PILOT STUDY ON THE INFLUENCE OF DIFFERENT TYPES OF GLOVES ON CURING TIME OF THE ADDITION SILICONE

ESTUDIO PILOTO SOBRE LA INFLUENCIA DE DIFERENTES TIPOS DE LUVA EN EL TIEMPO DE PRESA DEL SILICÓN POR ADICIÓN

ESTUDO PILOTO SOBRE A INFLUÊNCIA DE DIFERENTES TIPOS DE LUVA NO TEMPO DE PRESA DO SILICONE POR ADIÇÃO

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Abstract

Objective: To evaluate the influence of different types of gloves on curing time of the addition silicone.

Materials and Methods: A dense paste of the addition silicone was manipulated without gloves and by three different types of gloves (latex, vinyl and nitrile), then was molded a metal matrix and after curing time the mold was submitted to compression test to verify if the surface of silicone was marked after the curing time.

Results: After the curing time established by manufacturer, the mold manipulated with latex gloves did not have cure. The molds obtained with manipulation of silicone without gloves, as well as vinyl and nitrile gloves did have cure.

Conclusion: The vinyl and nitrile gloves did not interfere on curing time of the addition silicone tested.


Resumén

Objetivo: Evaluar la influencia de diferentes tipos de guantes en el tiempo de presa del silicón por adición.

Materiales y Métodos: La pasta densa del silicón por adición fue manipulada sin guantes y por tres diferentes tipos de guantes (látex, vinilo y nitrílica), luego fue moldeada una matriz metálica y después del tiempo de presa, el molde fue sometido a la prueba de compresión para comprobar si el silicón se había marcado en su superficie después del tiempo de presa.

Resultados: Después del tiempo de presa establecido por el fabricante, el molde manipulado con guantes de látex no tomó presa. Los moldes obtenidos con la manipulación de la silicona sin guantes, así como con guantes de vinilo y nitrílica obtuvieron la presa.

Conclusión: Los guantes de vinilo y nitrílica no interfirieron en el tiempo de presa del silicón por adición probada.


Resumo

Objetivo: Avaliar a influência de diferentes tipos de luva no tempo de presa do silicone por adição.

Materiais e Métodos: A pasta densa do silicone por adição foi manipulada sem luvas e por três diferentes tipos de luva (látex, vinil e nitrílica), em seguida foi moldada uma matriz metálica e após o tempo de presa, o molde foi submetido ao teste de compressão para verificar se o silicone foi marcado em sua superfície após o tempo de presa.

Resultados: Após o tempo de presa estabelecido pelo fabricante, o molde manipulado com luva de látex não tomou presa. Os moldes obtidos com a manipulação do silicone sem luvas, bem como com luvas de vinil e nitrílica obtiveram a presa.

Conclusão: As luvas de vinil e nitrílica não interferiram no tempo de presa do silicone por adição testado.

Introduction

The good quality of prostheses and indirect restorations is related to the quality of the molding. Addition silicone has good physical-mechanical properties compared to polyether, mercaptan, and polypropylene, as well as polypropylene and condensation silicone.

The fidelity of the molding with the silicone by addition depends, among other factors, on the molding technique used, however, the use of latex gloves during the manipulation of the silicone by addition may cause the contamination of the catalyst of the polyvinylsiloxane with the dithiocarbamate, present in the gloves of latex during the prey reaction and inhibit it.

Dentists are subject to contamination due to constant contact with oral fluids, and using gloves is one of the simplest methods of disease prevention and control. Latex gloves are preferred in clinical practice because of different methods of glove making have been cited in some studies, and their chemical and structural composition is related to the inhibition of silicone prey by addition. The concentration of dithiocarbamate varied from glove to glove causing more or less change in prey.

Sulfur or sulfur-based products, such as dithiocarbamate, contaminate the chloroplatinic acid catalyst and cause inaccuracies in the material leading to distortion. Contact may occur directly when the latex glove comes in contact with the silicone during the clinical procedure be avoided. It is recommended that the contact of the glove with the teeth and the periodontal tissues during the clinical procedure be avoided.

In view of the necessity of wearing gloves during clinical practice and of their undesirable effect on addition silicone, it becomes evident the need to study the effect of different types of gloves on the polyvinylsiloxane in order to avoid changes in the molding material. Thus, this pilot study aimed to evaluate the influence of latex, vinyl and nitrile gloves on the time of silicone prey by addition.

Material and Methods

To evaluate the influence of different gloves on the time of silicone prey by addition, we used three types of gloves (latex, vinyl and nitrile) and a silicone dense paste by addition (Table 1).

<table>
<thead>
<tr>
<th>Materials used in the study</th>
<th>Manufacturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Latex gloves Satari®</td>
<td>Siam Sempermed, Hatayai Songkhla, Tailândia</td>
</tr>
<tr>
<td>Vinil gloves</td>
<td>Danny, Guarulhos, SP, Brazil</td>
</tr>
<tr>
<td>Ntrile gloves Sensiflex flex</td>
<td>Danny, Guarulhos, SP, Brazil</td>
</tr>
<tr>
<td>Adsil soft putty™</td>
<td>Coltene Vigodent, Rio de Janeiro, RJ, Brazil</td>
</tr>
</tbody>
</table>

Source: Organized by the authors.

The base and catalyst pulps were placed and handled according to the manufacturer's recommendations, considering the proportion between the pulps, the
handling time (30 seconds), the working time (2 minutes) and the waiting time in the mouth (3 minutes).

Initially the silicone was handled with clean and dry hands (Figure 1A) until a homogeneous mixture was obtained, later the material was manipulated with latex gloves (Figure 1B), vinyl (Figure 1C) and nitrile (Figure 1D). For each type of glove, the material was manipulated three times, each manipulation was performed with a new pair of gloves, and at each glove type change, the operator's hands were washed with water and neutral liquid soap.

![Figure 1. Manipulation of silicone by addition. A - No gloves (L0); B - With latex gloves (L1); C - With vinyl gloves (L2); D - With nitrile gloves (L3).](image)

After manipulation, the material was inserted into an acrylic resin tray made according to the dimensions of the matrix which was molded and immediately brought to the oven at 37 °C until completion of the mouth waiting time determined by the silicone manufacturer.

Thereafter, the tray with the molding material was removed from the die and taken immediately to the mechanical testing machine (EMIC, São José dos Pinhais, PR, Brazil) (Figure 2) to perform the compression test by means of a (Figure 3) which was displaced against the silicone at a speed of 5mm / min until a pressure of 0.5kgf (force similar to the pressure used in a molding procedure determined in this pilot study) was reached.
The silicone prey was evaluated by two observers (A1 and A2) who indicated whether or not the impression left by the tip of the instrument on the surface of the molding material after the compression test, so this nominal variable was quantified in "yes" or "not".

The results were cataloged in a spreadsheet of Microsoft Office Excel® 2010 software and later analyzed through descriptive statistics.

**Results**

The results of this pilot study were concordant by both evaluators when the silicone was manipulated by the different glove types, as presented in Table 2.

<table>
<thead>
<tr>
<th>Gloves</th>
<th>Manipulation 1</th>
<th>Manipulation 2</th>
<th>Manipulation 3</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A1 / A2</td>
<td>A1 / A2</td>
<td>A1 / A2</td>
</tr>
<tr>
<td>L0</td>
<td>not / not</td>
<td>not / not</td>
<td>not / not</td>
</tr>
<tr>
<td>L1</td>
<td>yes/ yes</td>
<td>yes/ yes</td>
<td>yes/ yes</td>
</tr>
<tr>
<td>L2</td>
<td>not / not</td>
<td>not / not</td>
<td>not / not</td>
</tr>
<tr>
<td>L3</td>
<td>not / not</td>
<td>not / not</td>
<td>not / not</td>
</tr>
</tbody>
</table>

* "Not" - without interference in prey time; "Yes" - with interference in the holding time.

**Discussion**

It is of great relevance to evaluate the interaction of the gloves of procedures with the silicone by addition, in order to preserve the biosafety of the dental team, as
well as to maintain the quality of the molding procedures performed so that treatments with satisfactory results can be obtained.

Interference in prey time when the silicone was handled by latex gloves, as well as the non-influence of prey time when handled by vinyl gloves found in our study agreed with the findings of other studies.\(^\text{10}\) Inhibition of (a widely used latex accelerator), which is capable of retarding the curing of the silicones by addition by means of the inactivation of the platinum catalyst present in these materials.\(^\text{11}\)

Nitrile gloves did not influence the silage prey time by addition tested. There were no reports in the researched literature of work on the interference of this type of glove on the silicones. The results of this study are also in agreement with the literature findings, which reported that some types of gloves may prevent the configuration of some molding materials.\(^\text{12}\)

Based on this and the potential for irritation of this chemical and its derivatives on the skin, the use of gloves without dithiocarbamate is recommended. It is possible that the natural rubber glove does not contain dithiocarbamate. In this sense, testing the gloves of different materials and manufacturers available on silicones by addition of different brands becomes important due to the different concentrations of dithiocarbamate in latex gloves produced by different companies, as well as possible interactions between polyvinylsiloxane and components of different glove types.\(^\text{7}\)

It is noteworthy that non-natural rubber gloves tested, such as vinyl and synthetic rubber, did not affect the fit of any addition silicone tested. This finding suggests using synthetic gloves in place of or on latex gloves to avoid cross-infection when additional silicones are used.\(^\text{13}\)

Our pilot study developed a specific methodology that allows the execution of further research using a larger arsenal of gloves and silicones by addition, besides showing favorable results on the manipulation of silicon with nitrile gloves, not mentioned previously in the scientific literature.

**Conclusion**

According to this pilot study, we concluded that the vinyl and nitrile gloves tested did not influence the silicone prey time by addition used.

**References**


