International Journal of Advanced Engineering Research and Science (IJAERS)
Peer-Reviewed Journal
ISSN: 2349-6495(P) | 2456-1908(O)
Vol-9, Issue-12; Dec, 2022
Journal Home Page Available: https://ijaers.com/
Article DOI: https://dx.doi.org/10.22161/ijaers.912.19

Predictability of Endodontic Treatment in Tooth with Extensive Lesion: Clinical Case Study

Bárbara Maciel Grama Santiago Peixoto, Hildete Souza de Araújo Santos, Thalyta karller Dias Correia, Eduardo Fernandes Marques

Instituto Tocantinense Presidente Antônio Carlos – Fapac/Itpac Porto Nacional

Received: 13 Nov 2022,

Receive in revised form: 06 Dec 2022,

Accepted: 12 Dec 2022,

Available online: 19 Dec 2022

***Keywords*— Endodontics. Abscess. Fistula.**

Abstract— *The pulp tissue and the periodontal ligament are closely linked through the apical foramen, lateral canals, dentinal tubules, inter-conducts, and apical deltas, allowing the exchange of agents between them. Contamination of root canals can lead to injury in the furcation region and endodontic treatment can promote disinfection of the dental element and enable the healing process. The aim of this study was to evaluate, through a case report, the predictability of endodontic treatment in a tooth with extensive damage. A patient was attended who had the element 36 necrotic, asymptomatic and with a furcation lesion, confirmed in the initial radiography. In the first session, anesthesia, access surgery, absolute isolation, irrigation with 2.5% sodium hypochlorite, odontometry, instrumentation with Logic rotary files at working length, drying and insertion of intracanal medication (calcium hydroxide) were performed. In the second session (after 15 days), the intracanal medication was removed, the distal root canals were filled using thermoplastified technique and the mesial ones were filled with added mineral trioxide. During the proservations period, crown/radicular fracture of the dental element and painful symptoms were observed. It is possible to conclude with this clinical case that even using biostimulating materials such as aggregated mineral trioxide, the endodontic treatment was not successful.*

I. INTRODUCTION

The pulp tissue and the periodontal ligament are closely linked through the apical foramen, lateral canals, dentinal tubules, interconducts and apical deltas, allowing the exchange of agents between them Bramante (1998). The contact between the pulp and the periodontal ligament can increase in cases of resorptions, periodontal treatments, root fractures and perforations (Borges et al., 2011).

The interrelationship between the pulp and the periodontium is not restricted to the dental apex, especially in the case of furcation regions of multirooted teeth, where dentin permeability is high due to the presence of interconducts and foramina. Thus, it is of great importance the use of liquids, in irrigation, that clean the root canal system and create permeability for the local medicine to act and the success of the treatment to occur (Boff et al., 2014).

Injuries that involve the pulp and periodontium in the same tooth are generically called endo-periodontal injuries, with their clinical characteristics being very variable in terms of signs and symptoms. Thus, knowing the origin of lesions in these tissues is relevant for the diagnosis, treatment plan and determination of the prognosis. Endo-periodontal lesions are localized pathological conditions, with loss of periodontal attachment and pulpal involvement in the same tooth, with the diagnosis being the determining factor for the treatment and prognosis of the case (Boschini et al., 2020).

According to Clark & Levini (2019) endo-periodontal lesions can be classified according to their origin in: lesions of pulpal, periodontal, or true origin. Cardenas et al., in 2013, described that lesions of primary pulpal origin with periodontal involvement present loss of insertion fibers due to the presence of ramifications of the channels that drain the inflammatory infiltrate from the pulp to the insertion periodontium and furcation region, especially in younger patients. In these cases, after endodontic treatment, the insertion ligament regenerates without the need for periodontal intervention.

The chronification of the previous process triggers the endodontic lesion with secondary periodontal involvement, in which the regenerative potential of the periodontal ligament is altered, requiring endodontic and periodontal treatment Carvalheiro (2018). According to Espindola (2002), periodontal disease, even advanced, rarely leads to pulp alterations. It is suggested that the presence of root cementum protects the accessory canals and dentinal tubules from the invasion of inflammatory and bacterial products from periodontitis. The pulp has good defensive capacity if the apical vascular supply is intact. However, if periodontal disease reaches the apical foramen and bacteria enter through it, retrograde pulpitis occurs, which is rare.

The true endo-periodontal lesion is the occurrence of a simultaneous and independent endodontic and periodontal alteration, in the same tooth, which are found at a certain moment of development. Clinically and radiographically, they appear as a single lesion, with a more difficult prognosis. Pulp tests indicate necrosis and periodontal probing reveals deep pockets. This lesion requires periodontal treatment and endodontic therapy as it is produced by independent entities (Chengge et al., 2017).

Estrela (2013) pointed out that there are criteria to define true endo-periodontal lesions: 1) The tooth involved must present irreversible alteration of the pulp or be depulped. 2) The attachment periodontal ligament must be destroyed starting from the gingival sulcus, at a variable depth, reaching the root apex. 3) Both endodontic and periodontal treatment are necessary to solve the case.

According to Chaemim et al., 2013, to obtain the correct diagnosis of a periodontal and/or endodontic alteration, we need semi-technical tests, such as: medical and dental history of the patient, clinical examination, radiographic examination, sensitivity test and periodontal probe. Clinical examination verifies the presence of generalized periodontal disease.

Radiographic examination observes vertical and horizontal bone loss, periodontal involvement, and interradicular and periapical lesions. Sensitivity testing checks for pulpal tissue necrosis. Periodontal probing observes the depth of the grooves (Siqueira & Lopes, 1999).

It is estimated that 76% of lower molars have communication in the furcation regions. Perfusion studies demonstrate the vascular communication that exists between the interconducts in this region, as they represent an embryological analysis of the existing communications between the papilla and the periodontium that occurred during tooth development. The endodontic treatment of these dental elements is possible and will avoid tooth loss (Chong et al., 2003).

The literature indicates as treatment the preparation of root canals and dressing with calcium hydroxide, which should be changed from time to time, depending on factors such as symptomatology, presence of exudate and radiographic control. Calcium hydroxide is the material of choice for the intracanal dressing because it leaves the alkaline environment (pH 12.4) which is unsuitable for bacterial proliferation, destroys the cell membrane of bacteria and the lipid portion of bacterial lipopolysaccharide (LPS) present in the gram-negative membrane, which act in bone resorption (Damasceno et al., 2008).

Thus, the aim of this study is to evaluate, through a case report, the predictability of endodontic treatment in a tooth with extensive damage.

II. METHODOLOGY

The patient was approached in the triage sector of the Fapac/Itpac Porto Nacional multidisciplinary clinic.

Initially, anamnesis, tactile inspection, and periapical radiography of the dental element (Figure 01 – Initial radiograph) were performed to confirm the diagnosis of pulp necrosis and complete rhizogenesis. Subsequently, the patient was taken to an isolated room, where the patient will be informed about the endodontic treatment technique, with information in clear and accessible language. At this time, an invitation was made to participate in the research. Adequate time was granted for the guest to participate in the research and reflect, consulting, if necessary, their family members or other people who can help them in making a free and informed decision. After the patient's consent, the TCLE was signed by him.

Fig.1 – Initial radiograph

Source: own authorship

The treatment was carried out in two sessions following the following protocol:

1st session

Anesthesia was applied with Lidocaine 1:200000 (Dentsply/Sirona, Ballaigues - Switzerland). Later, tooth prophylaxis will be performed with a white straight AC brush (Microdont, Socorro - SP) and Herjos prophylaxis paste (Vigodent, Rio de Janeiro - RJ) and coronal 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 (A Formula compounding pharmacy, São Paulo - SP).

Initial exploration with a #10 K file (Dentsply/Sirona, Ballaigues - Switzerland) was performed until the apical region of the root canals was perceived. Subsequently, the preparation of the cervical third was performed with rotary files (Logic System) compatible with the diameter of each root canal.

During the entire instrumentation, irrigation was performed with 2.5% sodium hypochlorite (Manipulation Pharmacy – Formula and Action – São Paulo – SP), using a 10 mL Lüer Slip plastic syringe (Advantive, Nanchanc Jangxi - China) and a needle. disposable 25 x 0.55 (BD, Curitiba - PR). 30 mL of solution will be used per experimental unit.

The root canal, at the end of preparation, was dried with capillary tips (Ultradent Products, Inc, South Jordan, Utah, USA) attached to a high-power sucker and absorbent paper cones (Tanari, Manacapuru - AM). Soon after, the intracanal medication, calcium hydroxide (Calen, SSWhite, Ballaigues – Switzerland), was inserted with the aid of a number 40 lentulo and coronal sealing with glass ionomer.

2nd Session (The second session will be held shortly after 15 days)

Anesthesia was applied with Lidocaine 1:200000 (Dentsply/Sirona, Ballaigues - Switzerland) and coronary opening with drills 1014 and 3082 (KG Sorensen, Barueri - SP), absolute isolation, irrigation with 2% chlorhexidine gel and saline solution (Manipulation Pharmacy – Formula e Ação – São Paulo – SP), using a 10 mL Lüer Slip plastic syringe (Advantive, Nanchanc Jangxi - China) and a 25 x 0.55 disposable needle (BD, Curitiba - PR) and compatible rotary files (Logic system) with the root canals, to remove the intracanal medication.

The root 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).

The final irrigation was performed with 3 mL of EDTA (Ethylenediaminetetraacetic acid) 17% (Manipulation Pharmacy – Formula and Action – 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 operating at 30 kHz (CVDent 1000; CVD Vale, São José dos Campos, SP, Brazil), set at power level 3, for a period of 20s. This process was repeated 2 more times. After this process, irrigation was performed with 5 mL of 2% chlorhexidine gel and saline solution (Farmácia Formula & Ação, São Paulo - SP. The canals were dried with capillary tips (Ultradent Products, Inc, South Jordan, Utah, USA) coupled to a high-power sucker and absorbent paper cones (Tanari, Manacapuru - AM).

Obturation was performed using a thermoplastified technique in the distal canals and filling of the mesial canals with added mineral trioxide. The definitive restoration with composite resin or glass ionomer cement was performed after the treatment and the final radiography will be performed with a radiographic positioner (Indusbello, Londrina - PR).

Fig.2 – Final radiograph

Source: own authorship

During the proservations period, crown/radicular fracture of the dental element and painful symptoms were observed. The dental element was indicated for extraction and insertion of the dental implant of element 36 (Figure 02 – Final radiograph).

III. DISCUSSION

The objective of endodontic treatment is to maintain the dental element, providing aesthetics and function, in addition to preventing endo-periradicular lesions or treating them if they have already occurred.

The correct diagnosis of pulpal or periapical pathologies is obtained through physical and complementary examinations, such as radiographic and semi-technical examinations. The success of endodontic treatment depends on some factors, namely: adequate cleaning, shaping and filling of root canals. When there is failure in endodontic treatment, the indication of an endodontic retreatment is evaluated.

When the tooth is endodontically treated and a failure occurs despite the time or technique used, endodontic retreatment is resorted to. There are some indications for retreatment such as: periapical bone rarefaction that did not exist before, increase in the periodontal ligament space (greater than 2 mm), absence of bone repair, non-formation of a new lamina dura, indication of progression of root resorption and infiltration coronary disease that occurs mainly when the first treatment is performed, and the tooth is not definitively restored within 30 days Siqueria Jr. et. al. (2000).

According to Hartwell (2009) the benefits of endodontic retreatment are retention of the patient's natural dental structure, which can be used to restore dental form and function, minimizing the need for extensive prosthetic rehabilitation if the tooth were extracted.

Failures in endodontic therapy can be defined by the presence of a periapical lesion, resulting from the propagation and invasion of resistant microorganisms located in the periapex, together with the symptomatological response. It is known that failures can be avoided and for that it is necessary to evaluate the number of failures to avoid setbacks. (GABARDO et al., 2009; OCCHI et al., 2010; ESPINDOLA et al., 2002; OLIVEIRA et al., 2011). In the present study, crown/root fracture of the dental element and painful symptoms were observed. The dental element was sent for extraction and insertion of a dental implant.

According to Estrela (2013) the indicators of the need for a new endodontic intervention are characterized by the presence of periapical lesion and post-treatment symptomatology. This indicates that microorganisms are overcoming organic resistance.

According to Lopes and Siqueira Jr (2020) in response to intraradical infection, a periradicular lesion is formed, with this a barrier is formed against propagation to the alveolar bone and other regions of the body. acute periradicular inflammation, which is a purulent-like inflammation of the periradicular tissues in response to an outflow of pathogenic bacteria from the root canal.

Lopes and Siqueira Jr (2020) classify the types of post-endodontic treatment periradicular lesions as follows: a) Emergent - was absent and develops after treatment. b) Persistent - persists despite treatment. c) Recurrent - reappears late after having repaired. About 10% of tooth extractions are caused by periradicular lesions after endodontic treatment. In the present study, even using biostimulating materials such as aggregated mineral trioxide, the endodontic treatment was not successful.

According to Hartwell (2009) there are numerous reasons for the failure of the initial treatment, the most frequent of which are the non-elimination of the microorganisms present, either due to failure to detect or treat all root canal systems, reintroduction of microorganisms, cleaning and obturation. inadequate root calcification, transoperative accidents, which may result in root perforations and canal obstructions.

According to data obtained in the anamnesis and clinical and radiographic examinations, it is concluded that in the case study there was a reintroduction of microorganisms in the root canal system, since the dental element was fractured and exposed in the oral cavity, favorable to recontamination of microorganisms present in the oral cavity.

IV. CONCLUSION

During the proservations period, crown/radicular fracture of the dental element and painful symptoms were observed. It is possible to conclude with this clinical case that even using biostimulating materials such as aggregated mineral trioxide, the endodontic treatment was not successful.

REFERENCES

[1] BRAMANTE, C.M.; FREITAS, C. V. J. **Retratamento endodôntico: estudo comparativo entre técnica manual, ultra-som e Canal Finder**. *Rec Odontol Univ São Paulo*, v.12, n.1, p.13-17, jan./mar. 1998.

[2] BORGES, Daliana Cristina Pereira Caixeta; LOPES, Renata Carvalho Portes; TAVARES, Warley Luciano Fonseca. **Técnica Híbrida de Tagger: a escolha pelos alunos do**

Instituto de Estudos da Saúde. Belo Horizonte, MG: Instituto de Estudos da Saúde – IES, 2011

[3] BOFF, Tiago Luís et al. **Histological analysis of cleaning capacity in apical third of flattened root canals with passive ultrasonic irrigation.** *RSBO (Online)* [online]. 2014, vol.11, n.2, pp. 113-117. ISSN 1984-5685.

[4] BOSCHINI, L; PLOTINO, G; MELILLO, M; STAFFOLI, S; GRANDE, N. M. **Endodontic management of an autotransplanted mandibular third molar: A simplified approach.** *J Am Dent Assoc*. 2020;151(3):197-202. doi:10.1016/j.adaj.2019.10.025

[5] CLARK, D; LEVIN, L. **In the dental implant era, why do we still bother saving teeth?.*Dent Traumatol*.** 2019;35(6):368-375. doi:10.1111/edt.12492

[6] CARDENAS E. V.; MACHADO M. E. L.; MATHIAS M.A.; COBEIM M. V.; REIS F. A. Z.; KFOUR F. A. **Intentional reimplantation in order to remove a fractured endodontic instrument - case report.** *Full Dent. Sci*. 2013; 4(16):633-636

[7] CAVALHEIRO, Tomas Galves. **Comparação de técnica exodôntica minimamente traumática em relação à técnica de extração convencional: indicações, benefícios e limitações: resultados parciais.** 2018. 57 f. Trabalho de Conclusão de Curso (Graduação em Odontologia) – Faculdade de Odontologia, Universidade Federal do Rio Grande do Sul, Porto Alegre, 2018.

[8] CHAEMIM, Helem et al. **Técnicas de Obturação Endodônticas.** *Revista FAIPE*, [S.l.], v. 3, n. 2, p. 30-58, june 2013. ISSN 2179-9660.

[9] CHENGGE, H. **Geoestática em exodontias cirúrgicas minimamente invasivas.** Hua Xi Kou Qiang Yi Xue Za Zhi. 2017;35(2):119-123. doi:10.7518/hxkq.2017.02.002

[10] CHONG BS, PITT FORDP TR, HUDSON MB. **A prospective clinical study of Mineral Trioxide Aggregate and IRM when used as root-end filling materials in endodontic surgery.** *Int Endod J*. 2003;36(8):520-526.

[11] DAMASCENO, João Luís Néri et al. **Estudo comparativo do selamento apical em canais radiculares obturados pelas técnicas cone único Protaper e termoplástica sistema TC.** *RGO*, v. 56, n. 4, p. 417-22, out./dez. 2008.

[12] ESPÍNDOLA, A.C.S.; Avaliação do grau de sucesso e insucesso no tratamento endodôntico em dentes uni-radiculares**.** RGO. v. 50, n. 3, p. 164166. 2002.

[13] ESTRELA, Carlos; Endodontia Laboratorial e Clínica. São Paulo, p.93-98. 2013.

[14] ESTRELA, Carlos.; BIFFI, João; DIRCEU, Rodrigo. Ciências Endodônticas. São Paulo, p. 619-623. 2004.

[15] GABARDO, M.C.L.; OCCHI, I.G.P.; Avaliação de sucesso e insucesso dos tratamentos endodônticos realizados na clínica odontológica da UNIPAR. UNINGÁ Review. v. 8, n. 2, p. 39-46. 2011.

[16] HARTWELL, Gary; Retratamento não Cirúrgico. Rio de Janeiro, V.4, p. 341-344. 2009.

[17] OLIVEIRA, D.C.; Microbiologia do insucesso do tratamento endodôntico. Revista gestão & saúde. v. 1, n. 1, p. 11-17. 2009.