Adjunctive Role of Supra- and Subgingival irrigation in Periodontal therapy

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Abstract

The primary purpose of irrigation is to nonspecifically reduce the bacteria and their by-products that lead to the initiation or progression of periodontal diseases. Supragingival irrigation allows for the disruption and dilution of marginal bacteria and their by-products which helps to prevent or treat gingivitis. Subgingival irrigation interferes with the complex ecosystem required for the initiation and continued destruction of the compromised periodontium in the susceptible host. The literature presented here exemplifies an important fact that, like all other therapeutic modalities, irrigation has both limitations and benefits. This review encompasses many new studies investigating various aspects of supragingival and subgingival irrigation including: new devices and methods of delivery by clinicians and patients; effect on plaque toxicity; depth of solution penetration; various chemotherapeutic agents employed; ultrasonics and antimicrobials; safety; and bacteremia associated with irrigation.

Introduction

The efficacy of locally applied antimicrobial agents in periodontal therapy depends on obtaining adequate subgingival delivery of the agent, attaining sufficient contact time between the antimicrobial agent and the target microorganisms, and achieving effective concentrations of the antimicrobial agent. Failure to properly account for one or more of these parameters is the reason for the relative ineffectiveness of many local antimicrobial regimens in periodontics.

Adequate subgingival delivery of the antimicrobial agent poses a problem for many local application systems. Antiseptics in mouthrinses exert no direct effects on the subgingival microbiota due to the nearly total lack of penetration of oral rinses below the gingival margin (mean 0.2 mm)[1]. Similarly, toothbrushes fail to gain substantial access into subgingival areas (mean 0.9 mm penetration).[2]

Since the scientific rationale for local delivery in periodontal pockets was to kill or inhibit subgingival bacteria, many people postulated that gingival or subgingival irrigation might provide a simple means of delivering chemotherapeutic agents to the local site. Antimicrobial agents also have been incorporated into gels, pastes, films, strips, polymers and fibers as a vehicle for local controlled drug release into periodontal pockets. The ability to adequately apply these products into the deeper aspects of severe periodontitis sites and deep furcation lesions remains to be assessed.

Ram & Slots Classification [3]

I) 1. Personally applied (in patient home self-care)

A. Nonsustained subgingival drug delivery (home oral irrigation)

B. Sustained subgingival drug delivery (none developed to date)

2. Professionally applied (in dental office)

A. Nonsustained subgingival drug delivery (professional pocket irrigation)

B. Sustained subgingival drug delivery

PATIENT APPLIED HOME IRRIGATION

1) **Supragingival home irrigation:** Several studies have shown that water or other antimicrobial medicaments provide an increased reduction of gingivitis and bleeding on probing (BOP) over normal oral hygiene alone in maintenance patients.[4,5]
2) **Subgingival home irrigation.** A wide array of subgingival irrigation devices have been used in patient applied home irrigation. Patients seem to comply with recommendations to use home jet irrigators, and find them relatively easy to use.[6,7]

Macaulay and Newman [8]had patients use a pulsed mono-jet subgingival irrigation system, once daily for 4 weeks and found the treatment to be effective in controlling subgingival plaque for at least 2 months after the end of a 1-month period of active treatment.

Wolff et al [9]studied the mono-jet subgingival irrigation system and concluded that, if patients delivered antimicrobial agents subgingivally between maintenance visits, additional reductions in the clinical signs associated with inflammatory periodontal disease were evident.

It appears that both supra- and subgingival home irrigation is effective. It should be kept in mind, however, that as with any oral hygiene device, the device is only as good as the operator, and beneficial results vary widely from patient to patient. While supragingival irrigation can be performed by patients with a moderate degree of success, subgingival irrigation in particular may pose technical difficulties for patients with limited dexterity.

Partial subgingival delivery of antimicrobial agent solutions is possible with oral irrigation devices designed for home use. A conventional pulsed oral irrigator (Water Pik@, Teledyne Water Pik, Fort Collins, CO) at a high-pressure setting may deliver an aqueous solution to approximately 50% of the distance between the free gingival margin and the most coronal connective tissue attachment.Directing the standard blunt jet tip at either a 45" or 90" application angle to the tooth-gingival tissue margin produced a similar depth of pocket penetration.[10]

A recently developed soft cone-shaped rubber tip (Pik Pocket@, Teledyne Water Pik) may enhance local pocket placement and delivery of antimicrobial agents. These tips are reported to provide subgingival aqueous penetration to 90% of the depth of sites ≤6 mm, and to 64% of the depth of pockets ≥*7* mm.

Braun & Ciancio [11]also did not take into account the height of the junctional epithelium, and thus may have underestimated the ability of the modified irrigation tip to deliver agents into the periodontal pocket. Since heavy subgingival calculus deposits may markedly impede pocket delivery of oral irrigants, these personal application techniques are best employed in conjunction with professional subgingival debridement.

Greenstein G [12] suggested that blunt-tipped irrigating cannula connected to either a hand-held syringe or an oral irrigator can be used for both personal and professional applications of antimicrobial agents into periodontal pockets. The irrigating tip of a hand-held syringe needs to be advanced at least 3 mm below the gingival margin to attain full pocket penetration of an aqueous solution into shallow and deep periodontal sites.

PROFESSIONAL APPLICATION

Delivery devices: Professional delivery of supragingival irrigation primarily uses two different systems; direct irrigation using a hand-held syringe or mechanical irrigation using a special pumping device that produces a stream of irrigant with regular intermittent breaks resulting in a pulsating effect. A variety of irrigator tips including cannulas and soft hollow rubber tips have been developed and modified for home or professional use with irrigation delivery systems.

Professional application with pulsed irrigation:

Boyd et al.[13] evaluated subgingival irrigation using a pulsed jet irrigator with either a standard tip or a cannula on an oral irrigator and found that irrigation with the cannula tip penetrated farther into both medium (3.5 to 6.0 mm) and deep (≥ 6 mm) pockets than did irrigation with the standard pulsating tip.

Larner and Greenstein[14] studied three different irrigator tip designs: a 24 gauge single side-port cannula, mono-jet subgingival tip (0.955 mm tip with a single end port), and a 23 gauge cannula with a single end port. They determined that the cannula type tip on the oral irrigator had significantly greater penetration than did the mono-jet subgingival system.

Professional application with a hand held syringe:

Hardy et al[15] demonstrated clearly that placing an irrigating needle 3 mm within periodontal pockets with a hand-held syringe provides an efficient and predictable means of reaching the apical subgingival plaque border with an irrigating solution.

Itac and Serfaty [16]studied the clinical effectiveness of subgingival irrigation with a pulsed jet irrigator versus a syringe and found that professionally administered saline irrigation with a pulsed mono-jet subgingival irrigate or system to be even more effective than the syringe/needle treatment regardless of the solution used.

Effect on Plaque Toxicity:

Brownstein et al.[17] suggested that the effect of irrigation on gingival bleeding and to a lesser extent plaque may be due to the following factors:

1) Change in plaque composition;

2) Flushing out of the inflammation-inducing factors; and

3) A physical change in tissue integrity.

Others have hypothesized that irrigation may involve specific host-parasite alterations in the subgingival environment or that perhaps the inadvertent mechanical stimulation of the gingiva may in some way be beneficial[8]

Penetration:

Pitcher et al[18] reported that disclosing solutions failed to reach the apical extent of the periodontal sulcus with mouthrinses and with direct irrigation using a hand held syringe. Direct irrigation of pockets ≥5 mm with a hand held syringe, while more effective than rinsing, resulted in penetration of 1.8 mm versus only 0.2 mm for rinsing.

Boyd et al [13] determined disclosing solution delivered in a cannula-type irrigator tip inserted half the depth of the pocket in medium and deep periodontal pockets penetrated farther than solution delivered with a standard supragingival tip. They also found no difference in penetrability within either group between proximal, facial, or lingual surfaces or between furcated and non-furcated teeth.

G.Greenstein[12] has suggested that subgingival irrigation may penetrate more deeply than previously thought. Since calculus impedes irrigation in deep sites, patients should be instructed to use irrigation after initial debridement has been completed to obtain the most benefit from irrigation therapy. It would appear that maximum results are obtained if the irrigant reaches the base of the pocket either by cannula on a pulsed irrigator or by inserting a blunt irrigating needle on a hand held syringe at least 3 mm subgingivally.

IRRIGATING SOLUTIONS

Water: The majority of studies reviewed utilize some type of a placebo agent as a control including water[19,20,21] or saline.[22,23,24]**.**It is important to note that the majority of the studies concluded that water provided an equal, and sometime superior, beneficial result when compared to other test medicaments.

The implication of this studies is that the physiologic flushing of the pocket itself may comprise the primary therapeutic effect of irrigation, regardless of the irrigant used. However, the following studies show a wide spectrum of beneficial effects when antimicrobials and antiseptics are used in irrigating solutions in conjunction with periodontal debridement, supportive periodontal treatment, or home care.

Chlorhexidine: Chlorhexidine (CHX) has been shown to possess a broad spectrum of topical antimicrobial activity. It is this property, in addition to the safety, effectiveness, substantivity, lack of serious side effects, and lack of toxicity, that has allowed it to be used extensively in dentistry, usually as a mouthrinse. Chlorhexidine activity in the oral cavity is promoted by binding to plaque, salivary pellicle, oral mucosa, and hard structures and its release for up to 24 hours makes it a highly substantive product. Reversible side effects that can occur with prolonged use of chlorhexidine in the oral cavity include staining of hard tissues and some dental materials, altered taste sensation, supragingival calculus accumulations, and less commonly, a mild mucositis.

Minimum inhibitory concentration (MIC) of CHX was tested against a range of 52 bacteria commonly isolated from subgingival plaque and was reported to be between 8 and 500 mg/ml[24].

Stabholtz et al [25] irrigated subgingivally one time with 0.12% CHX solution prior to extraction and tested the tooth root for any residual antimicrobial activity. No antimicrobial activity was found. In contrast, when teeth irrigated with 50 mg/ml (5%) of tetracycline hydrochloride (TCN) were compared to 0.12% CHX or saline irrigated teeth, TCN revealed significantly greater residual antimicrobial activity for 12 days than the 0.12% CHX treated teeth, and significantly more activity for 16 days than the saline irrigated teeth.

2.0% chlorhexidine: Southard et al[26] found that combined therapy using SRP plus 4 weekly CHX irrigations resulted in significant attachment gains and reduction of *P. gingivalis* for longer time periods (up to 11 weeks) compared to no treatment, scaling and root planing alone, or irrigation whereas Braatz et al [27] and MacAlpine et al [28] studies have masked the effect of the 2.0% CHX irrigation.

0.2% chlorhexidine: Wan Yosuf et al [29]found that When a 15-second CHX irrigation or 1- minute rinse with 0.2% chlorhexidine was compared to saline, it was concluded that irrigation with chlorhexidine was more effective at reducing plaque vitality than rinsing with chlorhexidine.

0.12% chlorhexidine: Vignarajah et al.[6] used lower concentrations of CHX (0.12%) in a mono-jet pulsed irrigator and found significant probing depth reduction during routine periodontal care.

0.06% chlorhexidine: Brownstein et al[17] compared oral irrigation with 0.06% chlorhexidine and rinsing with 0.12% chlorhexidine to placebo in the treatment of naturally occurring gingivitis over a 2-month period. They concluded that delivery of chlorhexidine (0.06%) by an oral irrigator is effective at reducing gingival bleeding, plaque, and *Actinomyces* species and is thus an effective means of treating naturally occurring gingivitis.

0.04% chlorhexidine: Jolkovsky et al [30] using a combined professional and home applied technique, found a single professional subgingival irrigation with 0.12% chlorhexidine in periodontal maintenance patients followed by daily home marginal irrigation with 0.04% chlorhexidine found reduced GI, as well as *Wolinella recta* and black-pigmented *Bacteroides* species.

0.02% chlorhexidine: Lang and Ramseier-Grossman [31] conducted a study to determine the optimal dosage of chlorhexidine digluconate for chemical plaque control when applied by a fractionated jet oral irrigator. They tested daily applications of numerous concentrations and volumes of irrigants and concluded that one daily application of 400 ml of a 0.02% chlorhexidine solution was the minimal optimal concentration for complete inhibition of dental plaque.

Peroxides: Earlier reports by Wennstrom et al.[32] showed that professionally performed periodic subgingival irrigation with hydrogen peroxide used alone, or in combination with thorough mechanical debridement, has a significant therapeutic effect on clinical or microbial parameters.

Jones CM et al [33] has shown that 1.5% hydrogen peroxide was of no therapeutic value in the prevention or treatment of an experimental gingivitis when used as a mouth rinse, or in an oral irrigator.There appears to be some advantage in using frequent professional application of hydrogen peroxide in patients infected with *Actinobacillus actinomycetemcomitans*.

Wikesjö et al.[34] reported the effects of subgingival irrigation with hydrogen peroxide biweekly until *A. actinomycetemcomitans* was no longer detected by selective culture at 6 months. They found that the irrigation regimen tested has some potential to suppress *A. actinomycetemcomitans* for up to 5 months. The reduction rate to below detectable levels seems related to initial numbers of cultivable bacteria from the periodontal pockets; the higher the numbers of *A. actinomycetemcomitans*, the longer it took to eradicate them from the pocket.

Fluorides: Mazza J et al [35] established that subgingival irrigation with 1.64% stannous fluoride (SnF2) was more effective than 0.4% stannous fluoride or saline in decreasing motile bacteria and spirochetes for several weeks in advanced periodontitis patients.

Iodine: Wolff et al.[9]found that a single professional subgingival irrigation with 1.64% stannous fluoride immediately following SRP, when combined with daily home subgingival therapy with a 3.75% iodine solution (3.75mg/ml), was effective in gingivitis and early periodontitis patients.

Clark WB et al.[36] reported on the effect of a commercially prepared solution of povidone iodine and hydrogen peroxide as the subgingival irrigant on established gingivitis. They determined it to be a beneficial adjunctive treatment for the prevention and control of gingivitis when used with routine oral hygiene procedures.

Nakagawa et al[37] compared the bactericidal effects of three different concentrations of the povidone-iodine solution delivered subgingivally. Undiluted solution resulted in a significant reduction in colony forming units (CFU), but the 10% and 20% dilutions did not produce the same reductions. Total CFU were reduced to less than 1% in several sites, which was not true for sites irrigated with biological saline.

Advantages of iodine alone or in combination with other over-the-counter agents include low cost to the patient and a very low probability of bacterial resistance.

Since povidone iodine is a topical antiseptic and kills bacteria on contact, rather than effecting cell wall synthesis and other mechanisms that might adversely alter the ecosystem, opportunistic or resistant organisms are unlikely to develop in response to short-term use of the antimicrobial. Disadvantages include sensitivity (allergy) to iodine which may be rather common, and the potential for staining teeth and restorations with prolonged use. Staining may be avoided by swabbing the teeth with hydrogen peroxide or brushing with a dentifrice immediately after povidone-iodine use.

Phenolics: Ciancio SG et al[44] reported that the use of a phenolic mouthrinse in an oral irrigating device could result in significant reductions in plaque, bacterial cell counts, and gingival bleeding, and is an effective adjunct to normal oral hygiene.

Fine et al.[21] reported significant short-term microbiological clinical effects of subgingival irrigation with phenolic mouthrinses along with reduction of supragingival plaque and gingivitis.

Sodium bicarbonate:. Christersson et al.[22] conducted a study in which sodium bicarbonate powder was subgingivally packed during periodontal debridement by H files wetted with water. It was found that at 12 months post-treatment, 81% of sites initially 7 mm or greater showed 2 mm or more gain in clinical periodontal attachment after adjunctive sodium bicarbonate placement, as compared to only 39% of deep sites treated solely with conventional mechanical debridement. The magnitude of clinical enhancement after pocket packing of the sodium bicarbonate toothpowder was similar to that seen with a diluted povidone-iodine irrigant, and in contrast

to the ineffectiveness of an adjunctive3% hydrogen peroxide pocket irrigant**.** When combined with hydrogen peroxide to form a slurry, the supplemental efficacy of sodium bicarbonate pocket placement was found to be markedly diminished.

Microbiologically modulated Periodontal therapy or Keyes Technique [39]

The Keyes technique has the two major phases: monitoring and therapy.

The therapy phase consists of three components: the local mechanical therapy, the local chemical therapy, and the systemic antibiotic therapy (systemic chemotherapy).

a. **The local mechanical therapy**: using scaling and root planing plus mechanical oral hygiene effort.

b. **The local chemical therapy**: achieved preparing a dentrifice consisiting a mixture of baking soda, few drops of water, 3% hydrogen peroxide and Table salt also can be used, or Epsom salt on patient with low sodium diet .This dentrifice is worked between teeth with tooth brush, dental floss, or toothpicks and is left in place for one minute.This application of saturated salt solution deep into the sulcus socket spaces will eliminate or reduce potentially periodontopathic bacterial population.

c. **The systemic antibiotic therapy**: achieved by followed up after mechanical therapy with a course of tetracycline HCl, 250mg q.i.d. for two weeks.

IRRIGATION WITH ANTIBIOTICS

Root substantivity: Stabholz et al[25] investigated the substantivity and antimicrobial activity of tetracycline-HCl (TCN-HCl) after a single subgingival irrigation prior to tooth extraction. They concluded that 5% tetracycline (50 mg/ml) exhibited significantly greater antimicrobial activity than either 0.12% CHX digluconate for 12 days or saline for 16 days. The 1% tetracycline-HCl (10 mg/ml) exhibited significantly greater antimicrobial activity than 0.12% CHX digluconate and saline for 4 days. Thus, the amount of antimicrobial activity retained is proportional to the concentration of the TCN used for irrigation.

10% tetracycline-HCl:. Christersson et al**[40]** conducted a classic 6-month study to determine the substantivity of tetracycline-HCl and the effects of irrigation with tetracycline-HCl or saline following a single session of scaling and root planing. They reported that 10% tetracycline-HCl irrigation of root surfaces for long periods of time (5 minutes) results in a subsequent release of active antibiotic into the gingival fluid at therapeutic levels for at least 1 week. They also reported that the irrigation resulted in significantly greater attachment gain as compared to SRP alone over at least a 6-month period of healing. The substantive properties of tetracycline-HCl, in addition to its antimicrobial and anticollagenase activities, make it promising as an adjunct to mechanical therapy through local application.

0.5% metronidazole: Linden and Newman et al[41] found a simplified daily oral hygiene regimen combined with daily subgingival irrigation with 0.5% metronidazole or placebo was effective in reducing periodontitis for an additional 8 weeks, and that proportionately more sites improved in the metronidazole group.

TOPICAL IRRIGATION WITH NON-STEROIDAL ANTI-INFLAMMATORIES

Acetylsalicylic acid (ASA): Flemmig et al**[42]** investigated adjunctive supragingival irrigation with 0.3% acetylsalicylic acid in patients with moderate to severe periodontitis. They concluded that either 0.3% ASA or water irrigation in addition to regular oral hygiene can be a beneficial adjunct to periodontal supportive therapy in patients over a 6-month period. However, the use of buffered 0.3% ASA as an irrigant was not superior to water and does not appear to enhance the clinical efficacy of supragingival irrigation on periodontal health.

Flurbiprofen, meclofenamic acid, and ibuprofen:. Haesman et al.**[43]** determined that topically-applied NSAIDS may be of benefit in the management of periodontal inflammation, as the study reported that the systemic absorption of flurbiprofen may have reduced the severity of the developing inflammatory lesions.

Other Agents

Zinc sulfate: Newman et al**[44]** reported that water irrigation was superior to anti-plaque 0.57% zinc sulfate when looking at the GI, BOP, and PD, although this difference had no clinical relevance or probing depth changes. Plaque reduction was not observed with this agent when used as an irrigant. Most surprising was the fact that zinc sulfate as an irrigant did not demonstrate a benefit in reducing gingivitis over normal oral hygiene since water irrigation by itself was beneficial.

Chloramine-T: Herzog and Hodges**[45]** compared the effects of subgingival irrigation with and without chloramine-T. They concluded there were no differences in any of the clinical parameters measured when chloramine-T was used as an adjunct to scaling and root planing in periodontal therapy.

Parodontax: Itic and Serfaty [46]investigated the effects of parodontax subgingival irrigation following non-surgical therapy. They concluded that parodontax (active ingredient not given) is effective in the control of gingivitis and subgingival flora and appeared to be effective in detoxifying the cementum surface. A majority of the parameters examined at 90 days showed the test agent to exceed results obtained from non-irrigated quadrants.

Tetrapotassium peroxydiphosphate: Listgarten et al[47] followed the effect of subgingival irrigation with tetrapotassium peroxydiphosphate on scaled and untreated periodontal pockets. They found scaling and irrigation produced significant decreases from the initial PI and GI scores and PD and attachment loss (AL) measurements and that coccoid cells increased while motile bacteria and spirochetes decreased, but there were no differences for the therapeutic effect of the test solution.

Oxygen: Schlagenhauf et al[48] used a unique technique consisting of repeated subgingival applications of oxygen in untreated periodontal patients. They concluded that flushing the pocket with oxygen once a week for 8 weeks significantly improved clinical attachment levels, bleeding on probing, and the presence of disease-associated microorganisms relative to the control.

Ozone : Dodwad *et al.* [49]compared the effect of oral irrigation with ozonated water, 0.2% Chlorhexidine and 10% Povidone iodine in patients with chronic periodontitis and concluded that local ozone application can serve as potent atraumatic, antimicrobial agent to treat periodontal disease non-surgically both for home care and professional practice. It may also serve as good tool during supportive periodontal therapy.

Commercially available ozone generators for dental application : HealOzone (KaVo) and Ozotop (TTT).

ULTRASONICS AND ANTIMICROBIALS

Ultrasonic scaling devices have been used to professionally deliver antimicrobial agents into periodontal pockets during mechanical root debridement procedures. Pressurized containers attached to ultrasonic scalers allow an antimicrobial solution to simultaneously act as a coolant for the ultrasonic scaling tip and as a subgingival pocket disinfectant. Commercially available ultrasonic instruments also possess built-in coolant reservoirs designed for these purposes. Thin ultrasonic scaling inserts with similar dimensions as a periodontal probe can reach the base of deep periodontal pockets.

Nosal G et al [50] suggested that an irrigant delivered through ultrasonic scaling tips has shown complete pocket penetration in 86% of sites ranging from 3-9 mm in depth. However, since the irrigant showed only little lateral dispersion from the ultrasonic tip, overlapping working strokes must be employed with the ultrasonic scaling tips to ensure sufficient antimicrobial agent pocket delivery.

Chlorhexidine: The use of ultrasonic scalers for delivery of concentrations of 0.06% and 0.12% chlorhexidine as the irrigant has had mixed results. Slight adjunctive effect to differential clinical benefits that are site-dependent have been reported by Reynolds et al.[51] and Chapple et al.[52] .Also Taggart et al.[53] discovered a slight adjunctive effect in the reduction of PD when 0.02% chlorhexidine was used as a coolant during ultrasonic root planing for the treatment of chronic periodontitis.

Povidone iodine: Rosling et al[54] showed remarkable results were obtained with non-surgical periodontal debridement using 0.05% povidone iodine in an ultrasonic device compared to modified Widman flap surgery. Resultant healing was significantly better, and attachment gains were significantly greater, with the ultrasonic debridement compared to surgery.

SAFETY

Cobb et al.[55] reported a lack of deleterious effects when saline was delivered supragingivally at 60 psi by a pulsating jet irrigator with the tip placed at a right angle to the tooth. There was no observable difference when the tip was place 1 or 3 mm away from the tooth in regards to the control and irrigated specimens. Epithelial topography was not affected and cavitations and microulcerations were absent. Individual spatial relationships and cell appearances were normal for both treated and untreated groups in these 1 to 6 mm probing depth sites.

Dunkin et al.[56] reported the possibility of delivering normal saline solution to the bottom of the pocket without causing tissue injury or discomfort with an air-driven subgingival delivery kit. They advised that with low viscosity liquid, the 28-gauge tip is tip of choice, because it is easy to use without inflicting trauma to the area.

BACTEREMIA ASSOCIATED WITH IRRIGATION

Allison et al[57] concluded that the incidence of bacteremia following subgingival ultrasonic scaling and root planing can be reduced using an irrigating solution of 0.12% chlorhexidine. In direct contrast, Lofthus et al[58], reported that a single subgingival irrigation with 0.12% CHX or sterile water can result in a similar incidence of bacteremia as with other dental manipulations. Also, irrigation of periodontal pockets with either 0.12% CHX or sterile water did not alter the incidence of bacteremia after scaling and root planing when compared to non-irrigated controls.

Rahn [59]tested povidone iodine (PVP-I) in a 10% solution rinse compared to CHX and water, and found PVP-I capable of reducing the intraoral bacteria by 2 to 3 logs with a 30-second rinse. Based on these findings, he suggests using a 30-second rinse or oral antisepsis to support the antibiotic regimen given to patients requiring prophylaxis.

However, in a clinical trial, Witzenberger et al.[60] reported that rinsing for 1 minute with PVP-I and then receiving subgingival irrigation for 3 minutes with 10% povidone-iodine solution did not have any effect on either increasing or decreasing the incidence of bacteremia following thorough subgingival scaling.

It would appear that irrigation may cause bacteremia; therefore the evidence does not support recommendation of irrigation for patients at risk for infective endocarditis.

The American academy of Periodontology (AAP) position statement on the Role of Supra- and Subgingival Irrigation in the Treatment of Periodontal Diseases(2005)[61] concluded that Supragingival and marginal irrigation does aids in the treatment of gingivitis and maintenance of periodontal patients. Conceptually, irrigation therapy may be of increased value when root planing is less than ideal due to anatomy or other factors. However, it appears that the greatest shortcoming of irrigation therapy is the quick elimination of subgingivally placed drugs. To ameliorate this problem, when appropriate, conventional therapy can be augmented with subgingivally placed adjunctive aids that provide slow release of medicaments.These devices will ensure that a bactericidal dose is maintained for an adequate duration of time to reduce pathogens.

Conclusion

Local chemotherapy offers some advantages over systemic applications, however topical agents delivered in an irrigating solutions may fail to affect the periodontal pathogens at the base of the pocket, in furcations, and in other inaccessible areas. In addition, most agents available for home irrigation do not sustain a long term effect due to the rapid decline in the concentration of the agent and the high turnover rate of the sulcular fluid. Local application of solutions by irrigation or mouthrinse depends on “first-order kinetics” (high initial concentrations and multiple applications) in order to provide sustained effectiveness. Modification of the microflora present in the periodontal pocket may be appropriately treated with irrigation or a sustained delivery device, where infection within the tissue will most likely require systemic antibiotics.

In general, it has been shown by numerous studies presented in this review and in Table 1, that water irrigation at the gingival margin reduces gingivitis, and that the addition of antimicrobial agents has some additional clinical efficacy over water irrigation alone. However, subgingival irrigation as an adjunct to conventional therapy in periodontitis sites has had mixed results. With the exception of high concentrations of chlorhexidine (2%) or tetracycline (10%), the addition of other antimicrobials have resulted in rather unremarkable additional benefits beyond water or saline alone.

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