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Commentary

Is there a Dark Side of Aerosolization Prevention by High Molecular Weight Polymers in Dental and Orthodontic Practice?

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Abbreviations

COVID-19: Coronavirus Disease 2019; CFU: Colony Forming Unit; DUWL: Dental Unit Water Lines; EU: European Union; FDA: Food and Drug Administration; HPC: Heterotrophic Plate Count

We read with great interest the recent article by Plog., *et al*. on the complete suppression of aerosolization in dental procedures by introducing viscoelastic forces preventing droplet formation [1]. The authors underline the use of Food and Drug Administration (FDA)-approved high molecular weight polymers without anti-viral/bacterial activity, nor intending to kill virus/bacteria [1].

We recently published papers on the different problems during the application of guidelines for Coronavirus Disease 2019 (COVID-19) prevention in dentistry [2-4]. We believe that Plog's approach is novel, and a very interesting opportunity for infection prevention in dentistry.

That said, we want to call attention towards some side effects, which could influence effective protocols currently in use in dental and orthodontic facilities.

Firstly, nowadays, guidelines indicate mandatory continuous and/or shock treatments of dental unit water lines (DUWL) to limit water contamination and biofilm formation [5]. Outbreaks of waterborne infections from DUWL contamination are an increasing problem [5,6] and the standard established in the European Union (EU) is lower (Heterotrophic Plate Count (HPC) at 22°C is ≤ 100 Colony Forming Unit (CFU)/ml and at 36°C is ≤ 20 CFU/ml) than in the USA (HPC ≤ 300 or 500 CFU/ml) [7-10]. The EU standard is not easy to maintain, above all during COVID-19 epidemics because of patient appointment scheduling, occupational COVID-19 outbreak and unpredictable lock down. Currently, treatment includes the use of a combination of products that have anti-adhesive, chelating and disinfectant activities, as well as the prevention of unpleasant odours [5].

However, due to the increased viscosity of the proposed solutions (2 wt. % PAA and 0.8 wt. % xanthan gum solution) compared to water, authors did not excluded any interference with these activities inside DUWL and on their components and also during in-office

water quality monitoring [5,9]. The authors did not excluded a relationship between fluid viscosity, bacterial adhesion and biofilm stiffness in DUWL [5,8-10]. In fact, it is generally considered that high shear rates result in high detachment forces that result in decreasing the number of attached bacteria, while they make the biofilm denser and thinner [11].

In addition, dental practitioners would have appreciated if the authors had reported some information on:

a) Heat-resistance of aqueous solutions of hydrogel or polymer in small steam sterilizers (steam sterilizer: class B - European Norm 13060) and sterilization cycles which are used for medical purposes and employ moist heat. At present, it is unknown if high molecular weight polymers can be used in sterile irrigation solutions for oral surgical and dental implant procedures [8,10,12].

b) Interference on dental etching agents, dental bonding agents and dental self-etching bonding agents, because of the main role of polymerization in adhesive dentistry (i.e. composite restoration and fixed orthodontics), and on products for tooth polishing and whitening [13-16].

Then, we urge that more knowledge is needed before the use of these high molecular weight polymers in dentistry.

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Conflict of Interest

Until 2018, L. Barenghi had a service agreement with KerrKaVo and was a consultant for DentalTrey il Blog (http://blog.dentaltrey.it/), neither of which gave any input or financial support to the writing of this article. The authors (A. Barenghi, F. Spadari, A.B. Giannì) declare that there are no conflicts of interest regarding the publication of this paper.

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