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## Research Article

### EVALUATION OF DETAIL REPRODUCTION OF TWO KINDS OF IRREVERSIBLE HYDROCOLLOID AFTER DISINFECTION BY NANOSIL D2 AND MICROTEN BY SPRAY AND IMMERSION METHOD

REZA GODAZPOUR, DDS, MDS. SEYEDE ZAHRA ASKARPOUR\* DDS.  
ASADOLLA AHMADZADE, DDS, MDS

School of Dentistry, Ahwaz Jundishapur University of Medical Sciences, Khuzestan, Ahvaz, Iran

\*Corresponding Author: [seza2010@gmail.com](mailto:seza2010@gmail.com)

#### Abstract

**Background and Aims:** As the alginate is the most commonly used impression material in dentistry and infection control is still an issue, so the aim of this study is to investigate the effect of disinfection procedure (Nanosil D2 and Microten) on two kind of irreversible hydrocolloid detail reproduction. **Materials and Methods:** A stainless steel die was used to make impression modified to ISO 21563 having 10, 20, 30, 40 and 50  $\mu\text{m}$  lines. Under standardized conditions a total of 50 impressions were made using two kind of irreversible hydrocolloids (Alginoplast and Iralgin) and divided into 10 groups. 8 groups were disinfected with Nanosil D2 and Microten by spray and immersion method and other groups as the control, sealed in a plastic bag for 15 minutes. Impression were examined for surface detail reproduction in accordance with ISO 21563 and Hall scoring system. Data was analyzed by Mann whitney and Kruskal-Wallis test. **Results:** Both irreversible hydrocolloids reproduced the 10  $\mu\text{m}$  wide line. There was no statistically significant change in the surface detail reproduction when disinfected with Nanosil D2 by spray and immersion and Microten by spray method. But alginate impressions subjected to immersion in Microten exhibited statistically significant differences. **Conclusion:** Both the impressions passed the ISO requirement for the surface detail reproduction before disinfection. Except the impressions which immersed in Microten, the others were not affected by disinfection procedures.

**Keywords:** Irreversible hydrocolloid, Disinfection, Surface detail, Nanosil D2, Microten

#### Introduction

Undoubtedly, alginate is one of the most popular materials for making an impression of the mouth (1-9). Because of the hydrophilic nature and components' surface of the alginate, it has been shown that irreversible hydrocolloid impressions appear to carry more microorganisms than any other material (4,10). While so many studies has been performed about disinfection procedures, but no one optimum method has been devised (4,11,12). So the role of a disinfectant is dual purpose, in that it must be an effective antimicrobial agent, yet cause no adverse response to the dimensional accuracy and surface texture features of the impression material and resultant gypsum cast (7,11-16).

Protocols established by the Centers for Disease Control (CDC) recommended the use of household bleach diluted one to ten, iodophor or synthetic phenols. This center authorized the both spray and immersion

methods for up to ten minutes (6,12,17). But to overcome the distortion issues, the American Dental Association (ADA) recommended that alginate impressions be sprayed with an ADA-approved disinfectant, and then sealed in a plastic bag according to the recommended disinfection time (4,14,17,18). Disinfection should be carried out with a product that requires the least amount of time for the disinfection process and in accordance with ISO 21563 the impressions have to reproduce the 20  $\mu\text{m}$  wide line before and after disinfection (14, 20).

Many studies have been performed about the effect of disinfection on different dental materials, and almost all of them were placed under standardized condition. Most of them assessed the gypsum casts after impression disinfection and a few examined the impressions too. These studies have been shown the detail reproduction into different manner; reproduction- not reproduction or

four qualitative scale as proposed by Oven in 1986 (10). Just one of them was more numerical in the results which in this study, a similar approach was taken (21).

According to previous studies, it seems that knowledge about the impression disinfection and also its effects, is poor, so the aim of this study is to evaluate the detail reproduction of two kinds of irreversible hydrocolloid after disinfection by Nanosil D2 and Microten by spray and immersion method.

## Materials and Methods

A stainless steel die was used to make impression modified to ISO 21563 having 10, 20, 30, 40 and 50  $\mu\text{m}$  horizontal lines. Size of all the lines were checked by SZX16 measuring stereomicroscope (Olympus Optical Co Ltd, Japan) with a magnification of 11.5. An alginate impression (Alginoplast® fast set/Heraeus Kulzer/Holland) was taken of the master model and poured with plaster of paris (Miladent/Iran). After the setting was complete, two layer (3mm) of waxes (Azarteb/Tabriz/Iran) were placed on the cast as spacer, except 1mm of its outer border. Then 5 special trays have been fabricated with the self-curing acrylic resin (Acropars/Marlik/Iran), and 2mm holes with a distance of 5mm were created on them.

Prior to forming productive lines by stereo microscope Czech SZX16 to be free of contaminants and then to simulate oral temperature for 15 minutes in the water bath temperature ( $35 \pm 2$ ) was used. Bayer alginate (Alginoplast- Germany) and Iralgin (Glchay- Tehran, Iran) prepared in accordance with the manufacturer's instructions and 30 seconds before the end of the work was placed in the center of Bath and 15 seconds later additions of slowly under pressure to come out. Then a weight of 1 kg for the final push to reach the final form were used. All components of the generator and the proposed time frame factory stay in the mouth for 90 seconds, in a water bath ( $35 \pm 2$ ) were placed. After the formation of productive separated, rinsed under running water and then additional water was removed by gentle air.

All templates are then separated from the generator were checked to no tear or deformation visually or otherwise excluded from the study and was replaced by another form. The 25 alginate mold by Bayer and 25 other format provided by the alginate Iralgin in total were divided into 10 groups of 5. The 4 groups Nanosil D2 (Kimia Fam- Iran) and 4 others by Microten (Unident-Switzerland) to both immersion and spray disinfectants and 2 group as a control rinse under running water and then was placed in a wet gauze wrapped in a plastic bag for 15 minutes.

For immersion method the impressions were immersed in solution of 2% Microten and Nanosil D2 for 15 minutes. And in the spray method, impressions were

sprayed 8-10 times for 30 seconds with both the material and then were placed in a plastic bag with a damp cotton rolls for 15 minutes. Upon completion of the disinfection impressions washed under tap water and additional water were removed and then examined under a microscope. According to Hall if 75% was recorded along the line it was able to register an impression material (21). According to the ISO 21563 standard 20 micron line in the form of irreversible hydrocolloid should be able to register the entire length of 25 mm. Mann whitney and Kruskal-Wallis test was used to check the data on the significant level of 0/05.

## Results

The results showed that both impression material were able to record 10 micron line and could pass the standard.

Kruskal-Wallis statistical analysis was done to check for significant differences between the 10 groups and it was found that there is a significant difference between them. Then, to determine the difference between any two groups, at first because of the similarity between the data, Kruskal-Wallis test was used again in 8 groups and the results showed that there is no significant difference between them. Finally Mann-Whitney test was used to compare between 9 and 10 which did not reveal significant differences between them. In addition the Evaluations showed that all groups except two immersion in Microten were in accordance with standard.

## Discussion

The aim of this study was to investigate the effects of disinfectants on the detail reproduction of the two types of alginate. The results showed that the detail reproduction of both impression materials (Iralgin and Alginoplast) after 15 minutes kept in a moist environment were in the standard range. Nanosil D2 disinfectant solutions in both disinfection methods and Microten solution only in spray method had no detrimental effect on impression and could passed the standard, while immersion in Microten were destroyed the surface detail of the impression materials.

According to the studies, it can be concluded that all disinfectants have been studied so far, when used in spray method, couldn't not make a significant difference in alginate detail reproduction. It is also fully consistent with the results of our study there. Finally, it may be concluded that the spray method is the best way to disinfect alginate impressions (10, 14-16, 21-27).

Another important point is that except one of the studies, the others examined the casts after disinfection which could affect the results. For this purpose, a recent study by removing plaster confounding factors, such as the form taken Suprono study, examined (10).

## Conclusion

Both the impressions passed the ISO requirement for the surface detail reproduction before disinfection. Except the impressions which immersed in Microten, the others were not affected by disinfection procedures.

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