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Use of a new collagen hydrogel in the treatment of periodontal pockets: a case series.

(pag 7)

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DESCRIPTION

The article presents a *case series* (10 clinical cases) of nonsurgical treatment of periodontal pockets. In all cases, a new collagen *hydrogel* (H42®, Bioteck Spa, Arcugnano - Vicenza) was applied following debridement and root planing of the involved elements using dedicated ultrasonic inserts and manual curettes.

The 10 treated patients had no systemic diseases and had the following initial average periodontal parameters: a pocket depth (PPD) of 7.4±1.2 mm, a plaque index (PI) of 1.7±1, and a Clinical Attachment Level (CAL) of 7.8±1.4 mm. Following mechanical *debridement*, the site was kept dry during the application of the *hydrogel*, which was extruded directly from the syringe through an appropriate needle, starting from the bottom of the pocket and loading it until the defect was filled. At this point, the site was kept dry for 5 minutes through the use of a surgical aspirator, and the patient was discharged without restriction in oral hygiene or feeding. Patients treated in this way showed accelerated gingival tissue healing and a reduction in tissue inflammation, as early as 7 days.

Follow-up at 90 days showed improvement in all periodontal parameters, with PPD decreased by about 4 mm, PI reduced to 1.2 and CAL decreased by about 2.5 mm.

Fig. 1

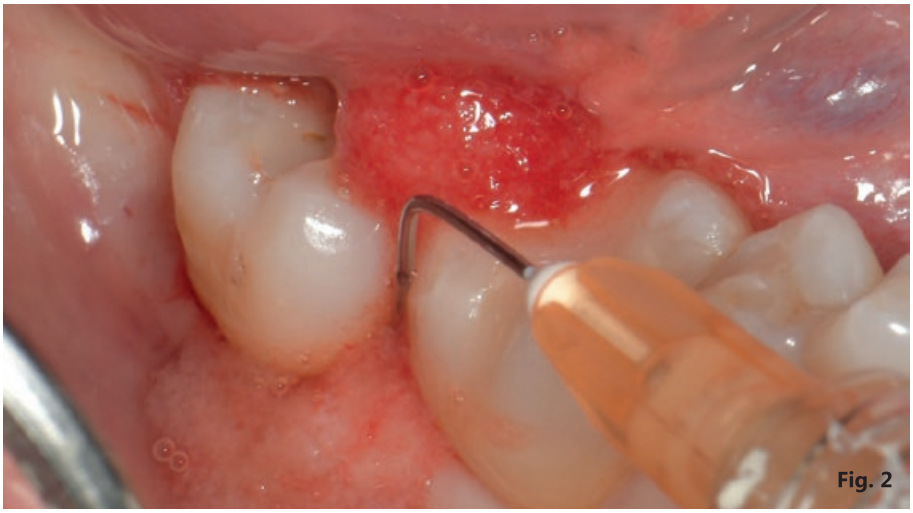

Fig. 2

Figure 1: H42® collagen hydrogel is presented inside syringes provided with male luer lock attachments so that they can be matched to the most appropriate needle.
Figure 2. H42® is applied starting from the bottom of the pocket until it is completely filled.


Fig. 3

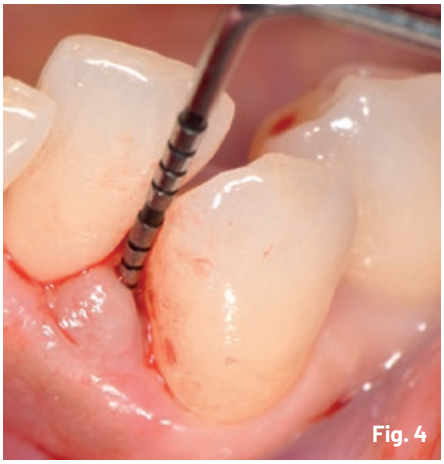
Fig. 4


Fig. 5


Fig. 6

Figure 3. Illustrative clinical case. Frontal view of the initial defect. The tissues appear edematous, the interdental papilla is swollen and detached from the surfaces of the contiguous teeth. **Figure 4.** Periodontal probing. PPD of 6 mm and CAL of 7 mm for element 33. **Figure 5.** H42® product setting stage. The site should be kept dry for 5 minutes after the application of H42® to promote its adhesion to the tissues. The product is set to completely fill the pocket until it comes out. **Figure 6.** Occlusal view of the treated defect at 7-day follow-up. Note the absence of inflammation and the healed tissue.

INTRODUCTION

Periodontitis is a chronic multifactorial inflammatory disease that affects about 150 million people in Europe[1]. Its triggering cause is to be found in the accumulation of bacterial biofilm, which, together with the persistence of the body's immune response leads to the progressive detachment of the gingival epithelium from the dental element[2, 3]. This results in the formation of periodontal pockets and subsequent damage of the alveolar bone, a condition that, if not properly treated, can lead to the loss of the affected dental elements[4].

To prevent and halt the progression of periodontal disease, the first step is the nonsurgical treatment by root planing to remove bacteria and the formed plaque. This procedure is considered the *gold standard* of non-surgical treatment of periodontitis[5] and promotes pocket healing.

However, it is common to observe a recurrence of infection and thus the need for further treatment. This has led to the use of adjuvant products to be applied after mechanical *debridement*, such as antibiotics and bactericidal substances. Although these procedures are superior to mechanical treatment alone, in the case of antibiotics there is a problem related to the development of antibiotic-resistant bacteria and possible side effects; regarding bactericidal substances, on the other hand, such as chlorhexidine, it should be noted that they can also have negative effects on the oral bacterial flora and thus create dysbiosis that can promote the onset of dental disease[6]. The subject of this article is an evaluation of the clinical results obtained in 10 patients following the use of a new *collagen hydrogel* as an adjunct to the mechanical treatment of periodontal pockets to prevent bacterial recolonization and promote tissue healing.

CLINICAL CASES

The 10 patients had no systemic disease and had periodontitis, with a severity ranging from grade II to grade IV. In nine patients, there were nine intraosseous periodontal pockets, while in one patient, the periodontal pocket was associated with an endoparodontal lesion. Initial periodontal parameters were: pocket depth (PPD) = 7.4±1.2 mm, clinical attachment level (CAL) = 7.8±1.4 mm, and plaque index (PI) = 1.7±1.

The tissues of the treated sites were assessed for inflammation with a scale of 1 to 4, which was divided as follows: 1 (very inflamed), 2 (moderately inflamed), 3 (mild inflammation), 4 (noninflamed tissue). At the first visit, the level of inflammation was distributed as follows: 4 patients had a high degree of inflammation, 3 patients had a medium degree, 2 patients had a mild degree, and 1 patient had no inflammation.

The patient's perceived pain was measured by NRS scale (1-10 scale), and at the first visit, it averaged 3.9 ± 2.4.

At follow-ups, soft tissue healing status was assessed using a scale of 1 to 4 as follows: 1 (no healing), 2 (visible fibrin layer), 3 (advanced healing), 4 (healed tissue).

All patients initially underwent subgingival scaling and root planing using dedicated ultrasonic inserts and manual curettes. Subsequently, the pockets were filled with a new collagen *hydrogel in a syringe* (H42®, Bioteck Spa, Arcugnano - Vicenza) (Fig. 1) consisting of type I collagen, high molecular weight polymers and ancillary amounts of vitamin C for rheology optimization. The product was extruded by using blunt needles for irrigating periodontal pockets with Gauge between 20 and 25, starting from the bottom of the periodontal pocket until it was completely filled (Fig. 2). During the extrusion of the product and for the next 5 min (named "setting" time), the site was kept dry by the use of surgical aspirator. During this period, the product became stickier, while maintaining a liquid appearance, such that adhesion to connective tissues was optimized. In the days following treat-

ment, patients did not have to observe any special precautions in dental hygiene or diet.

Qualitative checks (level of inflammation, level of tissue healing, and pain) were done weekly for the first month and then at 3 months.

Periodontal measurements were taken at 30- and 90-day follow-ups.

At 7 days of follow-up, the degree of inflammation had decreased: 4 patients were free of inflammation, 5 patients had a mild degree of inflammation and only one had a medium degree of inflammation. 7 patients had an advanced level of tissue healing while for 3 patients the tissues were completely healed. The pain was almost absent for all patients (mean NRS 1.7 ± 1.3).

Subsequent follow-up at 14 days showed further reduction in inflammation, with 8 patients free of inflammation and 2 patients with mild inflammation. Tissue healing also showed further improvement: 5 patients were in the advanced healing stage and 5 were completely healed. Similarly, pain disappeared completely in all patients (NRS 1).

Follow-up at 30 days showed that the tissues of all patients were healed and free of inflammation. Periodontal parameters had also improved: PPD at 4.8 ± 1.5 mm, CAL at 6.5 ± 2.6 mm, and PI at 1.4± 2. Recurrence of infection was not observed in any case.

The 90-day follow-up showed further improvement in periodontal parameters: PPD decreased to 3.7 ± 1.2 mm, CAL decreased to 5.5 ± 2.5 mm and PI equal to 1.2 ± 0.8. In no case was observed a recrudescence of the infection. An illustrative clinical case is presented in figures 3-8.

DISCUSSION AND CONCLUSIONS

Periodontitis is a multifactorial inflammatory disease caused by biofilm synthesized by pathogenic bacteria that results in an immune response that progressively damages the connective epithelium. This leads to the formation of periodontal pockets and possible involvement of the alveolar bone. It is therefore important to intervene early to halt the progression of periodontal disease by promoting natural tissue regeneration.

The standard procedure involves mechanical *debridement* to eliminate the bacterial biofilm[5], the cause of inflammation that damages gingival tissues. However, one of the most difficult challenges is keeping the treated site clean without disturbing the natural regenerative process, which takes about 4 weeks to complete[7, 8]. Several local-acting products exert their function through antibiotics and/or bactericidal substances, which while effective in counteracting bacterial reinfection, can interfere with the natural process of tissue regeneration.

In contrast, collagen is the protein that makes up most connective tissues (including gingival tissue), and its supply provides a *scaffold* for the proliferation of fibroblasts and cells involved in periodontal tissue regeneration.

This *case series* shows that the use of the new collagen *hydrogel* (H42®, Bioteck Spa, Arcugnano - Vicenza) consisting of type I collagen, high molecular weight polymers, and ancillary amounts of vitamin C, is effective in promoting periodontal pocket healing, reducing the pocket depth by about 4 mm, decreasing CAL by about 2.5 mm and reducing the plaque index to about 1 up to 3 months of follow-up. In addition, an acceleration of tissue healing, as well as a reduction in inflammation, could be seen as early as 7 days after the application of H42®. The H42® *hydrogel* exerted its occluding function, preventing bacterial recolonization and, at the same time, the collagen provided the necessary scaffold for fibroblasts to colonize the defect and promote regeneration of the gingival epithelium around the tooth, thus closing the periodontal pockets. No side effects were observed.

Bibliography available to the publisher.

Figure 7. Frontal view of the treated defect at 30-day follow-up. Periodontal parameters improved: PPD of 3 mm and CAL 4 mm. The clinical appearance of the tissues has significantly improved. The edema of the early stage has receded and there is a depression in the center of the papilla showing an advanced stage of healing.

Figure 8. Occlusal view of the treated defect at 90-day follow-up. The papilla has healed with tissue retraction resulting from the reduction in pocket depth. Pocket depth was further reduced: PPD by 2 mm and CAL 4 mm.


Fig. 7

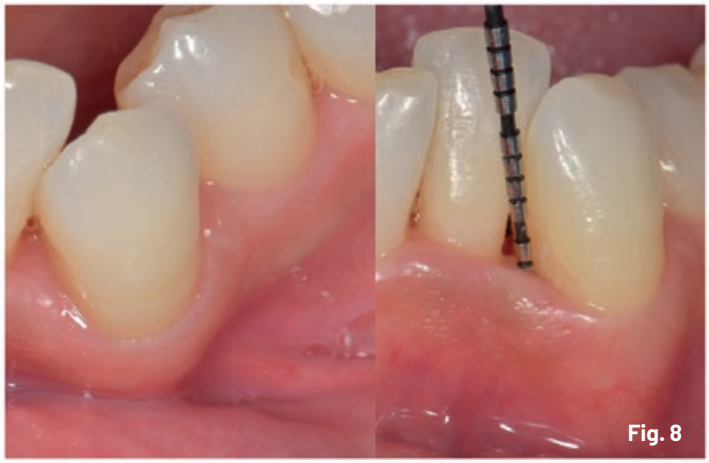
Fig. 8

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