



1 DIAGNOSE



2 INJECT



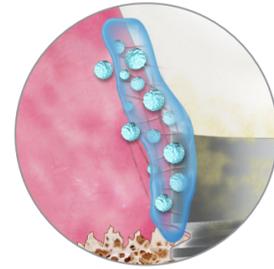
3 CLEAN



4 REPEAT AT WILL



1 SEAL



2 HEAL



3 TREATMENT & RECALL PLAN



5 mm probing depths associated with bleeding (BoP*). Peri-implant mucositis is diagnosed.



The cleaning agent is used in addition to mechanical debridement, as a biofilm eraser.



After at least 30 seconds following the application of the cleaning gel, the biofilm is mechanically removed with a titanium coated stainless steel micro-curette, mainly with horizontal strokes.



Repeat the cleaning steps until the pocket is clean, according to standards of best practice. E.g. tactical assessment of remaining biofilm presence.



Prepare the xHyA gel, a solution based on 1.8% cross-linked and native hyaluronic acid. It ought to be applied into pockets (and surgically) at room temperature, even in presence of blood and fluids.



The healing process is supported by the presence of hyaluronic acid, which has been shown to protect the site and up-regulate several growth factors.^{6,7,8}



It is essential that the clinician makes sure, that the interproximal spaces are accessible to the interdental brush and that the biofilm is effectively removed, especially in inflamed areas.



The cleaning gel is prepared by mixing the two components. This leads to the subsequent formation of a turbid, viscous solution consisting of water, carboxymethyl cellulose, sodium hypochlorite, sodium chloride, amino acids and titanium dioxide with an alkaline pH.



The clinician uses site-specific instrumentation including manual curettes and ultrasonic instruments with specific implant inserts.



Application of the biofilm eraser is repeated and acts by softening the extracellular matrix of the biofilm.⁵ The cleaning gel can be applied several times to the inflamed site, for a complete implant surface decontamination, while not risking to damage soft tissues.



After completion of the non-surgical peri-implant debridement, hyaluronic acid is applied to promote the healing process.^{9,10}



Patient maintenance: Refrain from brushing and eating at least during the hour following the application of the xHyA gel.



The cleaning gel is applied in the pockets for its antiseptic effect, biofilm softener, while being gentle to soft tissues.



Any residual biofilm present at the sites of mucositis diagnosis is removed using an ultrasonic device and a specific implant insert, which is held tilted to the long axis of the implant to allow gentle penetration into the peri-implant pocket.



After an exposure time of 30 seconds, the mechanical debridement using hand-held instruments and an ultrasonic device is repeated. In the illustrated case, a titanium brush mounted on a slow-speed handpiece was used to achieve additional and effective decontamination.



Besides its bacteriostatic action, the sealing gel is applied to stabilize blood clot and promote the healing process. Do not rinse the xHyA gel.

RECALL PLAN

APPOINTMENT TIMES	RECALL PLAN
	1st appointment: Full debridement with the clean and seal gels. Refrain using chlorhexidine for rinsing.
	Recall week 1 to reapply the xHyA sealing gel. Further controls at 3,6. According to clinical situation and patient's etiology, re-apply Clean & Seal if needed.
	Re-evaluation at week 12. Apply Clean & Seal.



Approximately one year after the diagnosis of peri-implant mucositis, the probing values are within normal range and no bleeding is detected.



Peri-implant mucositis has been successfully resolved using non-surgical treatment. An important factor was scrupulous home care and constant motivation of the patient at each scheduled appointment of the described protocol.



CLEAN & SEAL™

CASE PROVIDED BY DR MARISA RONCATI (ITALY)

PERI-IMPLANT AND PERIODONTAL THERAPY

The **CLEAN&SEAL®** concept facilitates therapies to save implants and teeth by preventing the further development of peri-implantitis or periodontitis.^{1,2}

As an adjunctive treatment to debridement, this two-step protocol starts first with the application of the cleaning gel. It helps to clean by softening the biofilm and eliminating the bacteria, while being gentle to soft tissues.^{3,4} Then, the application of **xHyA** sealing gel (cross-linked hyaluronic acid) into the pockets accelerates their closure by regenerating tissues and providing a bacteriostatic shield to the wound. **xHyA** contributes to reduce significantly the pain and swelling.⁵

CLEAN – It is of great importance to treat peri-implant and periodontal diseases at an early stage, with infection control and extensive debridement being crucial for positive treatment outcomes. Bacterial aggression is acknowledged as the primary etiology of periodontitis and peri-implantitis, unless the origin is the result of simple mechanical overload.⁹⁻¹⁶

SEAL – However, as for any oral wound healing, an open pocket is highly exposed to pathogen aggression. When predominant oral bacteria can be controlled, soft tissue healing (i.e. keratinocytes) is not impaired.¹⁵⁻¹⁷ Respectively a 70% faster wound closure can be observed at day 4 post-op.¹⁷ The likelihood of success is enhanced by the application of a sealing agent for protection, healing support and inflammation control.^{5,19,20} **xHyA** is providing a prolonged bacteriostatic effect to pockets while boosting tissue healing through its regenerative mechanism.²⁰



SEALING EFFECT:

- 1 ATTRACTS BLOOD
- 2 PROTECTS AS A BACTERIOSTATIC SHIELD
- 3 STABILIZES COAGULUM AND SUPPORTS TISSUE REGENERATION
- 4 ATTRACTS GROWTH FACTORS AND ACCELERATES ANGIOGENESIS
- 5 REDUCES PAIN AND SWELLING FOR A BETTER PATIENT EXPERIENCE⁵



CLEANING EFFECT:

- SOFTENS THE EXTRA-CELLULAR MATRIX OF THE BIOFILM⁹
- EFFECTIVE ANTISEPTIC PROPERTIES AGAINST ESTABLISHED BIOFILM²¹
- EASES BACTERIAL REMOVAL WITH ITS ANTISEPTIC AND BIOMECHANICAL PROPERTIES.
- ONLY AFFECTS INFECTED, NOT HEALTHY TISSUES.³



LITERATURE

1. Jepsen S et al. Primary prevention of periimplantitis: managing periimplant mucositis. J Clin Periodontol 2015; 42 (Suppl. 16): S152-S157. doi: 10.1111/jcpe.12369.
2. Costa FO et al. 'Peri-implant disease in subjects with and without preventive maintenance: a 5-year follow-up.' Journal of Clinical Periodontology 2012; 39, 173-183.
3. Arvidson A.Thesis (ISBN: 91-628-5882), University of Gothenburg, Sweden. 2003.
4. Hawkins CL et al. Amino acids. 2003;25:259-274.
5. Yildirim S et al. Effect of topically applied hyaluronic acid on pain and palatal epithelial wound healing: An examiner-masked, randomized, controlled clinical trial. J Periodontol. 2018 Jan;89(1):36-45. doi: 10.1902/jop.2017.170105. PMID: 28914592.
6. Pirmazar P et al. 'Bacteriostatic effects of hyaluronic acid.' J Periodontol 1999;70:370-4.
7. Engstrom PE, et al. The effect of hyaluronan on bone and soft tissue and immune response in wound healing. J Periodontol 2001 72: 1192-1200. doi:10.1902/jop.2000.72.9.1192
8. Asparuhova M, et al. 'Activity of two hyaluronan preparations on primary human oral fibroblasts'. J Periodontol Res 2018 Sep 27. Epub 2018 Sep 27.
9. Amano A. Host-parasite interactions in periodontitis: subgingival infection and host sensing. Periodontol 2000, 2010; 52 (1): 7-11
10. Colombo AP et al. Comparisons of subgingival microbial profiles of refractory periodontitis, severe periodontitis, and periodontal health using the human oral microbe identification microarray. J Periodontol 2009; 80 (9): 1421-32.
11. Paster BJ et al. Bacterial diversity in human subgingival plaque. J Bacteriol 2001; 183 (12): 3770-83.
12. Amano A. Bacterial adhesins to host components in periodontitis. Periodontol 2000, 2010; 52 (1): 12-37.
13. Jepsen S et al. Prevention and control of dental caries and periodontal diseases at individual and population level: consensus report of group 3 of joint EFP/ORCA workshop on the boundaries between caries and periodontal diseases. J Clin Periodontol 2017; 44 Suppl 18: S85-s93.
14. Sarmiento HL et al. A Classification System for Peri-implant Diseases and Conditions. Int J Periodontics Restorative Dent. 2016 Sep-Oct;36(5):699-705. doi: 10.11607/prd.2918. PMID: 27560674.
15. Kuboniwa M et al. (2012) Insights into the virulence of oral biofilms: discoveries from proteomics. Expert Rev Proteomics 9: 311-323.
16. Hajishengallis G et al. (2011) Lowabundance biofilm species orchestrates inflammatory periodontal disease through the commensal microbiota and complement. Cell Host Microbe 10: 497-506.
17. Graves DT et al. (2011) Review of osteoimmunology and the host response in endodontic and periodontal lesions. J Oral Microbiol. 3.
18. Bhattacharya R et al. Effect of bacteria on the wound healing behavior of oral epithelial cells. PLoS One. 2014;9(2):e89475. Published 2014 Feb 21. doi:10.1371/journal.pone.0089475
19. Eliezer M, et al. Hyaluronic acid as adjunctive to non-surgical and surgical periodontal therapy: a systematic review and meta-analysis. Clin Oral Investig. 2019 Sep;23(9):3423-3435. doi: 10.1007/s00784-019-03012-w. Epub 2019 Jul 23. PMID: 31338632.
20. Pirmazar P et al. 'Bacteriostatic effects of hyaluronic acid.' J Periodontol 1999;70:370-4.



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