Disinfection of Dental Impressions: a Safe but Feared Step

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Introduction

Cross-infection control in dental practice is of great importance. Most microorganisms are commensal and non-pathogenic; however, some may be opportunistic and cause oral or systemic pathology. One of the possible paths of transmission is by dental impressions that contain the patient's saliva and blood and, consequently, the gypsum casts produced after them, exposing oral healthcare professionals to possible contamination (1,2). To minimize the risk of cross-infection, several health organizations such as the American Dental Association (ADA) and the Centers for Disease Control (CDC) have published guidelines recommending disinfecting dental impressions immediately after their removal from the mouth, but there are no specific guidelines concerning disinfectants (3,4). In order to achieve a more precise clinical outcome, a disinfectant for dental impression materials must preserve the dimensional stability and the surface details of both the impression and the resulting cast.

Objectives

The purpose of this study to evaluate the knowledge regarding disinfection procedures among prosthesis technicians and dentists, as well as to assess the impact of water wash and of four disinfectant solutions on the dimensional stability of addition silicone' and alginate' impressions, namely, hydrogen peroxide (3%), MD520® (Durr™), or sodium hypochlorite (1% and 5.25%).

Methods

Survey on the Knowledge regarding Disinfection Procedures

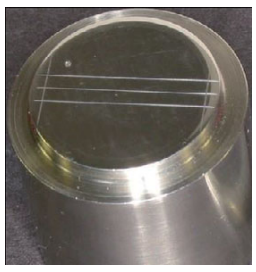
Questions:
- Practice of disinfection
- Reasons for disinfection
- Knowledge on the importance of dental impressions' disinfection

3 months later

1000 dentists
320 prosthesis technicians

Response rate of 9.5% and 7.8%, respectively

Dimensional Stability' Evaluation



Standardized model (ANSI/ADA specification nº18 and 19)

(Figure adapted from: Maria GA, Sanette MS. The effect of temperature on linear dimensional stability of elastomers. J Res Dent 2014;2:6-12)

The standardized model was washed in alcohol and placed in a greenhouse at 37º for 1 minute.

10 impressions in both alginate (*Orthoprint, Zhermack™*) and addition silicone (*Hydrorise Putty, Zhermack™*) were taken and submitted to the following protocols:

1) **Unwashed control**;
2) **Water washing** for 30 seconds;
3) **Immersion in 3% hydrogen peroxide** for 10 minutes*;
4) **Immersion in 1% sodium hypochlorite** for 10 minutes*;
5) **Immersion in 5.25% sodium hypochlorite** for 10 minutes*;
6) **Immersion in MD520®** (Durr™) for 5 minutes*.

*washed 15 seconds with water before and after the disinfection protocol.

(From: http://www.savazzi.net/photography/wild_leica_m420.htm)

ImageJ

Image Processing & Analysis in Java

(Adapted from: https://webllena.com/wp-content/uploads/2018/05/ImageJ.png)

Results

Among dentists, 21.3% never disinfect dental impressions, being the most common reason the fear of dimensional changes (25%) (figure 1). As for the prosthesis technicians, 12.5% never disinfect the impressions, mainly for considering it irrelevant (50%). Regarding the communication of the disinfection state of an impression between dentists and prosthesis technicians 58.9% of the dentists do not inform the state of disinfection, which is in accordance with the answers from the prosthesis technicians since 82.6% are not aware of the state of disinfection.

Addition silicone and alginate impressions' disinfection by immersion does not significantly impact the dimensional stability of the impressions ($p>0.05$, figure 2). All the values of dimensional changes calculated for side A were according to the ISO 19 standard 4823:2015, which states that the maximum percentage of dimensional change for elastomers should not exceed 1.5%.

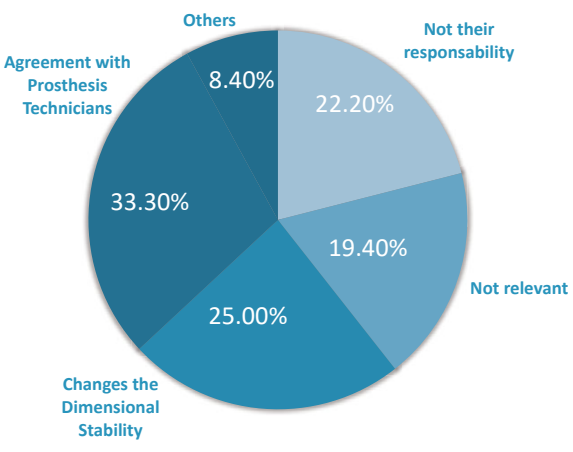


Figure 1 – Reasons given by dentists to not disinfect dental impressions.

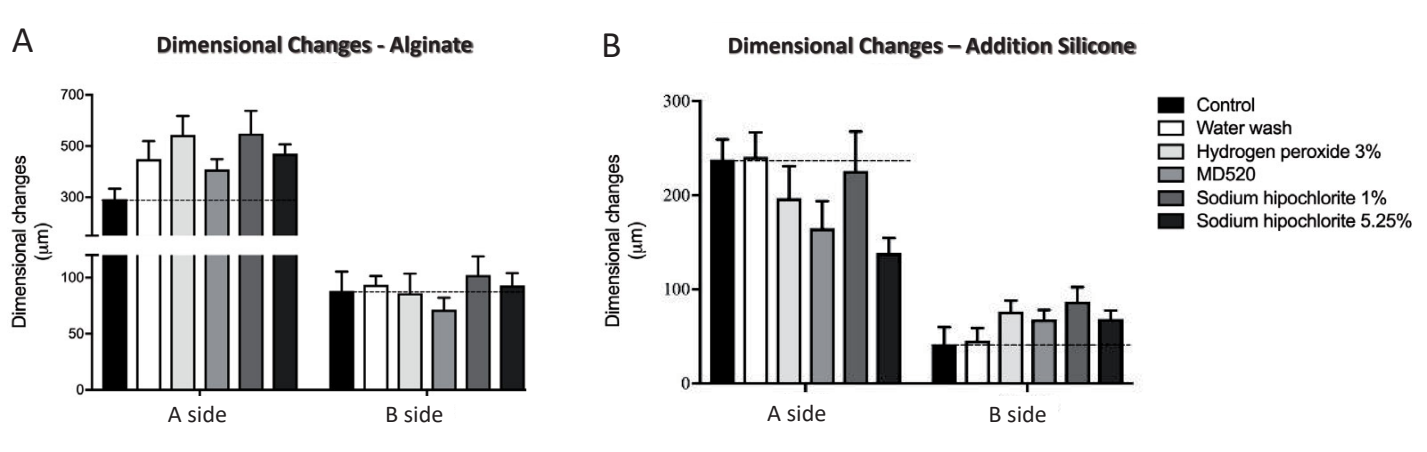


Figure 2 - Dimensional changes measured on sides A and B, in alginate (A) and addition silicone (B), after the different treatments. Bars represent mean and the error bars represent standard error of the mean.

Discussion and Conclusions

In our study, as in the others performed, a lack of knowledge in this area was noted (1,5). The behaviour of dentists and prosthesis technicians that this study highlights is probably due to the lack of information from the guidelines recommended by regulatory associations such as CDC and ADA. Dental impressions disinfection by immersion with 3% hydrogen peroxide, MD520® (Durr™), or sodium hypochlorite at 1% and 5.25% (and after tap water rinse) does not negatively impact the three-dimensional shape of the impressions. It will be necessary to invest in training at pre- and post-graduate levels in order to update the knowledge of health professionals, so they can recognize the importance of these prevention methods, accept them as crucial, to demystify the fear of dimensional changes after disinfection procedures and avoid the consequences of double disinfection.

References

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