Endodontic retreatment, fiberglass pin installation and composite resin prosthetic rehabilitation: Case report

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ABSTRACT

Introduction: Endodontic treatment aims to keep the tooth in proper shape and function, but it may fail, requiring retreatment. This involves the complete removal of the contents of the root canal for disinfection and refilling. The aesthetics and function of the endodontically treated tooth depend on the choice of restorative material, with fiberglass pins being an option that offers superior aesthetics and mechanical properties similar to dentin, providing greater retention and stability of the restoration. Case report: A female patient came to the clinic complaining of loss of restoration of the maxillary canine (13). Radiographic examination revealed an inadequate filling, exposed to the oral environment for a long period. Endodontic retreatment was performed in three sessions, with removal of the previous filling, disinfection of the root canal, and new filling with resin cement. Subsequently, a fiberglass pin was installed, followed by composite resin restoration. The steps included anamnesis, clinical and radiographic examinations, absolute isolation, use of files and solvents to remove the old filling, and application of intracanal medication. After the final filling, the canal was prepared to receive the fiberglass post, followed by the coronary restoration with composite resin. Conclusion: Endodontic retreatment is essential to eliminate bacteria from the root canal, especially in cases of previous failure. The choice of the fiberglass post, due to its biomechanical and aesthetic properties, in combination with the composite resin, proved to be effective in the rehabilitation of teeth with compromised coronary structure, resulting in a functional and aesthetically satisfactory restoration.

Keywords: Endodontics, Retreatment, Retainer.

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INTRODUCTION

The main goal of endodontic treatment is to keep the tooth in proper shape and function. But occasionally, endodontic treatment fails. In these cases, retreatment is indicated, which involves the complete removal of the contents of the root canal to perform complete disinfection of the apical foramen for subsequent refilling and aesthetic and functional rehabilitation (MOLLO *et al*., 2012).

The complete removal of the root canal filling material is a procedure of great importance in endodontic retreatment because, through mechanical instrumentation and the use of irrigating solutions, which constitute an effective measure against debris and root and periapical microorganisms (MARQUES *et al*., 2012; RIOS *et al*., 2014).

The restoration of endodontically treated teeth has evolved from a fully empirical approach to the application of biomechanical concepts based on scientific evidence to clinical decision-making (PEDREIRA; KOREN, 2013).

The aesthetics of dental rehabilitation depends on the material chosen to accurately copy the appearance of a natural tooth (CHU *et al*., 2004). All-ceramic systems are stable and biocompatible in the oral environment because they do not undergo changes. In this way, they constitute an alternative for better aesthetics without losing strength and durability. It became one of the best indications for making anterior tooth crowns (HONDRUM, 1992).

On the other hand, traditional feldspar dental ceramics, when associated with metal, clinically provide resistance and durability, which is highly satisfactory (NAPANKANGAS, 2008), however, among the disadvantages of this type of ceramic are associated with the lack of translucency, marginal darkening of the gums due to metal oxidation, which compromise the aesthetics of the treatment (ZAWTA, 2001).

It should be noted that for the aesthetic and functional rehabilitation of most dental elements with extensive coronary destruction, it is also necessary to use intraradicular retainers to provide better instability to the coronary restoration (ALBUQUERQUE; DUTRA; VASCONCELLOS, 1998). However, the main objective of the indication of these retainers is not to reinforce the remaining tooth structure, but to obtain better retention and stabilization of the restorative material (FERNANDES; DESSAI, 2001).

The clinical success of endodontically treated dental elements will depend, in addition to the degree of coronary destruction, on the tooth involved and its position in the arch, the bone support, the type of prosthesis and the forces to which these teeth will be submitted, since the preparation of the tooth to receive the intraradicular post follows protocols for removing the tooth structure so that it provides adequate installation (MEZZOMO, 2002).

Thus, the correct choice of pin will be decisive for the success of the restorative procedure. Among the different types of retainers, such as: the cast metal core, the metal prefabricated pin and the non-metallic fiberglass (MANKAR *et al.,* 2012), the latter stands out for having a greater bond to the dentin through adhesive systems, modulus of elasticity and rigidity similar to that of dentin, better aesthetics, and absence of corrosion. In addition to sufficient resistance to withstand masticatory forces (LIDEN; NORBERG, 2005).

Given the variety of options for intraradicular retainers, it is essential to know about the fiberglass post, so that it can be properly indicated in cases of rehabilitation of elements with extensive coronary destruction. It is worth noting the fact that the canine is a key occlusion tooth that receives lateral forces, requiring the placement of a material compatible with this load. Therefore, the objective of this study will be to report a clinical case of endodontic retreatment of an upper canine with the aid of an intraradicular fiberglass retainer and composite resin restoration.

OBJECTIVES

GENERAL OBJECTIVE

- To report a clinical case of endodontic retreatment of an upper canine (13), installation of a fiberglass pin, and prosthetic rehabilitation in composite resin.

SPECIFIC OBJECTIVES

- Describe the stages of endodontic retreatment;
- Describe the importance of effective coronary sealing after endodontic treatment and its correct indication;
- Demonstrating the use of the prefabricated fiberglass pin provides greater aesthetics and less wear during dental rehabilitation.
- List the steps from preparing space for fiberglass pins until final tooth restoration.

THEORETICAL FRAMEWORK

ENDODONTIC RETREATMENT

Endodontic retreatment is indicated after proof of failure of primary endodontic therapy. Creating adequate clinical and biological conditions for periradicular tissue repair (SOARES; GOLDBERG, 2011).

According to Lopes and Siqueira (2015), endodontic retreatment consists of a new therapy due to previous failure or inadequate treatment. Basically, endodontic retreatment consists of removing the filling material, reinstrumenting and refilling the conduit.

The most used technique in cases of endodontic retreatment has been manual, using Kerr and Hedstroem files associated with the use of solvents such as eucalyptol, xylol, chloroform and orange oil-based solvents (SOMMA *et al.,* 2008).

Complete removal of the contents of the canal and access to the apical foramen in a retreatment approach are mandatory for proper cleaning and refilling (SALEBRABI; ROSTSTEIN, 2010). The concern with the removal of the filling material is extremely important, as the presence of remnants of it inside the root canal can harbor microorganisms, making complete disinfection difficult (KALED *et al.,* 2011). The use of intracanal medication enhances the antimicrobial effect achieved in the root canal preparation phase (KUMAR *et al.,* 2015).

Thus, chemical-mechanical preparation plays a fundamental role in endodontic retreatments in order to promote complete cleaning, disinfection and modeling of the root canal (SIQUEIRA *et al.,* 2013).

REHABILITATION OF ENDODONTICALLY TREATED TEETH

Dentistry has presented significant advances in restorative techniques and materials and this advance is due to the recognition of the importance of preserving the tooth structure, since worn dentin, whether in the coronary portion or inside the root canal, implies less tooth resistance (MUNIZ *et al*., 2005).

The evolution of this treatment led to the perception that, in addition to restoring the aesthetic function, Restorative Dentistry also needs to be concerned with the protection of the remainder against fractures, and should be planned, because the tooth submitted to endodontics is subject to considerable loss of intracoronary and intraradicular dentin, in addition to other losses and is more susceptible, also, to the impairment of dental reinforcement structures, such as marginal ridges, enamel bridges, and pulp chamber roof (MENDONÇA *et al*., 2017).

The restoration of endodontically treated teeth has always been a challenge for clinicians and researchers, as the coronary structure has a significant part compromised (PRADO *et al*., 2014). In this way, the survival rate of these teeth depends on several factors such as; location in the arch, proximal contacts, amount of tooth tissue loss, previously performed endodontic restorations or accesses, periodontal and apical condition, occlusal contacts, among others (IQBAL *et al*., 2002).

As the loss of pulp vitality and the execution of endodontic treatment occur, dental tissues undergo structural and biochemical changes, which can generate changes in the aesthetics and biomechanics of the teeth (MUNIZ *et al*., 2011). Therefore, for the planning and execution of a restorative treatment of these dental elements, the dentist needs to be aware of these changes for the best management of the clinical case (GONZAGA *et al*., 2011).

The aesthetic and functional rehabilitation of these teeth, with extensive destruction due to carious lesions, fractures, defective endodontic access, replacement of restorations or internal resorptions, most of the time requires the use of intraradicular pins as an additional way to stabilize and retain the restorative material (FERRARI *et al*., 2000).

Due to the large insufficient coronary structure, in most cases, it is not possible to achieve sufficient anchorage for a restoration in the remaining dentin, therefore, it is necessary to place an intraradicular retainer to provide adequate retention to the stump and the final restoration (PHARK *et al*., 2012; HEYDECKE *et al*., 2002).

However, it is of fundamental importance to understand the biomechanical factors that affect the ability of the post to support a restoration and protect the remaining tooth structure for its long-term success (SCHWARTZ *et al*., 2004).

When a pin is placed in a root canal of a structurally compromised tooth, significant changes occur in biomechanical behavior (TORBJORNER *et al*., 2004), since stress is directly proportional to deformation (PHARK *et al*., 2012).

INTRARADICULAR RETENTORS

In the expectation of reducing the number of consultations and eliminating the laboratory stage, in the 1960s prefabricated metal pins were introduced to the market (AKKAYAN; GULMEZ, 2004). For decades, molten metal cores have been used as a technical solution for the reconstruction of endodontically treated teeth, however characteristics such as preparation far from being conservative, stiffness much higher than that of dentin, the need for the laboratory phase, probability of corrosion and impaired retention due to the lack of adhesion to the remaining tooth, led to studies that developed other retainers (SCOTTI; FERRARI, 2003) and at the end of the 80s, prefabricated ceramic pins and different types of fibers, including carbon, quartz and glass (AKKAYAN; GULMEZ, 2002).

Metal pin materials are found on the market in three types: stainless steel (nickel-chromium); titanium alloy (titanium, vanadium, and aluminum), and pure titanium. The most used are made of titanium alloy or pure titanium, as it tries to restrict the use of nickel-chromium, due to allergic reactions (CHRISTENSEN, 2004).

However, the use of metal pins can impair the aesthetic appearance, especially in the anterior teeth, in addition to the absence of chemical bond between the metal pins and the resinous materials. In addition, the act of fitting the metal pin into the dentin promotes stress that can generate restoration fractures, dental fissures, pulp hypersensitivity, pulp or periodontal perforation (FENNIS, 2013).

Zhou and Wang (2013), in *vitro* studies, observed the high modulus of elasticity, metal pins concentrate pressure on the root and promote a higher incidence of root fractures compared to fiber pins. The rigidity of metal pins transfers forces along their vertical axis, creating a wedge effect on the tooth structure, acting similar to a metal wedge on a piece of wood, thus causing unfavorable fractures.

The composition of the materials used in intraradicular seals has changed over the years, from materials with a high modulus of elasticity such as gold, stainless steel and zirconia dioxide to materials that have mechanical properties more similar to dentin, such as composite resin and carbon fiber (AKGUNGOR; AKKAYAN, 2006). Adjacent to this fact came the evolution of Aesthetic Dentistry, with the emergence of new pins in the market, such as those made of quartz fibers, carbon fibers coated with quartz and glass fibers (VICHI, 2002).

Several types of intraradicular reinforcements have been described and used to promote restorations retention in addition to metal pins, such as fiberglass pins (OLIVEIRA *et al*., 2010; MOTISUKI; SANTOS-PINTO; GIRO, 2005), pin made of orthodontic wire in the shape of the Greek letter alpha, short composite resin pins (PERRELA; SAGRETTI; GUEDES-PINTO, 1995; JUDD *et al*., 1990) and, biological pins from extracted tooth roots (SACONO *et al*., 2007; GALINDO *et al*., 2000).

Fiber pins have an anisotropic behavior, that is, they have different modulus of elasticity depending on the direction of the applied load. This characteristic is quite interesting since, when mechanically requested (oblique forces), the modulus of elasticity of the fiber spikes approaches the modulus of elasticity of the dentin, reducing the possibility of fracture. However, due to their elasticity, adhesive interfaces are more stressed, increasing the risk of unstripping, but decreasing the risk of fracture and when these occur in most cases they are repairable (UDDANWADIKER *et al*., 2007).

The type of pin (fiber, quartz, zirconia, gold, stainless steel, or titanium) determines the stress distribution and has a significant effect on the stress concentration (AUSIELLO *et al*., 2011).

Considering these aesthetic aspects, disadvantages and technical complications, other materials have been proposed as a way to replace metal pins by reinforcing composite resin restorations, such as the fiberglass post (MELO NETO, 2018).

In a study of teeth restored with fiberglass pins, they showed the highest resistance values in laboratory tests. Another characteristic recommended by the tests is that these pins have a low modulus of elasticity, so when a load is placed on the root structure, the stress is minimized and there is also a better absorption of the tensions between pin and root. Clarifying the absence of fractured roots and pins in the tests (MACCARI; CONCEIÇÃO; NUNES, 2003).

GLASS FIBRE PINES

During the rehabilitation procedure of extensive coronary destruction, intraradicular reinforcement is often necessary to increase the adhesion area and offer more resistance to the reconstructed tooth. In addition, oblique, horizontal and shear forces occur on the anterior teeth, and the use of pins favors the dissipation of these forces along the coronary remnant and the root, preventing the occurrence of fractures (WANDELEY *et al.*, 2015).

Fiberglass pins have proven to be a very viable alternative, as they have characteristics such as a modulus of elasticity similar to that of dentin, are biocompatible, distribute masticatory force better, are highly durable, resist corrosion, eliminate the laboratory phase and are aesthetically superior, as they have optical properties that provide greater translucency to the dental core (DURKAN *et al*., 2008; BALBOSH; KERN, 2006).

Chronologically, fiberglass pins represented the last proposed solution for the reconstruction of teeth with endodontic treatment. They were introduced to the market as a replacement option for metal pins, due to their aesthetic and mechanical properties. They can better absorb masticatory loads, due to their resilience, similar to that of dentin. This favors the distribution of forces on the root, reducing the stress transmitted to the tooth and minimizing the risk of root fracture, since the functional loads through the prostheses are transmitted and absorbed in a similar way to what occurs in the intact tooth (SÁ *et al*., 2010).

Fiberglass pins were introduced in the market with the purpose of replacing metal pins, favoring aesthetics due to their color similar to that of the dental structure and less wear of intraradicular dentin, dispensing with the laboratory phase (SOUZA *et al*., 2011) and have stood out among the options for intracanal reinforcement. These pins offer several facilities and advantages, such as the choice of diameter, both for deciduous and permanent teeth, high retentivity, due to its outer layer being surrounded by a BIS-GMA film, eliminating the existence of additional retentions, low risk of fracture, modulus of elasticity very close to that of the tooth and excellent aesthetics, dispensing with the use of opacifiers or aesthetic masking resources (WANDERLEY *et al*., 2015).

According to Dietschi *et al*. (2008) by Naumann *et al*. (2006), the main disadvantages of these pins are: higher cost, the sensitivity of the clinical cementation technique and the absence of radiopacity of some pins. Thus, there is a need to adapt the pins to the cement, so that the tooth structure is preserved with minimal wear. For this reason, the pin cannot be larger than 1/3 of the width of the root, or else it will be susceptible to fracture or loosening (MINGUINI *et al*., 2014).

However, for Marques *et al*. (2016) The technique for using the fiberglass retainer is simple, as long as it is carried out carefully, without neglecting any of the clinical steps, namely, selection of the diameter, length and shape of the pin to be used. There must also be a minimum remaining of 4.0 mm of filling material and the surface treatment of the pin and root canal. The cementation and preparation of the coronary part is performed with composite resin based on the characteristics of the crown to be used.

The indication of uses of this type of pin, in general, is for teeth whose half of the remainder still exists, but which need retention. In wide channels, it is necessary to use composite resin to reanatomize the pin. These pins are composed of longitudinal glass fibers, combined with a composite resin matrix. Most of them are oriented parallel along the axis in order to reduce stresses for the matrix. Its volume changes according to the manufacturer, but the greater the amount of fibers, the greater the resistance and rigidity (MARTINHO *et al*., 2015).

Thus, the longevity of endodontically treated teeth is directly related to both the remaining structure and the efficiency of restorative procedures, hence the importance of choosing this procedure correctly (AMIZIC; BARABA, 2016).

The technique for using the fiberglass retainer is easy to manipulate, but it must be performed without neglecting any of the clinical steps. The length of the pin is directly related to retention and must meet both functional and biological requirements, with the following rules (1) at least 3 to 4 mm of endodontic filling material must remain in the apical region; (2) a 1:1 ratio between crown height and pin root length; (3) the pin must extend at least half the length of the root supported by bone tissue; (4) the walls surrounding the canal (dentin) should be worn as little as possible for the placement of the pin, so as not to further weaken the tooth (BARATIERI, 2011).

Thus, cementation with dual or chemically active systems is preferentially indicated due to the difficulty of access to light from the light-curing device in the apical region (PERREIRA; FRANCISCONE; PORTO, 2005) and ceramics have been considered the ideal material for indirect restorations due to their physical, biological and optical characteristics (LORENZONE *et al*., 2012).

These properties allow durability in the color of the restoration, as well as resistance to abrasion, in addition to enabling great stability in the oral environment, high biocompatibility, and natural appearance in terms of translucency, luminosity, and fluorescence (SHIBAYAMA, 2016).

CASE REPORT

A female patient came to the School Clinic of Faculdade Santa Maria complaining of loss of the restoration of the maxillary canine (13) (Figure 1) previously treated endodonically, in the radiographic examination it was observed that the filling was far below the length of the tooth. Due to the long time in which the filling was exposed in the oral environment and the filling below the length of the tooth, endodontic retreatment was chosen.

The research complied with all the norms and guidelines proposed by resolution 466/12 of the National Health Council, with the approval of the Ethics and Research Committee of Faculdade Santa Maria with CAAE 38488420.6.0000.5180 and Opinion No. 4.351.837 (Appendix A) and was carried out after signing the Free and Informed Consent Form (Appendix A)

ENDODONTIC RETREATMENT

Endodontic Retreatment was performed in three sessions. In the first session: Anamnesis, extraoral and intraoral clinical examinations, initial X-ray (Figure 2), antisepsis, micromotor prophylaxis (NSK®, Japan), Robinson brush and pumice stone (Maquira®, Maringá – PR, Brazil) were performed; 2% lidocaine anesthesia with vasoconstrictor epinephrine (DFL Indústria e Comércio S.A., Rio de Janeiro – RJ, Brazil), coronary opening with diamond tip No. 1014 (KG Sorensen®, Barueri, Brazil), absolute isolation with rubber dam, Young's arch (Maquira®, Maringá – PR, Brazil), Ainsworth perforator (Golgran®, São Paulo, Brazil), clamp holder forceps (Golgran®, São Paulo, Brazil), dental floss, clamp No. 211 (Golgran®, Sao Paulo, Brazil), scissors (Golgran®, Sao Paulo, Brazil).

This was followed by the deblinding of the canal using the Gates-Glidden Reamers (Maillefer®, Ballaigues, Switzerland), using the Crown-Apex technique (CROWN – DOWN) preparing 2/3, the cervical and middle third with the reamers in sequence 4, 3, 2 and 1 working on the CAD (26mm) - 4mm = 22mm; irrigation with 2.5% NaClO. Kerr and Hedströem files (Maillefer®, Ballaigues, Switzerland) and eucalyptol solvent (Biodinâmica®, Ibiporã – PR, Brazil) were associated with the dissolution of the Guta-Percha, facilitating its removal, then the total cleaning of the ducts was carried out, irrigating copiously with 2.5% NaClO using the Navitip® system (Ultradent Products Inc., South Jordan, USA).

Because it is a very atretic channel, the desired limit was not reached in the first session. We sealed the mouth of the canal with a sterile cotton ball with 2.5% NaClO and conventional glass ionomer (Maquira®, Maringá – PR, Brazil) as a temporary restoration.

In the following session: Anesthesia with 2% lidocaine with vasoconstrictor epinephrine (DFL Indústria e Comércio S.A., Rio de Janeiro – RJ, Brazil), the provisional restoration was removed with the 1014 diamond ball drill (KG Sorensen®, Barueri, Brazil), absolute isolation. After the total removal of the anterior filling (Figure 3), odontometry was performed with an apical locator and the actual length of the tooth (24 mm) was determined. The foraminal patency (Figure 4) with the 10K file (Maillefer®, Ballaigues, Switzerland) working on the Real Length of the Tooth with advances in the apical direction.

Then, the file with a diameter smaller than the last Gates file used was selected After selection, the Apical Diameter (DA) was advanced, the Anatomical Diameter (DA) was determined, and the first file that was tight at the Real Working Length (CRT) 25K was determined.

The Initial Apical Instrument (IAI) was the 25K file. From the initial apical instrument, the apical third was prepared, using the sequence of 3 files: 30K, 35K, 40K calibrated in CRT = 23mm, the movements used were enlargement and filing: Rotation of 1/4 turn clockwise and traction of the file touching all the walls of the canal with the same intensity until it is loose in the canal, moving on to the next file, with the last file used 40K (Figure 5) called the Memory Instrument (I.M), always with abundant irrigation, aspirating and flooding the canal with 2.5% NaClO solution and making foraminal patency with the 10K file.

The last file, 40K used to dilate the canal in the CRT was the surgical diameter (DC), used with reference to the choice of the main cone in the obturation phase. After the chemical-mechanical preparation, the CALEN PMCCC (SS WHITE, Rio de Janeiro – RJ, Brazil) was applied as intracal medication, remaining with this medication for 07 days. Coronary sealing with conventional glass ionomer (Maquira®, Maringá-PR, Brazil).

In the third session: Intracanal medication was withdrawn with type K files aided by copious irrigation with 2.5% sodium hypochlorite and aspiration. Final irrigation protocol with 17% EDTA (Biodinâmica®, Ibiporã – PR, Brazil) mechanical agitation using gutta-percha cone, neutralization with 2.5% Sodium Hypochlorite. The canal was filled using the lateral condensation technique. Selection of the main cone (Figure 6) with 40 mm taper (Maillefer®, Ballaigues, Switzerland) disinfection and performance of the three tests: visual, tactile and radiographic. Final wash with saline solution and drying with absorbent paper (Maillefer®, Ballaigues, Switzerland) selection of MF secondary cones (Maillefer®, Ballaigues, Switzerland). The endodontic cement used was Sealer 26 (Dentsply Maillefer®, Petrópolis – RJ, Brazil), cementation was performed with the help of digital spacers; radiography to evaluate failures. The cutting of the Gutta-Percha to the mouth of the canal, with condensers from Paiva (Golgran®, São Paulo, Brazil) pulp chamber toilet with cotton ball with alcohol. Final radiograph (Figure 7) Provisional coronary sealing (Figure 8) with glass ionomer cement (Maquira®, Maringá – PR, Brazil).

After endodontic therapy was completed, a periapical X-ray was performed to assess the quality of endodontic retreatment, then the clinical protocol was performed: Filling of the canal using Gates-Glidden Reamers 5, 4 and 3 (Maillefer®, Ballaigues, Switzerland), leaving the endodontic remnant of 5 mm, the 0.5 fiberglass pin (Ângelos®, Londrina – PR, Brazil) was tested inside the canal. Radiographic test to verify the adaptation of the pin in the conduit.

Next, the channel was cleaned with distilled water and dried with absorbent paper cones (Maillefer®, Ballaigues, Switzerland). Dental structure was conditioned with 37% phosphoric acid (Figure 9) for 30 seconds, washed and dried with absorbent paper cones; application of the adhesive (Single Bond, 3M® Espe, Brazil) in the conduit (Figure 10). Next, the fiberglass pin was defatted with 70% alcohol (Figure 11); apply the silane (Figure 12) (Maquira®, Maringá – PR, Brazil) with a microbrush and wait 60 seconds; apply the adhesive (Single Bond, 3M® Espe, Brazil) on the pin (Figure 13), wait 30 seconds and light-cure for 1 minute (Figure 14).

The Allcem Core dual resin cement (FGM®, Santa Catarina, Brazil) was inserted into the root canal (Figure 15) and on the surface of the pin, the post was inserted inside the root canal

(Figure 16) and waited 5 minutes to remove the excess and photoactivate the set for 60 seconds. Next, the direct restoration of the dental remnant was performed by the incremental technique (Figure 17) and 40-second light-curing per increment, using A3 dentin and A3 enamel composite resin, Z350 (Filtek Z350 XT resin, 3M ESPE).

The removal of excess restorative material was done with 4138F and 4138FF diamond tips (KG Sorensen®, Barueri, Brazil). Occlusal adjustments, followed by finishing and polishing of the restoration, with silicone rubber (Enhance®, Dentsply, Brazil), abrasive gritting discs (SofLex Pop On, 3M ESPE, St. Paul, MN, USA), coarse (Figure 18), medium (Figure 19) and fine (Figure 20); silicon carbide brush (American Burrs®, USA) (Figure 21), felt disc (FGM®, Santa Catarina, Brazil) associated with diamond paste, to obtain adequate surface smoothness and texture of the restorations (Figure 22), followed by final radiography (Figure 23).

Figure 1. Initial Appearance

Figure 2. Diagnostic Radiography

Figure 3. Removal of the Blank

Figure 4. Patency with 10K lime

Figure 5. Memory Instrument

Figure 6. Principal Cone Selection

Figure 7. Final Radiography

Figure 8. Provisional Coronary Sealing

Figure 9. Acid Etching

Figure 10. Application of the Adhesive

Figure 11. Defatted with 70% Alcohol

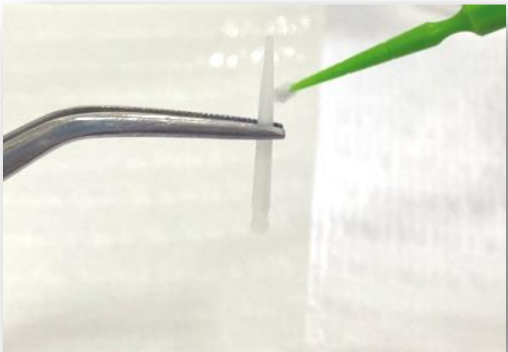

Figure 12. Application of Silane

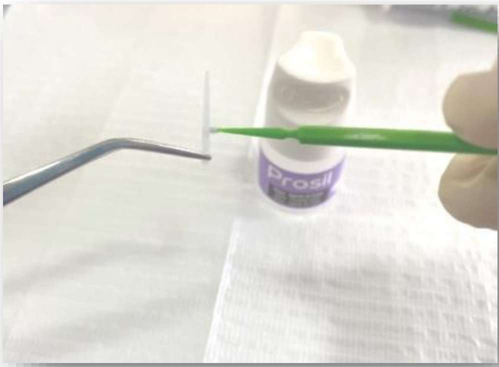

Figure 13. Application of the Adhesive

Figure 14. Photoplomerization

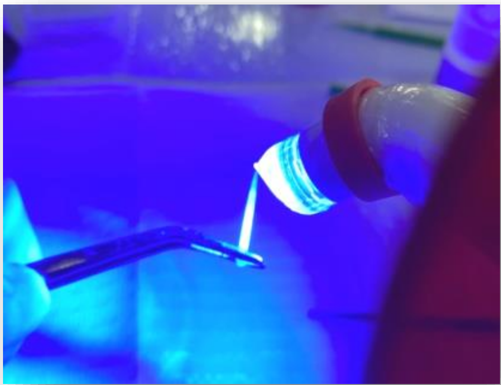

Figure 15. Cementation

Figure 16. Pin Inserted into Channel

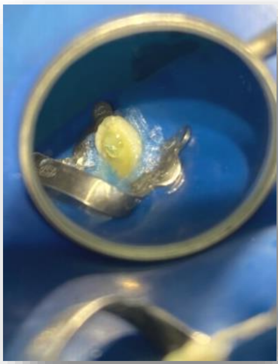

Figure 17. Incremental Technique

Figure 18. Coarse Sanding Disc Finishing

Figure 19. Medium Sanding Disc Finish

Figure 20. Finishing Fine Sanding Disc

Figure 21. Polishing with Silicon Carbide Brush

Figure 22. Final Restoration

Figure 23. Final Radiography

Figure 24. Final Appearance

 

DISCUSSION

The failure of endodontic treatment is due to several factors, including incomplete disinfection, deficient filling, and the existence of preoperative apical rarefaction (ANGES, 2019).

According to WERLANG *et al.* (2016), this failure occurs due to the deficiency of the restorative treatment, where coronary infiltration is established, contributing to apical injury. Deficient coronary sealing, exposing the canals to oral fluids and the type of material used can influence the final result of endodontic treatment (CONSOLARO, 2013).

Thus, endodontic retreatment was indicated in this case, due to the impairment of the coronary seal. However, it should be noted that the execution of this new therapy represents a risky maneuver, requires special care and has a dubious prognosis (ESTRELA, 2014).

However, in order to be successful in endodontic retreatment, it must be taken into account that root canal cleaning needs to be performed through the association of several endodontic instruments, in addition to irrigating solution and intracanal medication. (BRAGANTE *et al.*, 2018), therefore, for the removal of gutta-percha in endodontic retreatment, the use of solvent is necessary. The best known are: chloroform, xylol and eucalyptol (LOPES; SIQUEIRA, 2015).

The use of solvents eliminates the need for excessive force, as they favor the penetration of instruments, chloroform is the best solvent for gutta-percha, however, they have very high cytoxity. In the present study, eucalyptol was used, which is considered a viable alternative to replace these solvents, because it is less irritating than chloroform, has no carcinogenic potential, has antibacterial activity, camphor odor, and is biocompatible (LOPES; SIQUEIRA, 2015).

However, gutta-percha softened by solvents can turn into a paste that adheres to the walls of the canals, making it difficult to remove and presenting chances of extravasation to the apex. Therefore, it was decided to use solvent only in the first two thirds.

The apical third was prepared using more caliber instruments, which in this case 30K, 35K, 40K files were used, respectively, to promote the cleaning of the apical foramen (FONSECA, 2008).

Foraminal patency was performed with the #10K file and according to Gurgel (2010), this step is considered an essential step for cleaning and disinfecting the apical region, used throughout instrumentation.

It is worth mentioning that chemical-mechanical preparation requires association to better eliminate the microbiota present in the root canals. Thus, intracanal medication is indicated to enhance the antimicrobial effect achieved in the root canal preparation phase (MACEDO; NETO 2018). Calcium hydroxide is the most widely used drug in endodontics, with high antiseptic and antimicrobial potential, favoring tissue repair (BRAGANTE *et al.*, 2018). In the present case, CALEN® with PMCC was used for 07 days (LOPES; SIQUEIRA, 2015).

The success of endodontic treatment also depends on the elimination of microorganisms in the root canals and prevention of reinfection. Hegemonic coronary cleaning, modeling, and sealing form the triad for endodontic success (SILVEIRA, 2015).

In the present clinical case, after completing the root canal filling, a fiberglass intraradicular pin was cemented. This material has mechanical properties close to those of dentin and represents the most suitable way to rehabilitate the dental element (SIGEMORI *et al.*, 2012; MELO *et al.*, 2015; HINTZ; SILVA, 2015). In addition to the properties already described, they have no corrosion, low cost, compatibility with resin cements, and modulus of elasticity similar to that of dentin (biomimicry) (CECCHIN *et al.*, 2016).

In this sense, it is pertinent to consider that these cases constitute a challenge, since they are weakened due to factors such as loss of dental structure caused by caries, preliminary cavity preparations or endodontic treatment, which can make them more susceptible to fractures (MUNIZ, 2010).

The clarification of all the risks and benefits of coronary restoration options was passed on to the patient, due to economic conditions, and the use of composite resin was chosen. This material has a high adhesion capacity to the fiberglass pin (SOARES; SANT́ANA, 2018) and thus, added to the fact that light-curing composite resins have satisfactory mechanical properties (PARK *et al.,* 2014), their combined use with fiberglass pins allows the achievement of favorable aesthetic rehabilitation (SOARES; SANT'ANA, 2018; OLIVEIRA *et al.,* 2019), thus restoring the shape and function of the dental structure (PARK *et al*. 2014; OLIVEIRA *et al*., 2019), as clinically evidenced in the clinical case presented. In the face of such interventions, it was possible to achieve the desired success, ultimately emphasizing the importance of manual skill and sharpness and professional performance on anatomy, thus aiming to recover and/or restore form and function, masticatory physiology, harmony and aesthetics between the arches (CRUZ *et al*., 2018).

CONCLUSION

In view of the aspects exposed in the present clinical case, it is concluded that endodontic retreatment, prior to dental rehabilitation, becomes an indispensable step to combat the bacteria present in the root canal system due to the lack of coronary sealing and exposure of the root canal to oral fluids.

The choice of fiberglass pin in rehabilitation is due to the properties close to those of dentin and the association with composite resin, providing a satisfactory alternative for the rehabilitation of endodontically treated teeth that have little remaining tooth structure, obtaining satisfactory clinical, aesthetic and functional results.

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ANNEX A – SUBSTANTIATED OPINION OF THE CEP

SANTA MARIA COLLEGE

CNPJ 03.945.249/0001-68

CAJAZEIRAS – PB

CEP COMITÊ DE ÉTICA EM PESQUISA DA FACULDADE SANTA MARIA

FACULDADE SANTA MARIA/PB

Plataforma Brasil

PARECER CONSUBSTANCIADO DO CEP

DADOS DO PROJETO DE PESQUISA

Título da Pesquisa: RETRATAMENTO ENDODÔNTICO, INSTALAÇÃO DE PINO DE FIBRA DE VIDRO E REABILITAÇÃO PROTÉTICA COM COROA DISSILICATO DE LÍTIO: RELATO DE CASO

Pesquisador: MARCOS ALEXANDRE CASIMIRO DE OLIVEIRA

Área Temática:

Versão: 2

CAAE: 38488420.6.0000.5180

Instituição Proponente: Faculdade Santa Maria/ FSM /PB

Patrocinador Principal: Financiamento Próprio

DADOS DO PARECER

Número do Parecer: 4.351.837

Apresentação do Projeto:

RETRATAMENTO ENDODÔNTICO, INSTALAÇÃO DE PINO DE FIBRA DE VIDRO E REABILITAÇÃO PROTÉTICA COM COROA DISSILICATO DE LÍTIO: RELATO DE CASO

Objetivo da Pesquisa:

OBJETIVO GERAL - Relatar um caso clinico de retratamento endodôntico de um canino superior, instalação de pino de fibra de vidro e reabilitação protética com coroa de dissilicato de lítio.

OBJETIVO ESPECÍFICOS - Descrever a importância de um eficaz selamento coronário após o tratamento endodôntico e sua correta indicação;

Demonstrar uso do pino pré-fabricado de fibra de vidro proporciona maior estética e menor desgaste durante a reabilitação dentária.

Elencar as etapas do preparo de espaço para pino de fibra de vidro até a instalação da peça protética, através de um protocolo consolidado.

Avaliação dos Riscos e Benefícios:

Os riscos e os benefícios foram adequadamente descritos, conforme preconizado na Resolução 466/12, no TCLE e no arquivo gerado na Plataforma Brasil.

Comentários e Considerações sobre a Pesquisa:

A pesquisa está bem delineada e observa os preceitos éticos exigidos pela legislação, em especial

Endereço: BR 230, Km 504
Bairro: Cristo Rei **CEP:** 58.900-000
UF: PB **Município:** CAJAZEIRAS
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Página 01 de 03

CEP FACULDADE SANTA MARIA/PB Plataforma Brasil

Continuação do Parecer: 4.351.837

a Resolução 466/12.

Considerações sobre os Termos de apresentação obrigatória:

Todos os Termos de apresentação obrigatória foram apresentados adequadamente: Termo de Consentimento Livre e Esclarecido (TCLE); - Folha de rosto (datada e assinada); - Termo de Compromisso e responsabilidade do pesquisador responsável (datado e assinado); Termo de Compromisso e responsabilidade do pesquisador participante (datado e assinado); - Projeto completo e Instrumento de coleta de dados.

Conclusões ou Pendências e Lista de Inadequações:

Sem pendências e/ou inadequações.

Considerações Finais a critério do CEP:

Parecer emitido para o Projeto CAAE Nº 38488420.6.0000.5180 conforme Resolução 466/12, estando o pesquisador responsável, MARCOS ALEXANDRE CASIMIRO DE OLIVEIRA, comprometido com o cumprimento dos padrões éticos e legais, onde a execução da pesquisa será realizada conforme delineado no protocolo apresentado e a coleta de dados tem de ser posterior a aprovação pelo Comitê de Ética em Pesquisa.

Este parecer foi elaborado baseado nos documentos abaixo relacionados:

Tipo Documento	Arquivo	Postagem	Autor	Situação
Informações Básicas do Projeto	PB_INFORMAÇÕES_BÁSICAS_DO_PROJETO_1636325.pdf	16/10/2020 15:40:37		Aceito
Projeto Detalhado / Brochura Investigador	Tcc.docx	16/10/2020 15:40:23	MARCOS ALEXANDRE CASIMIRO DE OLIVEIRA	Aceito
Cronograma	CRONOGRAMA.docx	16/10/2020 15:40:01	MARCOS ALEXANDRE CASIMIRO DE OLIVEIRA	Aceito
Declaração de Pesquisadores	termo_de_responsabilidade2.pdf	24/09/2020 18:58:03	MARCOS ALEXANDRE CASIMIRO DE OLIVEIRA	Aceito
TCLE / Termos de Assentimento / Justificativa de Ausência	TCLE.docx	23/09/2020 21:55:47	MARCOS ALEXANDRE CASIMIRO DE OLIVEIRA	Aceito
Outros	termo_de_compromisso.pdf	23/09/2020	MARCOS	Aceito

Endereço: BR 230, Km 504
Bairro: Cristo Rei **CEP:** 58.900-000
UF: PB **Município:** CAJAZEIRAS
Telefone: (83)3531-1346 **Fax:** (83)3531-1365 **E-mail:** cepfsm@gmail.com

Outros	termo_de_compromisso.pdf	21:54:11	ALEXANDRE CASIMIRO DE OLIVEIRA	Aceito
Declaração de Instituição e Infraestrutura	Anuencia.docx	23/09/2020 21:52:55	MARCOS ALEXANDRE CASIMIRO DE OLIVEIRA	Aceito
Outros	Anuencia_de_risco.docx	23/09/2020 21:52:37	MARCOS ALEXANDRE CASIMIRO DE OLIVEIRA	Aceito
Orçamento	ORCAMENTO.docx	23/09/2020 21:50:31	MARCOS ALEXANDRE CASIMIRO DE OLIVEIRA	Aceito
Folha de Rosto	folhaDeRosto.pdf	23/09/2020 21:47:43	MARCOS ALEXANDRE CASIMIRO DE OLIVEIRA	Aceito

Situação do Parecer:
Aprovado

Necessita Apreciação da CONEP:
Não

CAJAZEIRAS, 21 de Outubro de 2020

Assinado por:
ANKILMA DO NASCIMENTO ANDRADE
(Coordenador(a))