THE USE OF FIBERGLASS POSTS IN DENTISTRY: A LITERATURE REVIEW

O uso de pinos de fibra de vidro na odontologia: uma revisão de literatura

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ABSTRACT

The choice of retaining material that will replace the lost properties of the tooth, in which it is fragile and with loss of dentin structure, is important. The success of the treatment will depend on the qualities presented in it. Therefore, the objective of this work, through a literature review, is to present the advantages and disadvantages observed in the use of fiberglass post intraradicular retainer. This paper reviews the most relevant articles on the specificities presented in the fiberglass post retaining material, published in the period (2003 to 2020). The bibliographic search was performed in PubMed, Lilacs, Scielo, Google Scholar databases. In view of the selected articles on the subject, it is possible to observe the authors' acceptance of the application of the use of retainers, highlighting that in the treatment of cases with extensive coronary destruction, the aim is to have the functional and retentive capacity returned, in addition to the tension resistance. Therefore, theThe use of fiberglass posts in weakened teeth is effective as the material of choice. In cases that require reconstruction and return of tissue integrity, it has sufficient advantages for its selection. Despite the disadvantages it has, these do not outweigh the benefits to the point of making its use unfeasible. However, knowing when, where and how to treat is always important in any procedure for a satisfactory final outcome.

Keywords: Dental Pins. Denture, Partial, Fixed. Dental Restoration, Permanent.

RESUMO

A escolha do material retentor que irá substituir as propriedades perdidas do dente, no qual este se apresenta de forma fragilizada e com perca de estrutura dentinária é importante. O sucesso do tratamento irá depender das qualidades apresentadas no mesmo. Sendo assim, o objetivo deste trabalho por meio de uma revisão de literatura é apresentar as vantagens e desvantagens observadas no uso do retentor intrarradicular de pino de fibra de vidro. Este trabalho revisa os artigos mais relevantes sobre as especificidades apresentadas no material retentor de pino de fibra de vidro, publicadas no período (2003 até 2020). A busca bibliográfica foi realizada nos bancos de dados PubMed, Lilacs, Scielo, Google Scholar. Diante dos artigos selecionados referentes ao tema, pode-se observar a aceitação dos autores sobre a aplicação do uso de retentores, destacando-se que no tratamento de casos com destruição coronária extensa o intuito é dispor da devolução da capacidade funcional, retentiva, além da resistência a tensão. Portanto, a utilização de pinos de fibra de vidro em dentes fragilizados apresenta

efetividade como material de escolha. Em casos que necessitam de reconstrução e devolução de sua integridade tecidual, possui consigo vantagens suficientes para sua seleção. Apesar das desvantagens que possui, essas não se sobrepõem aos benefícios a ponto de tornarem inviáveis ao seu uso. Entretanto, saber quando, onde e como tratar é sempre importante em qualquer procedimento para um desfecho final satisfatório.

Palavras-chave: pinos dentários, prótese parcial fixa, restauração dentária permanente.

INTRODUCTION

Teeth that were endodontically treated and with little remaining tooth, need adequate support for their preservation in the oral environment (CORRÊA et al., 2019). Due to their fragility and weakening, some treatment means are presented for their anatomical reconstruction (CORRÊA et al, 2019; SARKIS-ONOFRE et al., 2017). The chosen material should approach the properties presented in the dentin structure and allow as much as possible to return function without so many compromises to the tooth (SARKIS-ONOFRE et al., 2017).

Currently, intraradicular retainers have qualities that allow for increased retention and resistance to the restoration that will follow. Because of this, they are indicated for this purpose, and fit the prescribed aspects, and they are widely used (MARCHIONATTI et al., 2017). Understanding the proposed therapeutic resource is of paramount importance for a better longevity of the treatment (LEVIN & HALPERIN-STERNFELD, 2013).

The success of the procedure aimed at using retainers will depend on the adaptation, biodynamics, of the material's interaction with the space that was previously composed of the dental pulp. In which it presents itself in a fragile, weakened way and in need of structural reconstruction (MARCHIONATTI et al., 2017). Among the types of retainers, flexible non-metallic fiberglass posts are materials that are well regarded and accepted because of their benefits, they do not weaken the tooth that has been treated (GULDENER et al., 2017). Consequently, this is one of the materials of choice (ZAROW et al., 2018).

It has significant advantages for such a choice, among these the indication in anterior teeth and premolars, an area that is the most visible and aims for aesthetic repairs, considering that the retaining material has such specificity, being a material that also has good cost-benefit, and provides less stress on the

dental root (ZAROW et al., 2018; BOSSO et al., 2015). It can provide a shorter clinical execution time, being a passable and quality material that makes it possible to reduce damage due to its elasticity mode. In addition to having a favorable voltage distribution (MAZARO et al., 2006).

There are disadvantages present in this retainer, that is, factors that can affect and influence the outcome during and after treatment (SKUPIEN et al., 2015). Such as the region to which the material will adapt, position in which the tooth is in the arch and its length. in relation to the restorative margin (ZAROW et al., 2018). The understanding of these particularities must be taken into account when choosing and planning the therapeutic resource (MISHRA et al., 2020).

Therefore, the objective of this work is, through a literature review, to present the advantages and disadvantages observed in the use of fiberglass post intraradicular retainer.

MATERIALS AND METHODS

This paper reviews the most relevant articles on the specificities presented in the fiberglass post retaining material, published in the period (2003 to 2020). The bibliographic search was performed in PubMed, Lilacs, Scielo, Google Scholar databases. The descriptors used for the research were: dental aesthetics, dental posts, flexural strength, esthetics, dental, dental pins, flexural strength.

RESULTS

According to (PRADO et al., 2014) dentistry aims to restore the function, aesthetics and anatomy of teeth. Among the structures present in the tooth, the dental pulp is recognized as a significant base. Thatin turn, it consists of specific characteristics, in which it has mechanisms capable of detecting irregularities in its integrity, through which a response is obtained for each stimulus received, resulting in relevant results.

Endodontic procedures are performed in order to remove tissues injured by microbial agents or trauma and model the canal preparing it for subsequent restoration (PRADO et al., 2014). Due to the extensive loss of this structure, the tooth is weakened. Along with the clinical protocol used for this maintenance, dentin integrity becomes more friable and susceptible to damage. The treatment to be performed must enable the preservation of dental integrity, for this, good planning is necessary, aiming at understanding the structural characteristics of

the teeth, providing a greater probability of success (LEVIN & HALPERIN-STERNFELD, 2013). When there are extensive coronary destruction, the treatment must have the return of the tooth. functional capacity, retention and resistance to tensions.

According to (ARTOPOULOU et al., 2006) the use of prefabricated posts to recover the function of the lost dentin structure was introduced in the 1960s. Several types of posts were studied and implanted, metal alloys, carbon and ceramics were considered obsolete, due to their high degree of elastic resistance compared to the firmness of the dentin, causing, in turn, tensions and wear, as well as the fracture of the retainer of the structure in which it was installed. Recently, studies were carried out in which they tested the use of fiberglass post as a restorative material with tenacity close to dentin.

Claim that the use of this retainer presents itself in the existing advantage, which has the benefit of the aesthetic finish whose tonality is similar to that of dentin (MILDEMBERG et al., 2018). Another benefit is the preservation of the tooth root and it still provides mechanical strength. In addition, another contributing factor is technical practicality, increasing professional productivity and reducing clinical treatment time. State that the aesthetic post favors the distribution of tensions to the root structure, reducing its risk (QUALTROUGH & MANNOCCI, 2003).

For the fiberglass post has elastic stiffness around 40 gigapascal, similar to the strength of dentin, allowing this material to act as a shock absorber, distributing the stresses received (ARTOPOULOU et al., 2006). Another positive aspect is their high aesthetic potential, with a universal tooth coloration and they are highly translucent, in addition, they are easily repairable. (PLOUMAKI et al., 2013) state, regarding the material used in the adaptation of the retainer, that cementation contributes to the fixation and strengthening of the fracture.

According to (SANTOS et al., 2010) stress attenuation reduces the impact caused on the post/cement interface, contributing to the reduction of dentin stress. Other advantages are observed by (GULDENER et al., 2016) when conducting an evaluative study of the survival and success rate of endodontically treated teeth restored with or without fiber posts in which they considered that fiberglass retainers had a long-term survival and did not weaken the roots of treated teeth. Carried out a study to verify the impact on bone loss, in which it can be observed that the post does not significantly affect support loss (STEIN-LAUSNITZ et al., 2019).

According to (ZAROW et al., 2018) the fiberglass post is indicated for anterior teeth such as premolars, due to its aesthetics, resulting in increased biodynamic

properties. The length of the pins contributes as an advantage, providing resistance to the fracture of the teeth, and reduces the work time by not requiring laboratory procedures. Such aspects provide acceptance and choice as a restorative material, due to its particularities.

As for the disadvantages, (SANTOS et al., 2010) reported that in cases of retainer detachment while remaining in the root canal, there is a higher significant risk rate of root fracture. State (MISHRA et al., 2020) in a systematic study that fiber posts have low bond strength in the apical region, due to biological factors. Because of this, this material needs strategies to circumvent the vertical displacements it is subject to.

According to (GENOVESE et al., 2005) food-induced temperature changes play a key role with regard to the failure mechanisms of fiberglass posts. The difference between the thermal conductives and the coefficients of thermal expansion of restorative materials and dentinal tissues are numerically relevant, as they thus produce heterogeneities in the temperature distribution of the glass retainer, which is not a good conductor of heat, resulting in in turn, in stress concentrations. In general, thermal loads generate point stresses, which cause fragility points, leading to possible fractures of the fiberglass post.

DISCUSSION

The treatment to be proposed to patients who need an anatomical reconstruction must allow a satisfactory aesthetic and functional result, the advantages of the material must outweigh the disadvantages in relation to structure, properties and adaptation (MILDEMBERGER et al., 2018). Based on this understanding, studies state that the fiberglass post has characteristics that are sufficient for selection of choice (GULDENER et al., 2017; ZAROW et al., 2018). However, analyzing and evaluating each case and situation is essential for a beneficial effect, as there are cases in which the fiberglass post will not be material first choice (LEVIN & HALPERIN-STERNFELD, 2013).

One of the points that should be analyzed regarding the pins concerns their mechanical and micromorphological properties, where studies carried out on such aspects reported that currently the composition of these materials is based on carbon, quartz or glass, in which they are aggregated in a matrix of resin. According to the data obtained in the research, it was mentioned that both the type and the diameter of the pins can affect the flexural characteristics. Although there were no intercurrences in the resistance in relation to the structural characteristics, being them density, diameter and distribution of fibers. It is also reported that there is a preference in choosing silanized glass fiber

posts, due to their mechanical attributes, aesthetic qualities and chemical bonding capacity to the polymer matrix (MARCHIONATTI et al., 2017).

In a meta-analysis study comparing cast and prefabricated posts using single crowns for restorations, prefabricated ones stood out, and semiprecious alloy posts resulted in greater failures, which increases material insight and selection decisions (PLOUMAKI et al., 2013). There are several evaluative analyses, one of them presented by (NOVAIS et al., 2016) who show a significant rate of survival and success in teeth that used fiberglass posts. Another positive aspect is that this material does not amplify the dentinal fragility that the root already carries with it after endodontic treatment.

According to a randomized study in which they had the comparison of two types of intraradicular retainers, using 72 teeth that were evaluated during a follow-up period of up to 3 years, in order to verify the survival in relation to the dentin treatment, in which they were already endodontically treated, however, without coronary remnant, it was found that the survival rate was similar. With this, it is remarkable that even the fiberglass post being considered one of the current and innovative materials, its strength and retention characteristics are not low compared to another retainer that is known as standard. Such material becomes conscientious regarding its structural benefits (SARKIS-ONOFRE et al., 2017).

A finite element analysis according to was generated in order to observe the stress distributions of weakened roots. This in turn used seventwo-dimensional numerical data, one from a healthy tooth and six from a weakened root restored with composite resin and post systems, in which even with different resultsalso confirmed that the fiberglass retainers compared to the others, except the carbon retainer, obtained a more equal tenacity distribution, which is close to that exerted by the tooth. This leads to a decrease in the probability of failure in extended channels, when their use is proposed and chosen.

Statethat the choice of fiberglass post depends on the position of the tooth in the present dental arch as well as the abutment and occlusion, that is, the occlusal load influences the procedure. Another author covers the thickness that the root canal is, the wider, the greater the probability of loss of retention (GUIOTTI et al., 2014). Through this, the importance of the therapeutic management that will be adopted by the professional is noted.

However, among the negative aspects that all material is subject, according to a study under systematic review, one of the most common disadvantages is the loss of core retention. This occurs in cases in which the amount of dentin structure is reduced, which leads to these failures, in addition to the decrease in

post survival (MARCHIONATTI et al., 2017). However, there are cases in which such damage can be reduced, at the time of preparation, one should avoid a greater tissue wear and select the type of post, such as double conicals that have this function. Knowledge of the seal manufacturer is always necessary, as its structural performance depends on the manufacturing processes (NOVAIS et al., 2016).

For (SANTOS et al., 2010) performed using finite element methods, in which they showed that in cases of detachment of the retainer while remaining in the root canal, there is a higher significant risk of root fracture. In addition, the systematic study explained by (MISHRA et al., 2020) state that fiber posts have low bond strength in the apical region, due to biological factors. Therefore, strategies are needed to overcome the vertical displacements to which the fiberglass post is naturally subjected.

However, the study, advancement and innovation are continuous, through which there is progress to improve this material and treatment, so that the disadvantages are circumvented. A proposed technique is for cases of wide canals, in which the post may be contraindicated, the retainer is relined with composite resin in which it is intended to model the conduit to increase the adaptation of the material, thus reducing the amount of cement at the time of stabilization (GUIOTTI et al., 2014). Another method used for reconstruction is with human teeth to manufacture these dentin posts, which in turn has minimal loss of modification in relation to the properties of dentin, however, there is still a lack of scientific basis to adopt its viable use.

CONCLUSION

Therefore, the use of fiberglass posts in weakened teeth is effective as the material of choice. In cases that require reconstruction and return of tissue integrity, it has sufficient advantages for its selection. Despite the disadvantages it has, these do not outweigh the benefits to the point of making its use unfeasible. However, knowing when, where and how to treat is always important in any procedure for a satisfactory final outcome.

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