

Treatment of periodontal and peri-implant inflammation

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The elimination of biofilm is the key factor in the treatment of periodontal and peri-implant inflammation. Periodontitis, peri-implant mucositis, and peri-implantitis represent bacterial inflammation with comparable symptoms. The clinical signs for all three are similar and include positive bleeding on probing, redness, oedematous tissue, suppuration and probing pocket depths of more than 4 mm. The cause of these similarly progressing infections is bacterial plaque, a biofilm rich of pathogenic bacteria. As a consequence, effective elimination of this biofilm is a fundamental prerequisite for the successful treatment of these diseases.

Treatment possibilities

Various methods (e.g. curettes, ultrasound, airflow) are available for the mechanical removal of biofilm. Complete elimination of the biofilm, however, is not always achievable by mechanical debridement alone.

PERISOLV® (REGEDENT) is a new antibacterial cleaning gel based on chloramines, which can be used in addition to mechanical cleaning in the treatment of periodontitis, peri-implant mucositis and peri-implantitis. The gel penetrates and softens the biofilm and, owing to its antiseptic properties, eliminates the pathogenic bacteria after only a few seconds.^{1,2}

PERISOLV® is a two-component preparation consisting of a 0.95 % sodium hypochlorite (NaOCl) and an amino acid solution. Before use, the two components are mixed. The sodium hypochlorite and the amino acids form short-lived chloramines (N-carboxy anhydride, NCA) as antibacterial and anti-inflammatory active ingredients. PERISOLV® thus has an antimicrobial effect while also softening the concrements on the tooth or implant surface. This favours a less abrasive mechanical debridement of the root surface.³

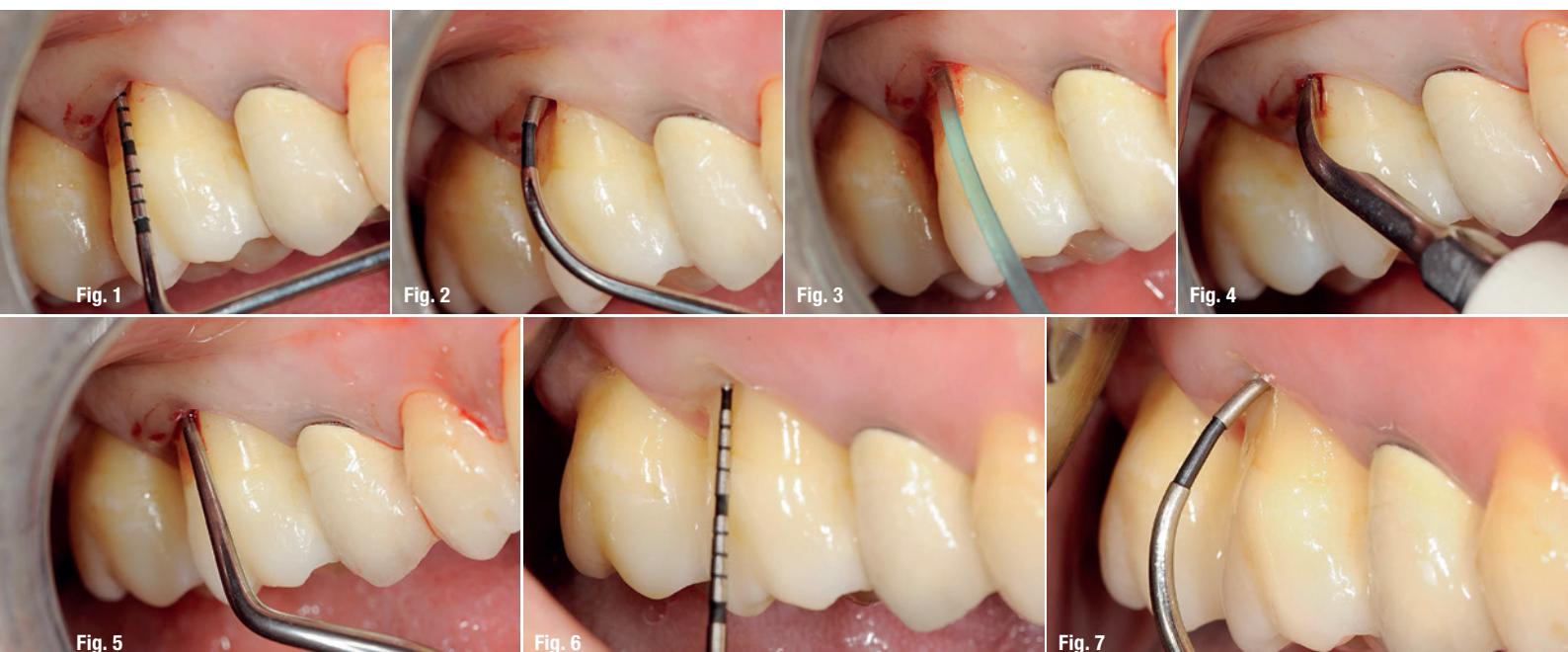


Fig. 1: A pocket depth of 5 mm with bleeding on probing was noted. **Fig. 2:** A Class II furcation defect was recorded. **Fig. 3:** PERISOLV® was applied into the furcation defect. **Fig. 4:** Subgingival scaling was performed. **Fig. 5:** Root planing was done. **Fig. 6:** A pocket depth of 4 mm at the buccal site was reported at the six-month follow-up. **Fig. 7:** The Class II furcation defect was reduced to a Class I furcation defect.

Chloramines are physiological compounds that play an essential role in the natural human immune system.^{4–6} PERISOLV® thus has a pronounced antimicrobial activity¹ also against bacteria in biofilms on implant surfaces.⁷ Its degranulating effect improves the efficiency of tooth root and implant surface cleaning (Figs. 1–7).^{7–9}

Antimicrobial activity

The antimicrobial properties of NCA are well studied. NCA causes a significant inactivation of bacteria,^{10–13} fungi,^{12,14,15} viruses^{16–18} and protozoa¹⁹. Even when exposed to sublethal concentrations of chloramines for pathogenic bacteria, a positive effect is observed. Chlorination of the bacterial cell membrane produces a postantibiotic effect (retardation of growth). As a result, bacterial inactivation is promoted by the body's immune system.^{13,20–22}

PERISOLV® shows significant antibacterial activity, which is pronounced even at rather low concentration.² It has further shown markedly higher inactivation rates than chlorhexidine and hydrogen peroxide for the periodontal pathogenic organisms *Porphyromonas gingivalis*, *Prevotella intermedia*, *Aggregatibacter actinomycetemcomitans* and *Fusobacterium nucleatum*. This superior effectiveness at low concentration is of great relevance for application in the tooth pocket. In this case, especially in periodontally infected pockets, a high sulcular fluid rate prevails, and this can cause rapid dilution of topically applied antiseptics/antibiotics.²³

An *in vitro* study at the University of Bern in Switzerland has shown that the specific composition of the preparation increases the inactivation efficacy on an established biofilm compared with standard disinfectants.¹ In this study, the antimicrobial activity of PERISOLV®, its components and chlorhexidine was investigated on bacterial strains associated with periodontal disease. The effect of the antiseptics on individual bacteria and on an established biofilm consisting of six kinds of bacteria was examined. PERISOLV® showed a greater inactivation rate on the biofilm than the chlorhexidine solution did (Figs. 8–11).

The activity of PERISOLV® was found to be different for Gram-positive and Gram-negative bacteria. Gram-negative bacteria were inactivated even at a low PERISOLV®



Fig. 8: Clinical situation of the peri-implant mucositis site. Implant with probing depth ≤ 5 mm and bleeding on probing. **Fig. 9:** Application of PERISOLV® before the non-surgical therapy. **Fig. 10:** After an exposure time of 30 seconds, the biofilm was removed non-surgically using an ultrasonic device with a PEEK tip. **Fig. 11:** Situation six months after therapy. Probing depth of ≤ 4 mm and no bleeding on probing.

concentration. This selective inhibition could benefit Gram-positive bacteria, which have a greater association with periodontal health.²⁴ For example, if these bacteria are eliminated, their physiological role in the regulation of blood pressure could be disturbed.²⁵

Conclusion

The adjuvant use of PERISOLV® for the decontamination of inflamed periodontal and peri-implant sites is indicated because the slightly alkaline gel softens the extracellular matrix of the biofilm (proteins and polysaccharides), allowing better penetration by the chloramines, which effectively eliminate pathogens. In addition, the immediate inactivation effect of PERISOLV® could prevent bacteria from entering the blood stream during mechanical treatment.

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about

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