and granulation tissue formation, besides retarding healing of the tissue (for review, see Burke 1971).⁶ Microorganisms that grow on or near a post-surgical periodontal wound may thus interfere with gingival healing.

Chlorhexidine has been found to be an efficient antibacterial and mycostatic agent in the oral milieu.⁷⁻¹¹ It is possible that a surgical dressing containing chlorhexidine would favor gingival healing by preventing bacterial growth in the wound area.

The purpose of the present study was to evaluate the effect of a chlorhexidine dressing on gingival healing after periodontal surgery.

MATERIALS AND METHODS

One hundred teeth in ten patients, seven females and three males, aged between 30 and 58 years, with advanced marginal periodontal disease constituted the material. Prior to surgery each patient had a thorough prophylaxis and was given instructions in oral hygiene. Surgery was not undertaken until the oral hygiene condition of each patient was acceptable.

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After reversed bevel incisions, full thickness flaps were raised from second bicuspid to second bicuspid in the upper or lower jaw. The flaps were replaced and sutured tightly interdentially. A volume of 1.5—2.5 ml of a dressing (A) consisting of 12% Methocel (methylcellulosum 1500, ADA, Sweden) and 0.2% chlorhexidine acetate was then applied with a syringe interdentially and along the gingival margin in the left or right side of the jaw. Chlorhexidine in 0.2% solution was chosen, as this concentration has been found to prevent dental plaque formation.⁹ The placebo dressing (B), consisting of 12% Methocel, was placed on the contralateral side. Neither the therapists nor the patients knew which of the two dressings contained the chlorhexidine. A custom-fitted vinyl splint (Figure 1) was then placed and sealed off at the periphery by a thin string of Coe-pak.* In order to prevent the active and placebo material from mixing, a string of Coe-pak was placed at the midline. Both dressings had a gel-like consistency and were water-soluble. Thus, the function of splints was to protect the dressings from the impact of saliva and mastication. The patients wore the splints day and night. Some patients found the splints uncomfortable. The dressings were changed on days five and eight and finally removed on day eleven. The sutures were removed on day eight. The patients started mechanical tooth cleansing procedures on day eleven. In addition, from day eleven they rinsed twice daily with 0.2% chlorhexidine-gluconate. Mechanical oral hygiene measures were practiced ad libitum.

To ascertain that the methylcellulosum did not inactivate the antibacterial properties of the chlorhexidine, the following tests were made. Volumes of 0.1 ml saliva diluted 1/10 were spread on blood agar plates. Filter paper discs with chlorhexidine dressing, other discs with placebo dressing, and still others which had been moistened with 0.2% chlorhexidine solution were placed on the plates. Plates with the different test materials were incubated 36 hours at 37°C both aerobically and anaerobically. Growth of salivary bacteria on the plates was inhibited in the areas adjacent to the filter papers to which the chlorhexidine dressing and the chlorhexidine solution had been applied. No inhibitory zones were observed for the placebo dressing.

Healing of the marginal gingiva was studied on days 5, 8, 11, 14, 21, 28 and 35 post-surgically by measuring gingival exudate and bleeding tendency of the gingiva following standardized probing. The Gingival Index (GI) was also scored at the end of the experimental period.

1. *Gingival exudate measurements*¹² were performed on the mid-buccal aspect of the gingiva in three contra-

*Coe-pak, Coe Laboratories, Inc., Chicago, Ill. 60658.

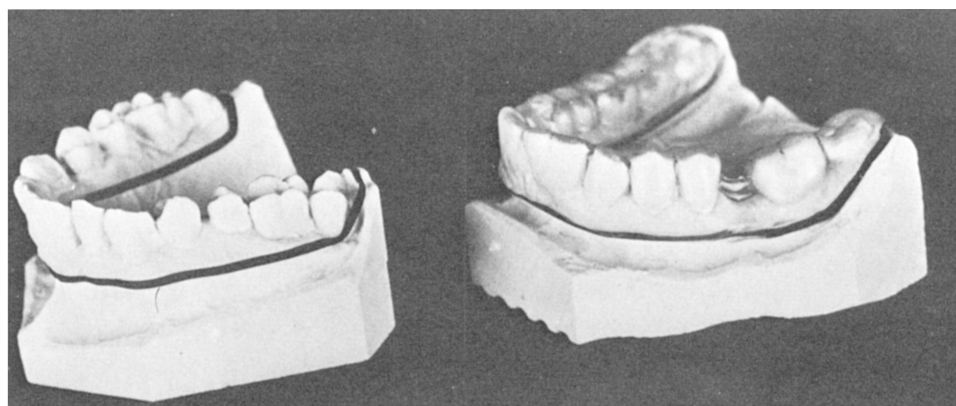


FIGURE 1. Vinyl splints fitted on individual casts. The dark line shows the extension of the covering splint on the buccal and oral aspects of the jaws.

lateral pairs of teeth in each individual. In most patients these teeth were the second bicuspids, cuspids, and first incisors. The diffusion of gingival exudate into the strips was measured to the nearest half millimeter. The sum of the three measurements made on either side was calculated for each set of samples.

2. *Bleeding tendency measurements* were made by a standardized probing procedure. The facial, mesial, distal and oral marginal gingiva of all teeth under study were probed and bleeding observed as described by Mühlemann and Son.¹³ The probe was a modified pen-balance † originally designed for measuring orthodontic forces (Figure 2). The balance consisted of a tube into which a piston could be forced. The force needed to push the piston a certain distance into the tube was delineated by labels on the piston. The actual probe was attached to the piston and the rounded tip of the probe was 0.5 mm in diameter. The selection of a probing force of 27 ponds was based on results by Gabathuler

and Hassel.¹⁴ Probing was omitted on day 5 in all patients and on day 8 in six patients since the tissues proved to be too tender. The frequency, or percentage, of bleeding units was determined for each side of the jaws.

3. *Gingival Index (GI)*.¹⁵ The mesial, facial, distal and oral gingiva of all teeth were scored on day 35 and the frequency of the different GI scores was computed for each side of the jaws.

RESULTS

The amount of gingival exudate for both the experimental (A) and placebo (B) side decreased during the observation period. In individual patients large variations were noted between two consecutive samples. However, at all intervals except on day 35 less gingival exudate was obtained from the chlorhexidine dressing side (Table 1, Figure 3).

The frequency of bleeding gingival units also de-

†Dontrix, E.T.M. Corporation, Monrovia, Calif. U.S.A.

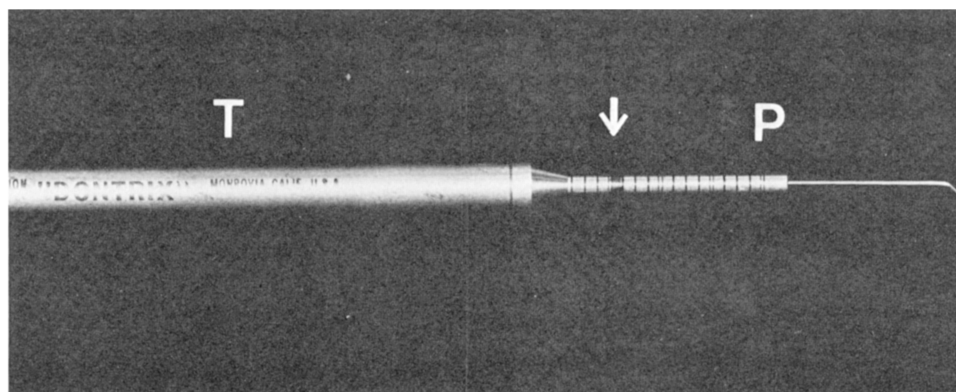


FIGURE 2. Instrument used for standardized probing. The piston (P) can be forced into the tube (T). The arrow indicates the mark at 27 ponds (one ounce).

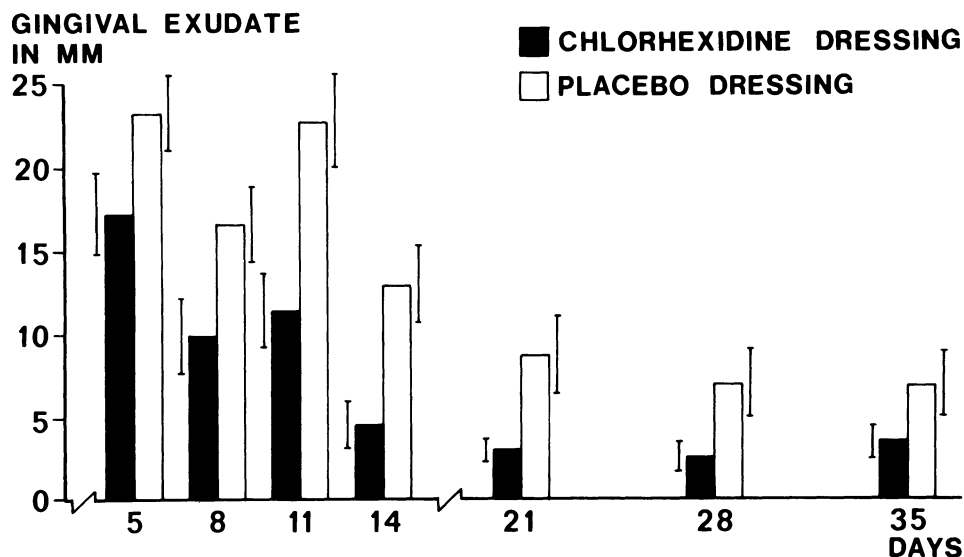


FIGURE 3. Diagrammatic representation of the variations in exudate collected from the healing gingiva covered with chlorhexidine and placebo dressings during the experimental period. Vertical lines indicate standard errors of the means.

creased post-surgically. The bleeding frequency was higher for the placebo side than for the chlorhexidine side up to day 28. On day 35 no significant difference was noted (Table 2, Figure 4).

A higher frequency of a GI score of 0 was found for the chlorhexidine side in six of the patients on day 35. GI scores of 2 occurred only on the placebo side (Table 3).

Nine of the ten patients were asked which of the sides had been more uncomfortable following surgery. Seven considered the placebo side to be the more painful while two said that there had been no difference between the two sides.

DISCUSSION

The difference in the amount of gingival exudate and in the bleeding frequency between the experimental and placebo sides indicate that the use of a surgical dressing containing chlorhexidine acetate in a concentration of 0.2% promotes the healing of gingival wounds after periodontal surgery. As mentioned earlier, chlorhexidine has proved to be an effective agent against oral microorganisms and the chlorhexidine-containing dressing used in the present investigation had an in-vitro antibacterial effect on the growth of salivary bacteria. It is therefore likely that the beneficial effect of the dressing on the healing processes in the gingiva was due to the

TABLE 1
Amounts of gingival exudate (mm) from experimental (A) and placebo (B) sites at the different sampling times.

Day	Dressing	Patient number										Mean	S.E.	Student's t. test A/B
		1	2	3	4	5	6	7	8	9	10			
5	A	11.5	22.0	1.5	15.5	23.5	23.0	22.5	23.5	9.5	19.0	17.2 ± 2.38	p < 0.05	
	B	11.0	30.0	16.0	15.5	21.5	23.5	30.0	24.0	30.0	30.0			23.2 ± 2.23
8	A	3.0	11.0	2.0	1.0	6.5	21.5	12.5	14.5	8.0	19.0	16.6 ± 2.24	p < 0.01	
	B	4.5	21.0	12.0	6.5	23.0	24.0	15.5	16.5	18.0	24.5			11.4 ± 2.13
11	A	4.5	23.0	8.5	1.5	16.5	10.0	5.0	18.0	14.0	12.5	22.7 ± 2.72	p < 0.001	
	B	6.5	30.0	30.0	13.0	25.0	22.0	26.5	30.0	14.0	30.0			4.5 ± 1.60
14	A	4.5	0.5	1.5	2.5	1.0	11.0	3.5	16.0	1.0	3.5	12.9 ± 2.29	p < 0.01	
	B	9.5	14.5	6.5	17.0	4.5	10.5	16.5	26.0	3.5	20.0			8.7 ± 2.28
21	A	3.0	8.5	2.0	3.0	1.0	3.0	3.5	3.5	1.0	1.5	3.0 ± 0.68	p < 0.05	
	B	8.5	11.0	4.5	22.0	3.0	9.0	3.5	20.0	3.5	1.5			2.6 ± 0.96
28	A	2.0	9.0	1.0	—	0.5	3.0	2.0	—	2.0	1.0	7.0 ± 2.00	p < 0.01	
	B	7.0	18.5	1.5	—	4.5	6.0	3.5	—	12.0	3.0			3.5 ± 0.95
35	A	0.5	6.5	1.5	—	1.5	7.0	2.5	—	6.5	2.0	6.9 ± 1.97	N.S.	
	B	3.5	5.5	1.5	—	2.5	17.5	3.5	—	10.0	11.5			

— not tested.

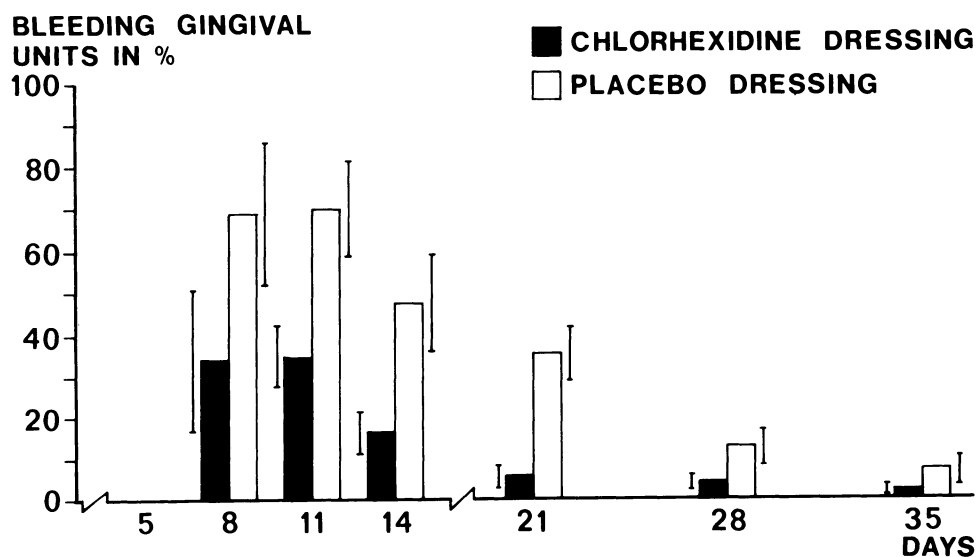


FIGURE 4. Diagrammatic representation of the variations in bleeding frequencies of gingival wounds covered with chlorhexidine and placebo dressings during the experimental period. Vertical lines indicate standard errors of the means.

TABLE 2

Frequencies (percentage) of bleeding units on the experimental (A) and placebo (B) sites at the various test times.

Day	Dressing	1	2	3	4	5	6	7	8	9	10	Mean S.E.	Student's <i>t</i> . test A/B
8	A	5	—	—	5	55	70	—	—	—	—	33.8 ± 16.88	
	B	50	—	—	31	100	95	—	—	—	—	69.0 ± 16.94	<i>p</i> < 0.01
11	A	10	40	45	0	35	60	56	—	30	—	34.5 ± 7.40	
	B	20	100	85	37	94	85	100	—	40	—	70.1 ± 11.43	<i>p</i> < 0.01
14	A	0	0	15	0	10	25	37	—	30	30	16.3 ± 4.88	
	B	0	75	65	6	67	25	87	—	20	85	47.7 ± 11.58	<i>p</i> < 0.02
21	A	0	0	25	0	5	5	0	5	15	0	5.5 ± 2.63	
	B	10	40	65	12	62	10	43	30	35	45	35.2 ± 6.34	<i>p</i> < 0.001
28	A	0	0	10	0	10	0	12	—	5	0	4.1 ± 1.74	
	B	0	15	30	6	37	0	6	—	10	10	12.7 ± 4.28	<i>p</i> < 0.05
35	A	0	0	0	10	10	0	0	—	0	0	2.2 ± 1.47	
	B	0	0	35	6	6	0	6	—	5	5	7.0 ± 3.62	N.S.

— not tested.

decreased possibility of oral bacteria colonizing the wound area.

The fact that most of the patients had less postsurgical discomfort from the chlorhexidine-treated regions is in agreement with studies showing that incorporation of antibiotics in periodontal dressing decreases the pain after surgery.¹⁶⁻¹⁷

After removal of the active and placebo dressings on day 11, differences in the amount of gingival exudate and bleeding frequency between the experimental and placebo sides continued during the subsequent healing period. The use of chlorhexidine rinsings assured optimal plaque control and the mechanical oral hygiene procedures were presumably similar for both sides. The fact that the differences in the gingival parameters persisted beyond this point suggests that the initial use of

an antibacterial dressing may have had a prolonged effect. A prolonged effect of the chlorhexidine dressing is also indicated by the difference in the GI scores on the experimental and placebo sides. The apparent extended effect on the gingival tissue of a short-term continuous exposure to an antibacterial agent during healing after surgery may be of clinical significance and the mechanisms behind this phenomenon should be clarified.

SUMMARY AND CONCLUSIONS

The effect of a chlorhexidine-containing surgical dressing was studied during the healing of reversed bevel operations in 10 patients with advanced periodontal disease. The gingival wounds of the right or left sides of the jaws were covered by a dressing containing 0.2% chlorhexidine acetate while the contralateral area was

TABLE 3
Frequencies (percentages) of Gingival
Index scores 0, 1 and 2 on day 35.

Patient	Dressing	GI score percentages		
		0	1	2
1	A	75	25	0
	B	60	40	0
2	A	50	50	0
	B	35	65	0
3	A	60	40	0
	B	30	55	15
4	A	44	56	0
	B	30	60	10
6	A	55	45	0
	B	75	25	0
7	A	20	80	0
	B	10	80	10
9	A	20	80	0
	B	0	70	30
10	A	40	60	0
	B	40	55	5

Mean and S.E. A 45.5 ± 6.71 54.5 ± 6.71 0
B 35.0 ± 8.61 56.3 ± 6.11 8.8 ± 3.63

covered by a placebo dressing. The dressings were kept in place for 11 days, after which the patients rinsed with a 0.2% chlorhexidine solution twice daily. The effect on the healing of the gingiva was evaluated by measuring gingival exudate and the tendency of the gingiva to bleed upon standardized probing. These assessments were made at intervals during a postoperative period of 35 days.

Throughout the observation period the gingiva which had chlorhexidine-dressing showed less gingival exudate and decreased tendency to bleeding. The results indicate that the chlorhexidine dressing increased the healing rate.

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