

Clinical Effect of Periodontal Pocket Irrigation with H₂O₂

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ABSTRACT

Statement of the problem: Subgingival irrigation with an antimicrobial agent after scaling and root planing (SRP) is assumed to be able to kill the bacteria left behind after mechanical debridement. 3% H₂O₂ is used in the treatment of periodontal disease and it has been shown effective in killing anaerobic pathogens.

Purpose: The aim of this study was to evaluate the clinical effects of subgingival irrigation of periodontal pockets with 3% H₂O₂.

Materials and methods: Thirty-five patients with probing depths of 3–5 mm were selected for the study. All the oral cavity sites were scored at baseline and on days 21 and 35 for these periodontal indices: gingival bleeding on probing, probing depth, and attachment level. The pockets in various quadrants were randomly assigned to professionally performed subgingival irrigation with 3% H₂O₂ or saline or to non-irrigation groups on baseline and days 7 and 14 after the first step of therapy with SRP and oral hygiene instruction.

Results: The results showed that subgingival irrigation with 3% H₂O₂ produced a significant reduction in gingival bleeding index compared to the control while there were no significant differences between the 3 groups in probing depth reduction. Irrigation with H₂O₂ also resulted in a significant reduction of attachment levels between the 3 groups on day 21.

Conclusion: The results of the present study indicate that subgingival irrigation with 3% H₂O₂ plays a potential role in inflammation control and reduction of gingival bleeding.

Keywords: Periodontal pocket, attachment level, gingival bleeding index, scaling and root planing, therapeutic irrigation.

INTRODUCTION

In the pathogenesis of the infectious disease of periodontitis bacterial plaque is considered the culprit and the treatment of

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periodontitis is based on destroying the plaque or altering its structure.⁽¹⁾ The first step of the different stages of treatment consists of scaling and root planing (SRP), oral hygiene instruction, and proper plaque control by the patient. Mechanical debridement of deep pockets is not usually completely possible and there are subgingival plaque and calculus left

behind.^(2,3) Subgingival irrigation using an antimicrobial agents following SRP is based on the assumption that the remaining bacteria after medical debridement can be destroyed this way.⁽¹⁾ To be effective, this irrigation should be carried out after careful SRP and the irrigation solution should be able to reach all tooth surfaces.⁽⁴⁾

Some researchers believe that compared to SRP as a solitary therapy subgingival irrigation does not have much further clinical benefits.⁽⁵⁾

Hydrogen peroxide has been used in dentistry in combination with salts or alone for over 70 years. Therapeutic delivery of H₂O₂ to prevent periodontal disease requires mechanical access to subgingival pockets. Furthermore, wound healing following gingival surgery is enhanced due to the antimicrobial effects of topically administered hydrogen peroxide. For most subjects, beneficial effects have been seen with H₂O₂ levels above 1%.⁽⁶⁾ Hydrogen peroxide has been shown to possess a wide spectrum of antimicrobial activity in that it is active against bacteria, yeasts, fungi, viruses and spores.⁽⁷⁻⁹⁾

In 1982 Wolff et al studied the effect of 3% H₂O₂ on gingival inflammation and concluded that 3% H₂O₂ is effective in reducing pocket depth of more than 4 mm but it showed no effect on bleeding and other gingival indices.⁽¹⁰⁾

Rosling et al reported in 1983 that professional and personal subgingival application of a mixture of H₂O₂-NaCl and

NaHCO₃ can decrease subgingival microorganism counts, including spirochetes and motile rods and significantly enhance the microbiological and clinical effects of periodontal scaling and root planing.⁽¹¹⁾

In 1987 Wennström et al studied the clinical effect of professionally performed periodic subgingival irrigation per se and as an adjunct to scaling and root planing in patients suffering from moderate/severe periodontal disease. The results revealed that repeated professional irrigation of unscaled periodontal pockets with chlorhexidine or hydrogen peroxide resulted in a temporarily reduced frequency of bleeding sites, with no clinically significant changes in probing assessments. A similar improvement in bleeding scores was observed in the saline-irrigated control group. The study failed to demonstrate that professionally performed periodic subgingival irrigation with chlorhexidine or hydrogen peroxide used alone or in combination with thorough mechanical debridement, has a significant therapeutic effect.⁽¹²⁾

Subgingival irrigation with a suitable agent currently constitutes an effective adjunct to the simplified oral hygiene regimen that does not require unrealistic levels of interdental or subgingival home-care cleaning by the patient.⁽¹³⁾ In a recent study subgingival irrigation with high concentrations of tetracycline was found to play a beneficial role in the management of

patients with chronic periodontitis.⁽¹⁴⁾ Targeted lavage and subgingival delivery of effective antimicrobial agents show potential as supplemental office procedures or as a component of a home oral hygiene regime. Additional research is needed to develop more efficacious chemotherapeutic substances than are currently available and to further define the optimum application of each.¹⁵ Considering the role of anaerobic bacteria in periodontal diseases and the ecosystem in periodontal pockets that allows microbial growth we decided to investigate the effect of subgingival irrigation with H₂O₂ and the destructive effects of its free oxygen radicals.

MATERIALS AND METHODS

Thirty-five patients who had been referred to the Department of Periodontics, Isfahan Dental, School, signed informed consent forms and were enrolled in this study. Patients' dental and medical histories were obtained. The patients had no systematic diseases such as diabetes, blood pressure, and hematologic, cardiovascular or renal disorders. None of them had taken any antibiotics or used any kind of mouthrinses in the previous 3 months and had mild to moderate chronic periodontitis with pocket depths of 3–5 mm

The clinical indices of patients were recorded at baseline: attachment level, pocket depth (by William's probe) and gingival bleeding (Ainano and Bay's method).⁽¹⁾

In this simple method for investigating

gingival sulcus bleeding using a probe, the probe is gently moved through the margins around a tooth; after 10 seconds presence or absence of bleeding is evaluated.

The first phase of treatment, consisting of OHI and full-mouth SRP, was carefully performed on each patient. SRP was carried out using a piezoelectric ultrasonic device (Cavitron EM, Dentsply). Each quadrant in each patient's mouth was randomly treated with 3% H₂O₂ subgingival irrigation in one quadrant and normal saline was used for irrigation in the other quadrant and the two other quadrants were treated with SRP alone. Subgingival irrigation was performed at baseline and after 1 and 2 weeks. The clinical parameters were recorded at baseline at the end of week 3 and at the end of week 5.

Data was analyzed with SPSS 11. T-test was used to compare mean probing depths, attachment levels, and gingival bleedings before and after treatment. The mean clinical parameters of the 3 groups in the different stages of the study were also compared using ANOVA.

RESULTS

According to the results of comparison of the mean probing depths before and after treatment (before the first treatment phase or baseline (0), 3 weeks after first treatment phase (after-1) and 5 weeks after treatment (after-2), a statistically significant difference observed (P<0.001) (Table 1)

In addition, there were significant

differences between (0) and after-1 and after-2 and between after-2 and after-1 in the mean attachment levels (Table 2).

There was also a significant difference between mean attachment levels between the 3 study groups in (0) and after-1 but the

difference was not significant in after-2 (Table 4)

The mean gingival bleeding index showed a difference that was statistically significant between (0) and after-1 and (0) and after- 2 (Table 3)

Table 1. Comparison of mean probing depths before and after the initial treatment phase

Treatment stages	Mean \pm δ	p
0	2.62 \pm 0.42	
After-1	2.02 \pm 0.37	
0	2.62 \pm 0.42	P<0.001
After-2	1.79 \pm 0.34	
After-1	2.02 \pm 0.37	
After-2	1.79 \pm 0.34	

Table 2. Comparison of attachment levels before and after treatment

Treatment stages	Mean \pm δ	P
0	1.57 \pm 0.41	
After-1	1.28 \pm 0.26	
0	1.57 \pm 0.41	P<0.001
After-2	1.21 \pm 0.21	
After-1	1.28 \pm 0.26	
After-2	1.21 \pm 0.21	

Table 3. Comparison of the mean gingival bleeding index

Treatment stages	Mean \pm δ	P
0	27.08 \pm 13.42	
After-1	6.9 \pm 6.95	
0	27.08 \pm 13.42	P<0.001
After-2	6.57 \pm 6.68	
After-1	6.9 \pm 6.95	
After-2	6.57 \pm 6.68	

Table 4: Comparing mean attachment levels in the three different treatment groups

Treatment stages	Normal Saline		Hydrogen Peroxide		First Phase of Treatment (SRP)	
	Mean \pm δ	P	Mean \pm δ	P	Mean \pm δ	P
(0)	1.43 \pm 0.36		1.76 \pm 0.42		25	
After-1	1.22 \pm 0.23	0.002	1.38 \pm 0.29	0.0271	1.98 \pm 0.23	0.4
After-2	1.19 \pm 0.21		1.25 \pm 0.22		1.20 \pm 0.19	2

DISCUSSION

This study was conducted to evaluate the clinical effect of subgingival irrigation with 20 mL of 3% H₂O₂. The results showed significant reduction in gingival bleeding compared to normal saline and SRP alone, reaching from 28.95 \pm 14.02 to 1.11 \pm 6.98 in the H₂O₂ group but from 24.95 \pm 13.3 to 9.11 \pm 6.98 by normal saline and from 27.34 \pm 12.99 to 9.5 \pm 5.47 by SRP alone, which is different from what Wolff reported in 1982.⁽¹⁰⁾

Many studies have considered gingival bleeding as a sensitive index of evaluating primary gingival inflammation. BOP is considered a good marker for periodontal health.⁽¹⁾

According to the results, 3% H₂O₂ had no significant effect on probing depth compared to the other two groups. In the H₂O₂ group mean probing depth changed from 2.77 \pm 0.44 to 1.72 \pm 0.36 mm and in the normal saline group it decreased from 2.54 \pm 0.37 mm to 1.8 \pm 0.37 mm and from 2.56 \pm 0.41 to 1.85 \pm 0.31 for the SRP group.

In Wolff's study % H₂O₂ had a positive effect on depth reduction in pockets more than 4 mm deep. A study by Wolff et al showed that an oxidizing agent containing H₂O₂ had a positive effect on probing depth compared with SRP alone.⁽¹⁶⁾

The results of the present study showed that in the 3% H₂O₂ group 3 weeks after the first phase of treatment there was a greater gain in attachment level, reaching from 1.76 \pm 0.42 to 1.38 \pm 0.4 mm in the H₂O₂ group in week 3 and from 1.43 \pm 0.36 to 1.22 \pm 0.23 in the normal saline group and from 1.51 \pm 0.39 to 1.25 \pm 0.23 with SRP alone but in week 5 there were no significant differences between the 3 groups regarding attachment gain. Wolff's study also showed that H₂O₂ was more effective in attachment gain than SRP alone.⁽¹⁶⁾

Since these results were significantly different between the 3 groups at week 3 but not week 5 it can be concluded that attachment gain in the H₂O₂ group was faster than the other groups. Changes in attachment level are a result of losing or

building an attachment, which better correspond to the amount of periodontal destruction.

Clinical attachment level shows the amount of root surface without PDL whereas the pocket depth is less important since it is not always related to bone level. Periodontal attachment is also a mechanical barrier against microorganisms and the earlier it is established the more resistance there is against microorganisms and a lower chance of periodontal diseases recurrence.

An important thing is that in a periodontal pocket the probe penetrates approximately 0.3 mm into the JE and connective tissue, which can be important to have in mind and

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consider when comparing probing depths before and after treatment; reduction in probing depth might be more as a result of remission of inflammation rather than attachment gain.

It can be concluded from this study that subgingival irrigation with 3% H₂O₂ is effective in reducing gingival bleeding and inflammation and also in the speed in gaining an attachment, demonstrating a positive clinical effect compared to SRP alone. Still successful periodontal therapy will always remain dependent on patient compliance to regular professional and home care.

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