Requirements and characteristics of materials for functional impressions in complete dentures: a literature review

Requisitos e características dos materiais para moldagem funcional em prótese total: uma revisão da literatura

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ABSTRACT
Functional impression is one of the fundamental steps for the success of the rehabilitation treatment. Therefore, the objective of this work is, by means of a literature review, characterized as the main characteristics of the materials used in the functional impression in total prosthesis. The review was carried out through research in the database PubMed, Google Acadêmico, Lilacs and Scielo between the months of May to July 2020. Were used for the search of descriptors such as total prosthesis, materials for dental impression and dental materials. Secondary impression is divided into two stages: peripheral sealing and functional impression. The materials are classified as elastic and anelastic and must be used according to each clinical situation. To guarantee the quality of the functions, it is essential that all necessary steps are followed. In this context, being a functional molding conditioned according to the mucosa resilience, the present study was linked to describe the different materials, in order to ascertain their specificities according to the conditions of each individual. The professional must understand the characteristics of functional impression materials to develop better results in prosthetic rehabilitation, obeying the criteria obtained from the clinical examination of the patient, respecting the recommendations of each manufacturer of the material, and presenting the technique in which the dentist dominates and feel able to perform the procedure.

Keywords: denture complete, dental impression materials, dental materials.

RESUMO
A moldagem funcional é uma das etapas fundamentais para o sucesso do tratamento reabilitador. Sendo assim, o objetivo deste trabalho é, por meio de uma revisão da literatura, descrever as principais características dos materiais utilizados na moldagem funcional em prótese total. A revisão foi realizada mediante pesquisa na base de dados PubMed, Google Acadêmico, Lilacs e Scielo entre os meses de maio a julho de 2020. Foram utilizados para a pesquisa os descritores como prótese total, materiais para moldagem odontológica, e materiais dentários. A moldagem secundária é dividida em duas etapas: selamento periférico e moldagem funcional. Os materiais são classificados em elásticos e anelásticos e devem ser utilizados de acordo com cada situação clínica. Para garantir a qualidade das funções é fundamental que seja seguida todas as etapas necessárias. Nesse contexto, sendo a moldagem funcional condicionada as resiliências das mucosas, o presente estudo vinculou-se a descrever os diferentes materiais, a fim de averiguar suas specificidades de acordo com as condições de cada indivíduo. O profissional deve compreender as características dos materiais de moldagem funcional para desenvolver melhores resultados na reabilitação protética, obedecendo critérios estabelecidos a partir do exame clínico do paciente, respeitando as recomendações de cada fabricante do material e escolhendo a técnica em que cirurgião-dentista domine e sinta-se apto para realizar o procedimento.

Palavras-chave: prótese total, materiais para moldagem odontológica, materiais dentários.
1 INTRODUCTION

The increase in the population’s life expectancy has suggested new challenges in the field of oral rehabilitation, in this context, it can be said that oral health is also a fundamental element to provide the well-being of the elderly (LEMOS, 2013; OLIVEIRA, 2020; DE AZEVEDO, 2021). Still in this context, it can be said that the majority of the elderly population uses dental prostheses (BASTOS, 2022; AGOSTINHO, 2015). This condition is intrinsically linked to aging, which, in most cases, leads to partial or total loss of teeth (ALVES, 2018). Thus, there is a need for need to reestablish their functions through oral rehabilitation (SOUA, 2016; KILKANI, 2017).

To ensure the quality of functions such as: chewing, aesthetics, phonetics, swallowing and phonation (MEDEIROS and ALMEIDA, 2018), it is vital that the entire process of elaborating a dental prosthesis is guided by a careful protocol, obeying all the necessary steps (REZENDE, 2019). In addition, the choice of materials, laboratory qualification and applied techniques must be accompanied by a dentist (REIS, 2007). In this context, a special focus should be given to functional molding, which partially guarantees the success of the rehabilitation treatment. With this impression, more suitable models are obtained and promotes retention, support, stability and aesthetics for the individual (GERMANI, 2013).

Professionals must understand, in addition to physical properties, the most important characteristics of materials, in order to enhance results and reduce failures, evaluate cost and availability of these inputs on the market. These actions are fundamental not only in terms of quality criteria, but also cost-effectiveness in the development of dental prostheses (FRANCISCONI, 2009; PAPADIOCHOS, 2017). Two significant steps are performed during the functional impression process: peripheral sealing and functional impression (SIEBRA, 2017).

The material selection process can be based on the resilience characteristics of the mucosa and the patient’s conditions. Thus, the importance of the relationship between materials and the factors that presuppose the manufacture of dental prostheses is perceived, following criteria stipulated from a clinical examination of the patient (GENNARI FILHO, 2004). In the functional molding of edentulous patients, zinc paste is used and eugenol, polysulfides, polyether, addition silicone, among others (GERMANI, 2013).
Therefore, the objective of this work is, through a literature review, to describe the main characteristics of the materials used in the functional impression of complete dentures.

2 MATERIALS AND METHODS

This study reviewed the most relevant articles on the physical characteristics, mechanical properties and clinical indication of materials used in functional impressions of complete dentures, published in the period of 2004 to 2020. The bibliographic search was performed in PubMed, Google Scholar, Lilacs and Scielo databases. The descriptors used for the research were: complete denture; dental impression materials; dental materials; dentures; dental impression materials; and dental materials.

3 RESULTS

The functional molding aims to achieve more appropriate models to build excellent prostheses (GERMANI, 2013), they should guarantee the elaboration of complete denture bases that establish the limits of the oral tissues (REIS, 2007). For Ulbrich and Franco (2004) the purpose of the functional molding is to acquire the retention of the future prosthesis, resulting in well-being and comfort for the patient. For the execution of the secondary impression, an individual tray made of acrylic resin is used, which must be compatible with the impression material, cover the entire plateable area, have rigidity and stability (REIS, 2007).

For Goiato (2013) in functional molding elastic and anelastic materials are used. There are four types of elastic bands: addition silicone, condensation silicone, polysulfide and polyether, they appeared in the 1950s (SINHORETI, 2010). The anelastics are made up of compound and zinc oxide and eugenol paste (SIEBRA, 2017). A clinical examination should be performed. rigorous to evaluate the conditions of the patient, in order to provide a better prognosis (GENNARI FILHO, 2004).

For Singh (2012), precision is very important for the adjustment of the prosthesis. Materials and technique play a fundamental role in achieving a better adaptation of the same (BHOCHHIBLORA, 2018). The secondary impression is a very important phase in the manufacture of a prosthesis (GOIATO, 2013). It is necessary to have knowledge of the materials used in the final impression to obtain a better result (FRANCISCONI, 2009).

Gennari Filho (2013) recommends zinc oxide and eugenol paste for secondary molding, as it exerts minimal pressure on the oral tissues and has good flow. It has
excellent dimensional stability, rigidity and low cost (PARDIM and CUNHA, 2019). It is considered a mucostatic material, that is, it does not compress the mucosa. Therefore, it is a material used for patients who have a very resilient mucosa (ANUSAVICE, 2013).

According to Reis (2007) there were several experiments to arrive at a qualified method to reproduce the details of oral tissues. Still on the materials that can be used at this stage, it can be mentioned that it is necessary to determine the techniques applied at the time of molding and the main characteristics, which will be considered for the election of the material, according to the proposed work and the experience of each professional. Therefore, the objective is to maintain the health and integrity of the oral tissues and influence the final quality of the mold (TURANO, 2010).

Addition and condensation silicones have three different consistency types: very heavy or dense, heavy or regular and light (ANUSA VICE, 2013). With this, it allows the professional to modify the molding techniques and choose the best material for the impression. The choice will depend on the characteristics of the edges and the purpose of the impression (TELLES, 2010).

Addition silicone, also known as polyvinylsiloxane or vinylpolysiloxane, is a material that does not need to be poured immediately, as it is known to have excellent dimensional stability. Their reaction, therefore, are highly stable (ANUSA VICE, 2013). For Silva (2016) this material has a great acceptance in the market, due to its excellent physical properties.

For Anusavice (2013) condensation silicone has low tear resistance, does not allow multiple leaks and does not have an unpleasant odor. This material has a good working time, it is a hydrophobic material, so it needs to be poured instantly. Due to the requirement of a pressure to provide the flow of the material, it is considered contraindicated for patients who have a very resilient mucosa (GENNARI FILHO, 2013). Therefore, it can be used in patients with medium resilience mucosa (SIEBRA, 2017).

For Telles (2010) Polyether is a hydrophilic material, and has a short working time. It is a high-cost material, has good resistance and has a high viscosity. This material has an unpleasant taste, does not need to be poured immediately and is a great material for printing soft tissues. Its biggest disadvantage is compression against supporting tissues, that is, it cannot be used for patients who have flaccid resilience (ANUSA VICE, 2013).

Polysulfide, or mercaptan, is a material that has a long working time, moderate cost and high tear strength. Its main disadvantages are: unpleasant odor, immediate
leakage and staining clothes. Compared to other materials, it has the lowest viscosity and has the lowest rigidity (TURANO, 2010).

Therefore, the market offers different materials for each job to be performed in the case of functional molding. They have specific characteristics (GENNARI FILHO, 2013). For the choice, there are some criteria, including knowledge of the different types of mucosal resilience, the molding technique and the physical properties of the materials so that the fidelity of the model cannot be compromised and have a better fit of the prosthesis (TELLES, 2010).

4 DISCUSSION

Prosthetic rehabilitation will present a satisfactory result if all the necessary steps are followed (REZENDE, 2019). The choice of materials is very significant in the elaboration of a prosthesis, but one must respect the skill of the professional, follow the manufacturer's guidelines and select the correct technique to each situation (REIS, 2007). With this, it guarantees a prosthesis with good retention and stability for the patient and increases the chances of success of the rehabilitation treatment (ULBRITCH AND FRANCO, 2004).

Impression materials are classified as elastic and anelastic (GOIATO, 2013). Anelastic materials are used for edentulous patients who do not have retentive ridges. Elastic materials are easier to manipulate and are indicated for impressions for dentate and edentulous patients, and for impressions in retentive and non-retentive areas, as it is a material that undergoes elastic deformation (PARDIM AND CUNHA, 2019).

Polysulfides appeared in 1950 and were the first molding materials (SAKAGUCHI and POWERS, 2010). For Anusavice (2013) it has greater strength and an affordable cost. It also states that this material can be easily removed from retentive areas. Mezzomo and Fernandes (2004) mention that its main disadvantage is the unpleasant odor due to the sulfur in its composition, so the operator needs attention when handling the material.

Gennari Filho (2013) states that condensation silicone for peripheral sealing allows the material to be cut. The main disadvantage is the cost of the material and the use of adhesive to provide retention. This material is excellent for copying the details satisfactorily and for having a convenient flow (SINGH, 2012). Anusavice (2013) states that the condensation silicone used in the functional molding itself requires the plaster to
be poured within a maximum time of thirty minutes so that there is no distortion as it is a hydrophobic material.

Polyethers appeared in 1965 and have three consistencies: low, medium and heavy (SAKAGUCHI and POWERS, 2010). For Telles (2010) they are great for reproducing soft tissue edges. Mezzomo and Fernandes (2004) state that this material has an excellent ability to copy, and can be poured into plaster within seven days. He also claims that this material has a high value. It is considered quite rigid, so it makes it difficult to remove material from the oral cavity.

Addition silicones appeared in 1975, state that addition silicone has excellent physical properties and is considered the best elastic material available (SAKAGUCHI and POWERS, 2010). This material does not have an unpleasant odor. They also state that for best results it should be used with individual trays for functional impression. Greco (2009) state that it can be leaked in up to a week without loss of precision. They also state that a second leak is allowed within 21 days.

According to Anusavice (2013) the compound stick is indicated for peripheral sealing. For Telles (2010) it is easy for the operator to add or subtract the material, good adhesion to the tray, adequate fluidity to exert minimal pressure on the tissues, great resistance, stability, ease and several other properties that make it advantageous over another material. For Pardim and Cunha (2019) the compound enables the recording of insertions.

Siebra (2017) state that the zinc oxide and eugenol paste has a difficulty in cleaning the material. Pardim and Cunha (2019) point out that, as it is a rigid material, it should not be used on retentive edges, in addition, it can be relined. These anelastic materials are less advantageous than elastic ones, causing discomfort to the patient during the impression (SIEBRA, 2017).

5 CONCLUSION

The professional must understand the characteristics of functional impression materials to develop better results in prosthetic rehabilitation, obeying criteria established from the clinical examination of the patient, respecting the recommendations of each material manufacturer and choosing the technique in which the dentist dominates and feels be able to perform the procedure.
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