EVALUATION OF DIMENSIONAL STABILITY OF IMPRESSION MATERIALS IMMERSED IN DISINFECTANT SOLUTIONS USING A METAL TRAY

AVALIAÇÃO DA ALTERAÇÃO DIMENSIONAL DE MATERIAIS DE MOLDAGEM IMERSOS EM SOLUÇÕES DESINFETANTES USANDO UMA MATRIZ METÁLICA

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ABSTRACT

Introduction: When impressions are taken, saliva and blood may become trapped in the material, and washing them does not always guarantee that all microorganisms are removed. Therefore, methods for disinfecting impressions (immersion and spray) have become a necessity, but they can affect the accuracy of dental impressions. Material and methods: This study used a total of 135 impressions, 45 of each of the following materials: Impregun F® (polyether), Permlastic® (polysulfide) and Hydrogun® (irreversible hydrocolloid). Sodium hypochlorite and glutaraldehyde were selected as disinfectants and the immersion times were 10 or 15 min. Ten impressions of each material were immersed in both solutions: 2% glutaraldehyde solution (Glutacid® 2%) and sodium hypochlorite solution (Milton 1%), for 10 or 15 min. The other 5 impressions of each material were used as a control group without immersion in disinfectant solutions. Results: Neither polyether nor polysulfide impressions showed any statistically significant difference (ANOVA) from their control measurements after being soaked in the two disinfectant solutions. However, when the alginate impressions were disinfected by sodium hypochlorite for 15 min, a significant distortion (~0.122 mm) occurred, compared with control group. Conclusion: Within the limits of this study it can be concluded that the immersion practices for disinfection did not influence the quality of impressions obtained, except when sodium hypochlorite was used for 15 min.

UNITERMS: dimensional stability; disinfection; impression materials.

SUMO

Introdução: Nas moldagens para obtenção de modelos para confecção de próteses, principalmente quando são realizadas em áreas retentivas da boca, resíduos de saliva e sangue ficam retidos no material e podem conter microorganismos patogênicos. Somente a lavagem do molde em água corrente não garante que todo sangue e microorganismos aderidos à superfície do molde en. soluções desinfetantes . Assim torna-se necessária a desinfecção dos moldes para a qual os soluções desinfetantes . Foi verificada a eficiência para esse propósito. No entanto, esse procedimento pode afetar a estabilidade dimensional dos materiais de moldagem após a

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INTRODUCTION

During the past few decades, authors have perpetuated the notion that dental impressions can lead to transmitting diseases, such as B hepatitis, tuberculosis, herpes and AIDS (Bond et al.3, 1983). When impressions are taken in retentive edentulous areas and subgingival preparations, blood has frequently been seen in the material, and washing alone does not clear it away, so there is no guarantee whatever that all organisms from the mouth that may have adhered to the impression surface have been removed (Look et al.13, 1990; Rios et al.18, 1996). Thus, disinfection methods have become a necessity; but these can affect the accuracy of dental impressions (Minagi et al.16, 1987; Setcos et al. 20, 1985; Setcos et al. 21, 1986; Johnson et al. 9, 1998; Drenon et al. 7, 1989). In 1985, The American Dental Academy (ADA) published guidelines for infection control in the dental office and commercial dental laboratory. Contaminated materials and impressions should be cleaned and disinfected before being handled in the dental laboratory (Drenon et al.7, 1989).

Immersion and spray disinfectants, as well as many other solutions have been tested and proved to be effective for this purpose. The most reliable disinfection method is to immerse the impression in solutions desinfetantes de hipoclorito de sódio 1% e glutaraldeído 2%. Material e métodos: Foram realizadas 45 moldagens para cada um dos materiais: poliéter (Impregun F®), polissulfetos (Permlastic®), e hidrocólóide irreversível (Hydrogun®). 40 moldes de cada material foram imersos nas soluções desinfetantes variando-se o tempo entre 10 e 15 minutos. 10 moldes foram imersos em glutaraldeído a 2% por 10 min, 10 por 15 min, outras 10 imersos em hipoclorito de sódio a 1% por 10 min, e 10 por 15 min. Os demais moldes 5 não foram imersos em nenhum desinfetante e serviram como grupo controle. Resultados: Nos moldes obtidos foram medidas as distâncias (AB, CD, AC, BD) em um microscópio digital Mitutoyo (TM 500) e os resultados foram submetidos à análise de variância a 2 critérios e as diferenças pelo teste de Tukey com intervalo de confiança de 95%. A análise dos resultados mostrou que no houve diferenças estatisticamente significantes para os moldes de poliéter e polissulfeto quando comparados ao grupo controle. No entanto, para os moldes de alginito desinfetados em hipoclorito de sódio a 1% por 15 min, observou-se uma distorção estatisticamente significante quando comparado ao grupo controle. Conclusão: Dentro dos limites dessa pesquisa pode-se concluir que a desinfeção dos moldes nas soluções de hipoclorito de sódio 1% e glutaraldeído 2% é uma prática segura, exceto para alginito que quando imerso durante 15 minutos em hipoclorito de sódio apresentou distorção, mas o mesmo não foi observado para esse material quando o tempo de 10 minutos foi usado.
Forty-five impressions were made with each of the following materials: Impregum F® (polyether), Permlastic® (polysulfide) and Hydrogun® (irreversible hydrocolloid). The selected disinfectants were: 1% sodium hypochlorite (Milton) and 2% glutaraldehyde (Glutacid®). They were freshly prepared for each experiment.

The experimental groups were divided according to the diagram:

Ten impressions from each group of materials were immersed in glutaraldehyde solution for 10 min, and 10 impressions of the same materials were immersed for 15 min. The same procedure was carried out with the sodium hypochlorite solution. Five (5) impressions of each material were immersed for 15 min. The same procedure was carried out with the sodium hypochlorite solution for 10 or 15 minutes, removed and rinsed under cold running water for 30 seconds and dried with compressed air. Immediately after drying, the original impressions were magnified ×30 and the distances between the lines AB, CD, AC and BD as shown in Figure 1 were measured three times by two examiners, for each elastomeric material. Irreversible hydrocolloid impressions were measured twice, because this material is more susceptible to syneresis and drench (Bayindir et al. 2002). Mitutoyo digital measurement microscope (TM500) sensitivity of 1.0 µm was used to measure dimensional sensitivity.

The analysis of variance (ANOVA) model was used to test the null hypothesis that there was no difference between control and experimental groups. A graphic presentation of the data in Table 1 includes means and standard deviations. Deviations ranged from 0.009 to 0.140 millimeters. Impression material after immersion separated from the tray after 6 minutes. They were measured immediately after the impression procedure, to prevent any risk of distortion. Next, every impression was immersed in a disinfectant solution for 10 or 15 minutes, removed and rinsed under cold running water for 30 seconds and dried with compressed air. Immediately after drying, the original impressions were magnified ×30 and the distances between the lines AB, CD, AC and BD as shown in Figure 1 were measured three times by two examiners, for each elastomeric material. Irreversible hydrocolloid impressions were measured twice, because this material is more susceptible to syneresis and drench (Bayindir et al. 2002). Mitutoyo digital measurement microscope (TM500) sensitivity of 1.0 µm was used to measure dimensional sensitivity.

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The Tukey Test was used to analyze the results and showed no significant dimensional changes in polyether and polysulfide impressions in all periods of disinfection with glutaraldehyde and sodium hypochlorite (p = 0.05).

Neither polyether nor polysulfide impressions showed any statistically significant differences from their control measurements after soaking in the two disinfectant solutions. The null hypothesis for these experiments was that the mean distances measured in the control group were the same, irrespective of the impression being soaked in either one of the disinfectant solutions. However, after the alginate impressions were disinfected with sodium hypochlorite for 15 minutes a significant change was observed when compared with control group. A reduction in measurement represented alginate shrinkage. Macro and microscopic porosities were also found. The differences attained 0.3 mm ($3 \times 10^{-4}$ m) mainly in the largest distances (AB and CD).

**DISCUSSION**

The effects of different disinfectant solutions and times on three impression materials have been evaluated. There have been disagreements regarding their dimensional stability after the process (Drenon et al. 7, 1989; Johnson et al. 1998; Setcos et al. 20, 1985, Thouati et al. 22, 1996). According to the specifications provided by the Disease Control Centers, chemical disinfectants such as chlorine compounds, formaldehydes, phenols, and iodophors have the potential to eliminate hepatitis, heroin viruses in 10 to 30 minutes (Matyas et al. 14, 1990). In this study, the choice was to evaluate polyether and irreversible hydrocolloid impression materials, because they are hygroscopic and therefore polyvinyl siloxanes. Sodium hypochlorite and glutaraldehydes, phenols, and iodophors have the potential to eliminate hepatitis, heroin viruses in 10 to 30 minutes (Matyas et al. 14, 1990). However, Minagi et al. 16 (1987) showed that immersion in 2% glutaraldehyde for 60 minutes for irreversible hydrocolloid impression materials did not jeopardize surface details. When it was immersed in 1% sodium hypochlorite for 15 minutes, however, it was possible to observe statistically significant differences in the dimensional measurements, like little craters, which can affect the final results of dentures. Undesirable impositions would be transferred to the casts and subsequently to the final restoration.

Altough this study showed no significant linear dimensional changes after immersion practices in all arch casts, cavities for inlays, and removable partial dentures, the problem of disinfecting dental impressions (Lepe et al. 12, 2002), particularly irreversible hydrocolloid and hydrophilic ones, such as polyethers, is a major concern. Herrera et al. 7 (1986); Merchant et al. 15 (1984), Langerwalter et al. 11 (1990) and Matyas et al. 14 (1990) did not find dimensional changes after the use of a 0.5% sodium hypochlorite solution for 30 minutes. In this study, the concentration of sodium hypochlorite was 2 times greater, which could explain the differences in the results. However, Minagi et al. 16 (1987) showed that immersion in 2% glutaraldehyde for 60 minutes for irreversible hydrocolloid impression materials did not jeopardize surface details. When it was immersed in 1% sodium hypochlorite for 15 minutes, however, it was possible to observe statistically significant differences in the dimensional measurements, like little craters, which can affect the final results of dentures. Undesirable imperfections would be transferred to the casts and subsequently to the final restoration.

Within the limits of this study it can be concluded that disinfect immersion practices
did not influence the dimensional stability of impressions obtained, except when sodium hypo-
chlorite and a 15-minute immersion time were used for disinfecting irreversible hydrocolloid 
impressions.

REFERENCES


