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Drill Sealing, Endodontic Retreatment and Fixed Prosthesis Installation in a Lower Molar - Clinical Case Study

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***Keywords*— Endodontics, Periapical abscess, Fixed prosthesis.**

***Abstract*—** *The access ionization attempt may occur during the coronary period, which may lead to a posterior dental access. The maintenance of the primary tooth is important, especially in cases of permanent tooth agenesis. The aim of this study is to report a clinical case about perforation sealing, endodontic retreatment, and installation of a fixed prosthesis in a lower molar. A patient was selected from the dental clinic of Fapac/Itpac Porto Nacional - TO, asymptomatic, negative sensitivity test and vertical percussion, need for retreatment and perforation in the furcation region. In the first session, anesthesia, access surgery, absolute isolation, irrigation with 2% chlorhexidine gel, identification of the perforation and its conditioning, odontometry, removal of gutta percha with rotary instruments (Logic RT system), drying and insertion of intracanal medication (calcium hydroxide) in root canals and perforation. In the second session (after 15 days), the intracanal medication was removed and the root canals were filled with gutta percha and plasticized technique, and the perforation was sealed with mineral trioxide aggregate (MTA). The clinical case was continued for 2 years, and during the follow-up, asymptomatic, periodontal tissues were clinically and radiographically normal and the dental element performed its masticatory functions satisfactorily. It is possible to conclude with this clinical case that even with a perforation in the furcation region and the need to insert a prosthetic rehabilitation in the dental element, the sealing of the perforation with the aggregate mineral trioxide allowed the maintenance of the dental element.*

I. INTRODUCTION

Root perforation occurs through pathological artifices due to resorption or caries and iatrogenic acts of the dentist that derive in the communication of the pulp cavity with the periodontal tissue and alveolar bone through artificial opening (ALRAHABI et al, 2019). They can occur during the stages of endodontic treatment, being considered a clinical challenge for the support of the dental element (ALVES et al, 2015).

Alrahabi et al (2019) also emphasizes that this type of complication occurs due to extensive caries, root resorption or incorrect use of drills and other endodontic appliances, by definition, root perforation is an opening of iatrogenic origin caused by the inadequate use of the dentist or from pathological origins such as caries and resorption.

Siew et al., (2015) highlight that the prevalence of root perforations simulates 10% (ten percent) of

accidents that occur during endodontic treatment. It is important that the dentist knows the location of the perforated region to have a good prognosis, thus carrying out the stages of endodontic treatment in detail to obtain success in the treatment, especially of the internal dental anatomy and access to the root canals. The authors also state that perforations can cause an inflammatory response in the periodontium causing irreversible destruction of the periodontal ligament or even tooth loss.

Marques et al., (2018) emphasize that the treatment of the perforation is associated with its location. When sealing is indicated, it is essential that the material to be used has desirable properties such as being biocompatible inducing mineralization, not being resorbable, having good sealing capacity, having radiopacity, low toxicity and antibacterial effect. They also state that Mineral Trioxide Aggregate (MTA) is the material that has been used most abundantly in these procedures because it has the appropriate characteristics.

The authors Marques et al., (2018) also emphasize that, to avoid loss of dental fixation, it is necessary to repair a perforation to maintain the health of the periodontium of the affected region, if the region is already compromised, it is necessary to reestablish the conditions of the region through the treatment of the perforation according to the adequate sealing and the material used.

Given the context, the objective of this work is to report a clinical case about perforation sealing, endodontic retreatment, and installation of a fixed prosthesis in a lower molar.

II. METHODOLOGY

One (01) patient was selected, in need of endodontic retreatment of a lower molar with perforation in the furcation region and need for prosthetic rehabilitation of element 36 (Figures 01 and 2), but asymptomatic according to the spontaneous demand in the multidisciplinary clinic. from Fapac/Itpac Porto Nacional. The research was carried out after the approval of the research project by the Ethics Committee (CAEE: 63627622.9.0000.5516) and the patient was aware of the care protocol and signed the informed consent document.

Fig.1 - Initial radiograph
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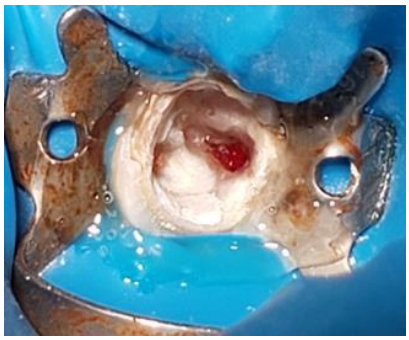

Fig.2 - Identification of the perforation
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The care protocol was performed in two consultations (to perform endodontic retreatment and perforation sealing and 3 more consultations to perform the prosthetic procedure, as follows:

1st Consultation:

Protocol that was performed in root canal retreatment

Anesthesia was performed with Lidocaine 1:100000 (Dentsply/Sirona, Ballaigues – Switzerland). Subsequently, tooth prophylaxis was performed using a straight white CA Brush (Microdon, Socorro – SP) and Herjos prophylaxis paste (Vigodent. Rio de Janeiro – RJ), caries removal with low rotation spherical drills (Dentsply/Sirona, Ballaigues – Switzerland) and coronary opening with drills 1014 and 3082 (KG Sorensen, Barueri – SP).

Absolute isolation was performed with a rubber sheet (Madeitex – São José dos Campos – SP), Ostby isolation arch (Prisma – São Paulo – SP) and various isolation clamps (KSK, Rio de Janeiro – RJ) disinfection of the operative field with 0.2% chlorhexidine (Fórmula Mais compounding pharmacy – Palmas – TO).

The root canals were irrigated with 2% chlorhexidine gel (Fórmula Mais Manipulation Pharmacy – Palmas – TO) and saline solution. Subsequently, the retreatment technique was performed with the Prodesign Logic 25/05 motor and rotary system (Easy – Belo Horizonte – MG) in the crown-apex direction until all gutta percha was removed in all root canals. Then, odontometry was performed with a Root ZX foraminal locator (J Morita, Kyoto – Japan), obtaining the real length of the tooth in all root canals. Foraminal patency was performed with a Prodesign Logic 25/01 rotary file (Easy – Belo Horizonte – MG) 1 mm beyond the actual length of the tooth, defined by an electronic foraminal locator. Patency check with file (10 or 15). Subsequently, a Prodesign Logic 05/25 file (Easy – Belo Horizonte – MG) made the apical stop, 1 mm short of the real length of the tooth, thus establishing the working length in all root canals.

During the entire instrumentation, irrigation was performed with 2% chlorhexidine gel and saline solution (Manipulation Pharmacy – Formula e Ação – São Paulo – SP), 10 ml Luer Slip plastic syringe (Advantive, Nanchanc Jangxi – China) and a 25x0 disposable needle. .55 (BD, Curitiba - PR). The needle was introduced throughout the instrumentation process until reaching 2 mm short of the working length.

The canals, at the end of the preparation, were dried with capillary tips (Ultradent Products, Inc, South Jordan Utah, USA) attached to a high-power sucker and with absorbent paper cones (Tanari, Manacapuru – AM) and immediately afterwards calcium hydroxide paste (Calen) (SS White – Rio de Janeiro –RJ) was inserted.

Provisional restoration with glass ionomer cement was performed after treatment.

2nd Consultation:

The root canals were irrigated with 2% chlorhexidine gel (Fmula Mais Manipulation Pharmacy – Palmas – TO) and saline solution. Subsequently, with the Prodesign Logic 25/05 engine and rotary system (Easy – Belo Horizonte – MG), the calcium hydroxide paste (Calen) (SS White – Rio de Janeiro – RJ) will be removed.

The final irrigation was performed with 3ml of 17% EDTA (Frame and Action Manipulation Pharmacy – São Paulo – SP). First, 1 ml of 17% EDTA was introduced, followed by ultrasonic vibration with a 25 IRRI S insert (VDW, Endo Ultrasonic Files, Endodontic Synergy, Munich, Germany) at a frequency of 30 kHz. The ultrasound insert was connected to a piezoelectric ultrasound device operating at 30 kHz (CVDent 1000, CVD Vale, São José dos Campos, SP), set at power level 3, for a period of 20s. This process was repeated 2 more times. After this process, irrigation will be carried out with 5ml of saline solution (Farmacia Formula e Ação, São Paulo –SP). The canals were dried with capillary tips (Ultradent Products, Inc, South Jordan, Utah, USA) attached to a high-power sucker and with absorbent paper cones (Tanari, Manacapuru – AM).

The filling cement used was AH Plus (Dentsply/Sirona, Munich, Germany) and was mixed according to the manufacturer's recommendations.

The canals were obturated in the same session using the Continuous Wave Condensation technique (Buchanan, 1994), which follows the principles of the Schilder technique (1967) using the Touchn Heat equipment. For this purpose, M and FM accessory cones (Tanari, Manacapuru – AM) will be selected. These were calibrated using an endodontic calibrating ruler (Dentsply/Sirona, Bullaigues, Switzerland) and adjusted to the working length. The thermoplasticizer of the Touchn Heat device will cut, plasticize and condensate the gutta percha inside the root canal. This filling phase is called Down Packing. Subsequently, the Back Fill phase was performed with the insertion of plasticized gutta percha with the aid of the Easy Pack (Easy, Belo Horizonte, MG).

Protocolo que foi realizado na perfuração da região de furca (após 7 dias)

The perforation was identified, and irrigation was promoted with 2% chlorhexidine gel (Formula Mais Manipulation Pharmacy – Palmas – TO) and saline solution. Subsequently, the region was dried with sterile cotton and MTA (Angelus, Santa Catarina, SC) was inserted with Shilder vertical pressers (Dentsply/Sirona, Munich, Germany) until the perforation was filled (Figure 03). The filling of the root canals and sealing of the perforation in the furcation region were identified in the final radiograph (Figure 04).

Fig.3 - Sealing the perforation

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Fig.4 - Final radiograph

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After the endodontic retreatment was concluded, preparation and installation of a fiberglass post, filling core with composite resin, preparation for zirconia crown and functional impression with addition silicone were installed. The fixed zirconia prosthesis was fabricated and installed. The dental element will be maintained at 1 month, 3 months, 6 months, 1 year and 2 years, analyzing the regression of pathology and symptomatology. In the initial radiographic examination, a radiolucent image is observed in the furcation region.

III. RESULTS

In a follow-up radiograph, after six months, asymptomatic and normal periodontal and periapical tissues were observed (Figure 05).

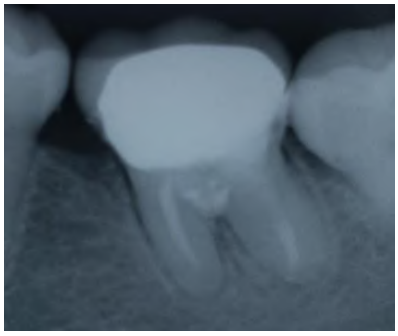

Fig.05 - 6-month follow-up radiograph

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On follow-up radiography, after 2 years, asymptomatic and normal periodontal and periapical tissues were observed (Figure 06).

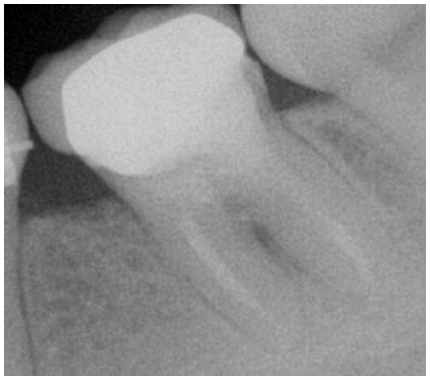

Fig.6 - 2-year follow-up radiograph

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IV. DISCUSSION

In the clinical study presented, it was noticed that the treatment was successful by analogy to the absence of contamination at the perforation site before the insertion of Mineral Trioxide Aggregate (MTA). Due to the high PH content, MTA favors bacterial reduction. According to Tanomaru Filho, Faleiros and Tanomaru (2020), to be successful in the treatment of root perforations, adequate sealing is required using a material that has adequate biological characteristics and conforms to the walls of the cavity made.

In a study presented in the Journal of Endodontics, at the University of Florence, Pace, Giuliani and Pagavino (2018) managed an experimental clinical study in twelve adult patients who had a clinic in teeth with furcation perforation with MTA and were followed for five years. Which, after this period, were analyzed for the presence or absence of periodontal deformity in the perforation cavity, pain, swelling and fistula and radiographically for periapical radiolucency and in the furcation region. two and five years.

Páttaro, Amaral and Gavini (2018) emphasize that, as it represents one of the fundamental causes of endodontic failures, researchers seek studies on the prevention of accidents of perforations in their dental structures as well as in the support structures to avoid these problems. Another study presented by Eghbal, Fazlyab and Asgary (2018) in the Iranian Endodontic Journal, presents a clinical case of sealing a furcation perforation with CEM (BioniqueDent, Tehran, Iran) a cement analogous to MTA, but with certain distinct elements in the powder and in the liquid, followed by a satisfactory year, to reveal the properties of this biomaterial.

Fukunaga et al (2018) also highlight that the success in the treatment of perforations is directly related to the severity of the initial damage generated in the

periodontal tissue, location of the perforation, size, sealing capacity and biocompatibility with the material used for filling.

According to Páttaro, Amaral and Gavini (2018), the presence of bacterial contamination leads to the destruction of the local periodontium, generating an inflammation process, accelerating the loss of the surrounding alveolar bone. For Júnior et al (2018), root perforations are significant complications for endodontic treatment, and can lead to tooth loss if not detected and treated properly.

Several materials are used in endodontics that, in contact with the periodontium, need to be biocompatible and non-toxic with host tissues, MTA is one of these materials and is widely used in these procedures because several researches through a meta-analysis showed that MTA, Super EBA , MRI are biocompatible and prevent microleakage, promoting the regeneration of the original tissues when in contact with the dental pulp or periradicular tissues (RODRIGUES et al, 2019).

Corroborating the authors mentioned above, Alrahabi et al., (2019) highlight that multiple materials are used in the treatment of root perforations, but the most indicated today is MTA, due to its sealing capacity and especially in repairs of root perforations, pulp capping, retrograde obturation and apexification. Vanderweele et al. (2016) says that the second cause of failure in endodontic treatment is perforation of the root canal located in the furcation region of molars and premolars, which represents 9.6% of cases. They also report that cements containing calcium silicate are a great advance for endodontic treatments, especially related to the treatment of root perforations.

Various materials were used to seal the communication pathways between the root canal system and the oral cavity, such as zinc oxide and eugenol-based cements, such as Super EBA, IRM, composite resins and glass ionomer cements, including in this case study. clinical. It was found that one of the best properties in sealing perforations and endodontic retreatment with MTA was the ability to set in the presence of moisture due to its fine particles that can be fixed in the presence of water without affecting their properties and still having advantages over other elements. also used as retro obturators (ALVES et al, 2015).

Camilleri (2018) emphasize the biocompatibility of MTA cement as an antibacterial, capable of adapting properly to the canal walls and radiopacity, favoring its visualization on radiography. It also can induce the formation of mineralized tissue, and it can also have its setting reaction in a humid environment. Based on the results of this study, MTA is a suitable material for perforation repair, endodontic retreatment, and adaptability to the fixed prosthesis in a lower molar.

CONCLUSION

It is possible to conclude with this clinical case that even with a perforation in the furcation region and the need to insert a prosthetic rehabilitation in the dental element, the sealing of the perforation with the aggregate mineral trioxide allowed the maintenance of the dental element.

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