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Periodontal dressing (Vocopac®) influences outcomes in a two-step treatment procedure

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Abstract

Objectives: It is not clear if periodontal dressing influences the long-term results in a non-surgical treatment procedure.

Material and Methods: The periodontal parameters (pre-baseline) of 36 patients with aggressive periodontitis were obtained before the patients were treated initially (1st step) by a dental hygienist, who completely removed the supra- and subgingival concrements. Baseline parameters were raised 3 weeks after the 1st step, before the 2nd therapy step was conducted. It consisted of a non-surgical procedure, which comprised a closed full-mouth manual root curettage (root planing), immediate systemic application of metronidazole, and the placement of a periodontal dressing (Vocopac®, Voco). The patients were randomized to two test groups having their periodontal packs removed after 3–4 days (group 1, $n = 12$) and 7–8 days (group 2, $n = 12$), respectively and a control group ($n = 12$) without periodontal dressing. Clinical parameters were raised again after 6 and 24 months.

Results: Six and 24 months later, changes in probing pocket depth (PPD) and probing attachment level (PAL) were observed in all three groups compared with baseline, but the difference was significant in group 2 only. In addition, group 2 showed a greater reduction in mean PPD and also a significantly greater gain of attachment in comparison with the controls.

Conclusion: Wound dressing has a positive effect on clinical long-term results using a two-step non-surgical procedure. Moreover, removing the dressing after 7–8 days leads to clearly better results than removing it earlier.

Key words: Two-step non-surgical procedure; aftercare; periodontal dressing; wound healing

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The periodontal treatment results are influenced by several factors like prescription of antibiotics, surgical techniques and root planing frequency, among other things. References in the literature as to whether the application time of the periodontal dressing contributes to the therapy results are rare. 70 years ago, periodontal dressings had already been described by Ward (1923, 1929). Nowadays, actual therapy studies are often lacking hints to post-therapeutic aftercare with periodontal packs, despite the fact that some authors have referred to special benefits resulting therefrom. Asboe-Jorgensen et al. (1974) discussed the use of dressings after periodontal surgery mainly in terms of improved patient comfort. Ramfjord (1980) stated that closed curettage causes a periodontal trauma, i.e. often results in a relatively wide dehiscence of the buccal and lingual papillae. After finishing the treatment, the soft tissue should be brought to a close contact with the tooth again, either by inter-proximal sutures or by a firm dressing (Ramfjord 1980, Eaglstein 1991, Plagmann 1998).

Other authors appreciate the advantages of dressings especially because they prevent persistent bleeding and keep away mechanical influences during the healing phase (Pritchard 1972, Sachs et al. 1984). Plagmann (1998) recommends covering the wound area for 3–4 days with a periodontal pack in addition to suturing because the dressing prevents food debris from impacting in inter-dental spaces. Plagmann assumes that the coagulum has to be stabilized so that movements are prevented and an untroubled attachment to the hard tissues is assured. Wikesjö et al. (1992) also described the elevated sensibility of healing during the first hours and days, especially in the process of fibrin attaching to the root surface. The dressing is able to protect the coagulum from forces occurring during talking and chewing and prevents its detachment from the root surface. In the

case of detachment the junctional epithelium grows into the periodontal space resulting in an epithelial lining of the pocket (Wikesjö et al. 1992). The present clinical study aimed to examine the influence of a periodontal dressing (Vocopac®, VOCO GmbH, Luxhaven, Germany) and its application time on the clinical long-term results in a non-surgical two-step treatment concept.

Material and Methods

Thirty-six patients (23 females, 13 males) with the former diagnosis of a generalized early onset periodontitis and ages ranging from 28 to 43 years (mean: 34.6) were included into the study. Informed consent was obtained from all participants. All subjects matched the diagnostic criteria for a severe generalized aggressive periodontitis (new nomenclature, Armitage 1999). All were non-smokers; four of them had quitted smoking during the initial therapy following appropriate motivation. Each patient also exhibited at least one site with a radiographically proven vertical bone loss of 2/3 of the root length. Fifteen percentage of the patients were characterized by at least one site from which pus could be evacuated. The species *Porphyromonas gingivalis, Bacteroides forsythus* and *Actinobacillus actinomycetemcomitans* were detected, either separately or in conjunction with each other, in the subgingival plaque of all patients.

Immediately before the 1st therapy step was done by a dental hygienist, the pre-baseline measurements were carried out (Figs. 1 and 2). The following clinical findings were made: Silness & Löe (1964) plaque index (PI), sulcus bleeding index (SBI) of Mühlemann & Son (1971), probing pocket depth (PPD) in mm, and probing attachment level (PAL) in mm (Hu–Friedy periodontal probe (Hu–Friedy Mfg. Co., Inc., Chicago, IL, USA), 15 mm length, graduated in steps of 1 mm). The evaluations were made at six sites per tooth: two of them at the mesial buccal/oral, two at the mid-buccal/oral, and two at the distal buccal/oral site. The mesial and distal sites were measured as close to the contact area as possible while the probe was kept in line with the long axis of the tooth.

The 1st treatment step, which comprised scaling, root planing (SRP) (i.e. complete removal of supra- and subgingival concrements), and polishing in 3–4 sessions, also included a meticulous instruction in the Bass technique.

Three weeks later, after the initial therapy (1st step) was finished, the clinical baseline measurements were done. The same parameters as in the pre-baseline measurements were ascertained.

Subsequently, the 2nd therapy step followed as a closed manual root curettage, carried out for all teeth, or root surfaces respectively. It was performed as a ''full-mouth root planing'' in one session by the same one dentist (Sigusch et al. 1999, 2001).

On the same day when the 2nd therapy step was started, Vagimid® (APOGEPHA Arzneimittel GmbH, Dresden, Germany; 250 mg, 2 × 2, 8 days), a pharmaceutical containing metronidazole, was administered systemically to all subjects. Meanwhile, adjunctive application of antibiotics is recommended in cases of aggressive periodontitis by several authors (Loesche et al. 1991, 1992, Pavicic et al. 1994, Flemmig et al. 1998).

At the 2nd therapy step the patients were randomized and assigned to the corresponding test groups or controls. Using lots for randomization resulted in an allocation of 12 subjects per group. Directly after finishing the root planing in the upper and lower jaws, the periodontal dressing Vocopac® was applied in all test groups. Vocopac® is a eugenol-free material for use as periodontal dressing that adheres excellently to the tooth surfaces. Whenever possible, care was taken to prevent saliva from accessing the affected areas. The material was mixed according to the manufacturer's advice and rolls of 0.5 cm diameter were formed. The application started at the area of the crown. A slight pressure directed to the inter-dental space was applied to well adapt the papillae, in particular. The patients were told to care for their oral hygiene as advised, but to spare the area of the dressing during the retainment time. It is sufficient to care for the occlusal surfaces of the crowns, because the inter-dental spaces are filled out. Directly after removing the dressing, the Bass technique was started again.

The test groups 1 and 2 differed in the application time of the dressings, which was 3–4 days in group 1, and 7–8 days in group 2. No dressings were applied in the control group. Six and 24 months after the second treatment step, the diagnoses were repeated. All clinical measurements were done by a second dentist, who was blinded regarding the application of the wound dressing.

The recall frequency was the same in all groups and based on a frequency of every 6 weeks up to the 6th month, and every 12 weeks up to the 24th month thereafter. The recall measures were carried out by the same dental hygienist who was responsible for the 1st therapy step. Plaque control was supplemented by a refreshed motivation and a supragingival scaling whenever necessary. Scaling was restricted to supragingival areas, however.

For statistical evaluation, the clinical indices of plaque, sulcus bleeding, probing pocket depth and probing attachment level were calculated as means for each patient at each examination date and then for each test group and the controls. The findings after 6 and 24 months past therapy were compared to the baseline data by using Wilcoxon's rank sum test. The analysis of the group differences was based on the use of the Kruskal–Wallis (H) and Mann–Whitney (U) tests.

Results

By the 1st therapy step, which included motivation and the complete removal of all supragingival and subgingival plaque and calculus, the plaque and inflammation parameters was drastically reduced in all 36 patients. The reduction of plaque together with the reduction of the inflammation was a prerequisite for the following root planing procedure (2nd step). Because almost no differences between the groups could be verified, only one value was displayed for the entire population (Figs 1 and 2).

The subjects of the test groups and the controls were re-evaluated after 6 and 24 months after the second therapy step was finished. The PI showed no greater differences until the 24-month examination, possibly due to the efficient recall regime. But 24 months after the second step we observed a significant reduction in the mean SBI score of group 2 compared to the control group ($p < 0.05$, Fig. 2). Compared to the baseline data, also changes in PPD and PAL were found in all three groups after 6 and 24 months, but the differences were significant in group 2 only ($p < 0.01$; Figs 3 and 4). PPD and PAL were reduced most in group 2, the one with the longer application time (7–8 days) of the periodontal dressing. The values of group 2 differed significantly when compared with those of the controls ($p < 0.01$).

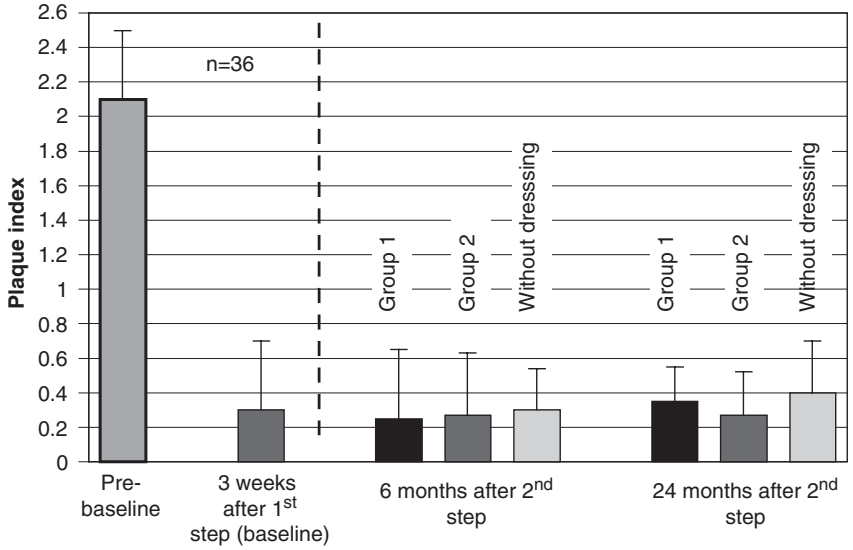

Fig. 1. Distinct reduction of plaque index values after the first treatment step in the whole study population. After the second step, plaque scores showed no major differences.

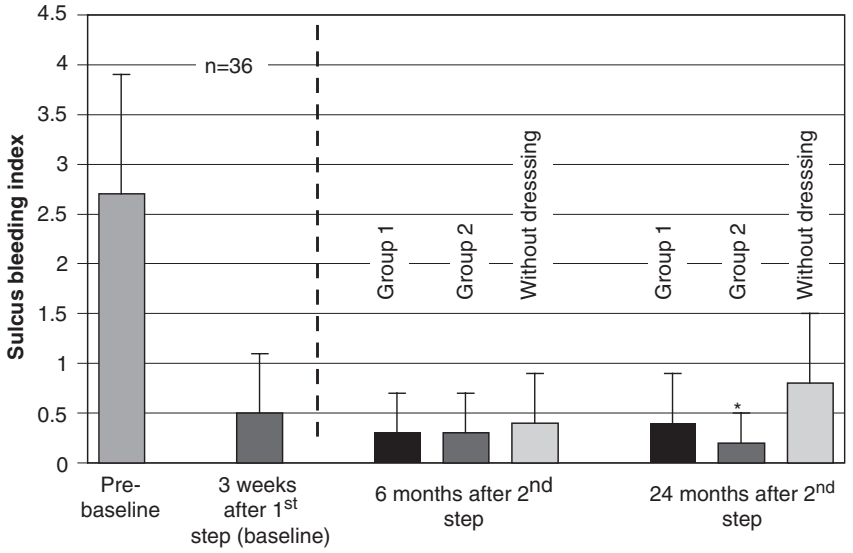

Fig. 2. Distinct decrease in sulcus bleeding index scores after the first step. *24 months after second step: significant difference between group 2 and controls, ($p < 0.05$).

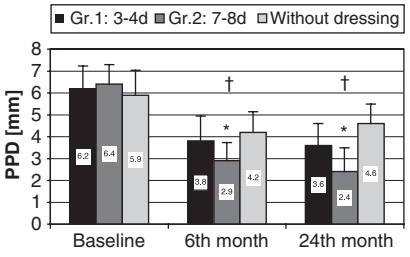

Fig. 3. Comparison of mean probing pocket depth (PPD), dependent on application time of periodontal dressing, baseline data, 6 and 24 months after 2-step-therapy. †, Significant difference between baseline data and 6 and 24 months after therapy, ($p < 0.01$); *, significant difference between test groups and controls ($p < 0.01$).

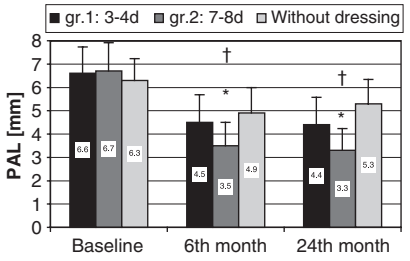

Fig. 4. Comparison of mean probing attachment levels (PAL), dependent on application time of periodontal dressing, baseline data, 6 and 24 months after therapy. †, Significant difference between baseline data and 6 and 24 months after therapy, ($p < 0.01$); *, significant difference between test groups and controls ($p < 0.01$).

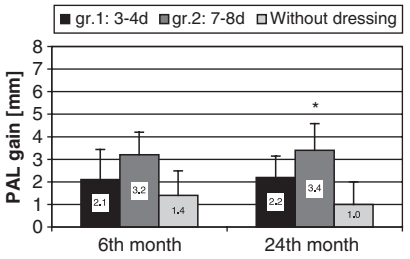

Fig. 5. Comparison of mean PAL gains, dependent on application time of periodontal dressing. *, significant difference between test groups and controls ($p < 0.01$).

Summarizing, the least reduction of PPD and PAL was achieved in the control group (without dressing) (Figs 3 and 4). Analogously, the values of mean PAL gain differed, but only that of group 2 was significantly above the mean of the control group ($p < 0.01$). The most obvious PAL gain was reached in group 2 after 6 and 24 months (Fig. 5).

Discussion

So far it is not obligatory to use dressings after periodontal treatment procedures. Especially references are missing in some actual clinical studies regarding an appropriate wound management (Haffajee et al. 1988, Novak & Polson 1988, Van Winkelhoff et al. 1992). This is despite the fact that several authors demand wound protection by a dressing after primary periodontal surgery (Pritchard 1972, Sachs et al. 1984, Plagmann 1998). It is assumed that the dressing provides some sort of a stent for the repositioned flap and improves the patient's comfort (Asboe-Jorgensen et al. 1974). As a matter of principle a dressing is used to protect the wound from many different influences and to stimulate wound healing. The dressing plays an important role by protecting the wound from bacterial influences, respectively, the dreaded wound infection. The periodontal pocket wound must be regarded as an open wound that is directly exposed to the bacterially contaminated oral environment. One can also assume

that the periodontal tissues of aggressive periodontitis patients are infected (Christersson et al. 1987). In the present study, the adjuvant prescription of antibiotics was targeted especially against soft tissue infection (Loesche et al. 1991, Sigusch et al. 1999, 2001). Comparison of the non-infected incised wound, whose edges are comprised of soft tissue on both sides, with a periodontal pocket wound, whose soft tissue should adhere to the hard tissue as much as possible after mechanical operation, one must state that the process of wound healing is a priori much more complicated in its mechanism. So the conclusion that such a wound is much more endangered in its healing process is obvious. Root planing in the 2nd treatment step, especially in very deep pockets (PPD $\geqslant$8 mm), leads to a widening of the periodontal pocket, comparable to the formation of a flap (Ramfjord 1980). In this context it seems to be important that, by dressing the gums with Vocopac® using a slight pressure, some sort of an anchoring of the dressing in the inter-dental space and a good adaptation of the flap to the root surface can be reached. Vocopac® cured within 16–24 h and in doing so assured that the wound was able to rest. Under the dressing a possible post-operative haemorrhage was prevented, and the tissues were given this chance to rest. Due to the hardness obtained, the affected area was not directly exposed to normal functional stresses. It is known that blood coagulation takes place immediately after a traumatic operation during the exudative phase. So, by developing the blood coagulum, the organism mediates the primary wound closure, precisely that of the periodontal pocket. Several authors (Wikesjö & Nilvéus 1990, Eaglstein 1991, Eibl-Eibesfeld & Kessler 1993) demand that a further organisation of the scab, which is fully fledged within several hours, should be preferably protected against the influence of fluids. It is due to that reason that a protection against saliva is urgently needed. Furthermore, the prophylaxis against infections, mediated by the dressing, should not be underestimated, because especially periodontopathogenic bacteria can also be found in extracrevicular regions (Asikainen et al. 1991, Müller et al. 1995) and presumably are also responsible for re-infection. Mertz et al. (1985) showed that a closed wound dressing can prevent pathogens from entering. Granulation tissue, which is well supplied with blood and resistant against infections, develops during the proliferative phase, which begins about the 3rd posttraumatic day by an immigration of fibroblasts and continues until about the 7th day (Andrä & Bethmann 1979, Eibl-Eibesfeld & Kessler 1993). Maybe the less satisfying results of group 1 (dressing for 3–4 days) can be accounted to taking off the dressings too early. Necessarily, a causal connection has to be discussed between a non-fully fledged coagulum at that particular time and a tearing of the coagulum resulting therefrom. The distinctly poorer results of the control group (without dressing) presumably have widely varied reasons, but again an untimely detachment of the coagulum from the root surface could be considered. Linsky et al. (1981) showed that wounds that had been provided with a dressing and had closed thereby, produced inflammations to a significantly lesser extent than open wounds. Wounds of the skin that had been provided with a dressing healed significantly faster (Eaglstein 1991). All in all, one can assume that wounds of the oral mucosa or periodontium show faster closure with less scar formation than skin wounds in other regions. For example, it is well known that the surgical removal of a tooth provides a large open oral wound, which heals mostly without complications (Jahangiri et al. 1998). The reason for a better wound healing in oral mucosal wounds, when compared with cutaneous wounds, could stem from a different inflammatory response of the tissues. Szpaderska et al. (2003) observed significantly lower levels of inflammatory cell infiltration and also IL-6 production in oral mucosal wounds. No differences were measured for the expression of anti-inflammatory cytokines e.g. IL-10. Presumably, the application of a wound dressing further reduces the inflammatory response, which is especially beneficial in the area of this complicated periodontal wound (periodontal soft tissue – root surface).

Presumably, a missing penetration of fluids, immobilization and the prevention of bacterial infection also play a role. Causally however, it is increasingly discussed that the wound exudates, which are emerging during the healing process, are caught by the dressing when the wound closes (Nemeth et al. 1982). The effectiveness of a closed wound dressing could therefore also be accounted for by the retention of exudate under the dressing. Probably, especially the wound exudate hosts important growth factors. Matsuoka & Grotendorst (1986) discovered platelet-derived growth-factors-like (PDGF) growth factors in the wound exudate. Nemeth et al. (1982) demonstrated by in vitro studies that the wound exudate can stimulate the growth of epithelial cells, fibroblasts and endothelial cells (Haffajee et al. 1988).

The results obtained clearly demonstrate the potential importance of the application of a dressing for a stable long-term success after periodontitis therapy. Clearly, the application time plays an important role, too, i.e. 7–8 days of application led to distinctively better long-term results in the observation period than the short-term application.

References

Andrä, A., Bethmann, W. & Heiner, H. (1979) *Kieferchirurgie-Klinik*, pp. 85–90. Leipzig: Johann Ambrosius Barth.

Armitage, G. C. (1999) Development of a classification system for periodontal diseases and conditions. *Annals of Periodontology* **4**, 1–6.

Asboe-Jorgensen, V., Attström, R., Lang, N. P. & Loe, H. (1974) Effect of a chlorhexidine dressing on the healing after periodontal surgery. *The Journal of Periodontology* **45**, 13.

Asikainen, S., Alaluusua, S. & Saxen, L. (1991) Recovery of *A. actinomycetemcomitans* from teeth, tongue, and saliva. *The Journal of Periodontology* **62**, 203.

Christersson, L. A., Albini, B., Zambon, J. J., Wikesjö, K. M. & Genco, R. J. (1987) Tissue localization of *Actinobacillus actinomycetemcomitans* in human periodontitis. I. Light, immunofluorescence and electron microscopic studies. *The Journal of Periodontology* **58**, 529–539.

Eaglstein, M. D. (1991) Wound dressings: current and future. In: *Clinical and Experimental Approaches to Dermal and Epidermal Repair – Normal and Chronic Wounds*, pp. 257–265. New York: Wiley-Liss.

Eibl-Eibesfeld, B. & Kessler, S. (1993) *Stenger-Verbandslehre*. München: Urban & Schwarzenberg.

Flemmig, T. F., Milian, E., Kopp, C., Karch, H. & Klaiber, B. (1998) Differential effects of systemic metronidazole and amoxicillin on *Actinobacillus actinomycetemcomitans* and *Porphyromonas gingivalis* in intraoral habitats. *The Journal of Clinical Periodontology* **25**, 1–10.

Haffajee, A. D., Dzink, J. L. & Socransky, S. S. (1988) Effect of modified Widman flap surgery and systemic tetracycline on the subgingival microbiota of periodontal

lesions. *The Journal of Clinical Periodontology* **15**, 255–262.

Jahangiri, L., Devlin, H., Ting, K. & Nishimura, I. (1998) Current perspectives in residual ridge remodelling and its clinical implications: a review. *The Journal of Prosthetic Dentistry* **80**, 224–237.

Linsky, C. B., Rovee, D. T. & Dow, T. (1981) Effect of dressings on wound inflammation and scar tissue. In: Dineen, P. & Hildick-Smith, G. (eds). *The Surgical Wound*, pp. 191. Philadelphia: Lea & Febiger.

Loesche, W. J., Giordano J, . R., Hujoel, P., Schwarcz, J. & Smith, B. A. (1992) Metronidazole in periodontitis: reduced need for surgery. *The Journal of Clinical Periodontology* **19**, 103–112.

Loesche, W. J., Schmidt, E., Smith, B. A., Morrison, E. C., Caffese, R. & Hujoel, P. P. (1991) Effects of metronidazole on periodontal treatment needs. *The Journal of Periodontology* **62**, 247–257.

Matsuoka, J. & Grotendorst, G. R. (1986) Two peptides related to platelet- derived growth factor are present in human wound fluid. *Proceedings of the National Academy of Sciences of the United States of America* **86**, 4416.

Mertz, P. M., Marshall, D. A. & Eaglstein, W. H. (1985) Occlusive wound dressings to prevent bacterial invasion and wound infection. *Journal of the American Academy of Dermatology* **12**, 662–668.

Mühlemann, H. R. & Son, S. (1971) Gingival sulcus bleeding – A leading symptom in initial gingivitis. *Helvetica Odontologica Acta* **15**, 107–113.

Müller, H. P., Eickholz, P., Heinecke, A., Pohl, S., Müller, R. F. & Lange, D. E. (1995) Simultaneous isolation of *Actinobacillus actinomycetemcomitans* from subgingival and extracrevicular location of the mouth. *The Journal of Clinical Periodontology* **22**, 413–419.

Nemeth, A. J., Hebda, P. A. & Eaglstein, M. D. (1982) Stimulatory effect of human wound fluid on epidermal outgrowth from porcine skin cultures. *Seminars in Dermatology* **1**, 137.

Novak, J. M. & Polson, A. M. (1988) Tetracycline therapy in patients with early juvenile periodontitis. *The Journal of Periodontology* **59**, 366–372.

Pavicic, M. I., van Winkelhoff, A. J., Douque, N. H., Steures, R. W. & de Graaff, J. (1994) Microbiological and clinical effects of metronidazole and amoxicillin in *Actinobacillus actinomycetemcomitans*-associated periodontitis. A 2-year evaluation. *The Journal of Clinical Periodontology* **21**, 107–112.

Plagmann, H. C. (1998) *Lehrbuch der Parodontologie*, pp. 452–453. München: Hanser.

Pritchard, J. F. (1972) *Advanced Periodontal Disease*, 2nd edition, pp. 348. Philadelphia: W.B. Saunders Co.

Ramfjord, S. P. (1980) Root planing and curettage. *International Dental Journal* **30**, 93–100.

Sachs, H. A., Farnoush, A., Checchi, L. & Joseph, C. E. (1984) Current status of periodontal dressings. *The Journal of Periodontology* **55**, 689–696.

Sigusch, B., Beier, M., Klinger, G., Pfister, W. & Glockmann, E. (2001) A 2-Step non surgical procedure and systemic antibiotics in the treatment of rapidly progressive periodontitis. *The Journal of Periodontology* **72**, 275–283.

Sigusch, B., Eick, S., Müller, B., Klinger, G. & Glockmann, E. (1999) Comparison between surgical and non-surgical therapy in patients with early onset periodontitis [in German]. *Deutsche Zahnärztliche Zeitschrift* **54**, 523–526.

Silness, J. & Löe, H. (1964) Periodontal disease in pregnancy II. Correlation between oral hygiene and periodontal conditions. *Acta Odontologica Scandinavica* **22**, 121–135.

Szpaderska, A. M., Zuckerman, J. D. & DiPietro, L. A. (2003) Differential injury responses in oral mucosal and cutaneous wounds. *Journal of Dental Research* **82**, 621–626.

Van Winkelhoff, A. J., Tijhof, C. J. & de Graaff, J. (1992) Microbiological and clinical results of metronidazole plus amoxicillin therapy in *Actinobacillus actinomycetemcomitans*-associated periodontitis. *The Journal of Periodontology* **63**, 52–57.

Ward, A. W. (1923) Inharmonious cusp relation as a factor in periodontoclasia. *The Journal of the American Dental Association* **10**, 471.

Ward, A. W. (1929) Postoperative care in the surgical treatment of pyorrhea. *The Journal of the American Dental Association* **16**, 635.

Wikesjö, U. M. & Nilvéus, R. (1990) Periodontal repair in dogs: effect of wound stabilization on healing. *The Journal of Periodontology* **61**, 719–724.

Wikesjö, U. M., Nilvéus, R. E. & Selvig, K. A. (1992) Significance of early healing events on periodontal repair: a review. *The Journal of Periodontology* **63**, 158–165.

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