

Treatment of primary molar utilizing lesion sterilization and tissue repair: a case report

Tratamento de molar decíduo utilizando esterilização de lesão e reparo de tecido: um relato de caso

Tratamiento de molares primarios mediante esterilización de lesiones y reparación de tejidos: reporte de un caso

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Abstract

Aim: Non-instrumental endodontic therapy has stood out for being a minimal intervention approach that uses a mixture of antibiotics to disinfect the root canals. The purpose of this case report was to describe the treatment and 36-month follow-up of a deciduous necrotic molar using the modified technique of “Injury Sterilization and Tissue Repair” (LSTR). **Methodology:** A 5-year-old female patient sought dental care complaining of pain in the region of tooth 85 whose oral clinical examination revealed the presence of caries with pulp involvement. In the preoperative period (T1), the patient presented with fistula, abscess and edema. Endodontic treatment was performed using the LSTR technique with triple antibiotic paste. In the follow-up, due to radiographic aspects, a large interradicular lesion was observed in T1 and at the end of the follow-up (T4 / T5), complete bone regeneration was observed in the region. **Conclusion:** Due to the high antibacterial efficacy of the paste used, the LSTR technique showed satisfactory results in the pulpectomy of a deciduous necrotic molar. **Clinical significance:** This technique shows the potential to be used in cases to be performed in a shorter operative time, which can be useful in the treatment of children with negative behavior.

Keywords: Child; Dental pulp disease; Teeth, Endodontically treated; Tooth, deciduous.

Resumo

Objetivo: A terapia endodôntica não instrumental tem se destacado por ser uma abordagem de mínima intervenção que utiliza uma mistura de antibióticos para desinfetar os canais radiculares. O objetivo deste relato de caso foi descrever o tratamento e acompanhamento de 36 meses de um molar necrótico decíduo usando a técnica modificada de “Esterilização de Lesões e Reparo de Tecido” (LSTR). **Metodologia:** Paciente do sexo feminino, 5 anos, procurou atendimento odontológico com queixa de dor na região do dente 85 cujo exame clínico bucal revelou presença de cárie com acometimento pulpar. No pré-operatório (T1), o paciente apresentou fístula, abscesso e edema. O tratamento endodôntico foi realizado pela técnica de LSTR com pasta tripla de antibiótico. No seguimento, devido aos aspectos radiográficos, observou-se grande lesão interradicular em T1 e ao final do seguimento (T4 / T5), observou-se regeneração óssea completa na região. **Conclusão:** Devido à alta eficácia antibacteriana da pasta utilizada, a técnica de LSTR apresentou resultados satisfatórios na pulpectomia de um molar necrótico decíduo. **Significância clínica:** Esta técnica mostra potencial para ser utilizada nos casos em que seja realizada em menor tempo operatório, o que pode ser útil no tratamento de crianças com comportamento negativo.

Palavras-chave: Criança; Doença da polpa dentária; Dentes tratados endodonticamente; Dente decíduo.

Resumen

Objetivo: La terapia endodóntica no instrumental se ha destacado por ser un enfoque de intervención mínima que utiliza una mezcla de antibióticos para desinfectar los conductos radiculares. El propósito de este reporte de caso fue describir el tratamiento y seguimiento de 36 meses de un molar necrótico deciduo utilizando la técnica modificada de “Esterilización de Lesiones y Reparación de Tejidos” (LSTR). **Metodología:** Paciente de sexo femenino de 5 años que

acude al dentista por dolor en la región del diente 85, cuyo examen clínico oral reveló la presencia de caries con afectación pulpar. En el preoperatorio (T1) el paciente presentó fístula, absceso y edema. El tratamiento endodóntico se realizó mediante la técnica LSTR con triple pasta antibiótica. En el seguimiento, por aspectos radiográficos, se observó una gran lesión interradicular en T1 y al final del seguimiento (T4 / T5) se observó una completa regeneración ósea en la región. Conclusión: Debido a la alta eficacia antibacteriana de la pasta utilizada, la técnica LSTR mostró resultados satisfactorios en la pulpectomía de un molar necrótico deciduo. Importancia clínica: Esta técnica muestra el potencial de ser utilizada en casos de realizarse en un menor tiempo operatorio, lo que puede ser útil en el tratamiento de niños con conducta negativa.

Palabras clave: Niño; Enfermedad de la pulpa dental; Dientes tratados endodónticamente; Diente caducifolio.

1. Introduction

The development and progression of periapical endodontic lesions is associated with the presence of microorganisms in the root canal system and presents itself as a common problem in primary dentition (Reddy & Ramakrshna, 2007). Primary dentition is essential for the correct development of occlusion, chewing, speech and aesthetics in children (Parisay et al., 2015). Keeping the tooth in a functional state until its time of natural exfoliation, without harming the permanent dentition or the child's general health, is of fundamental importance (Parisay et al., 2015). Thus, the main objective of endodontic treatment in primary teeth is the elimination of bacteria from the infected root canals and the extension of the useful life of these teeth in the oral cavity.

Pulp therapy on primary teeth is often a challenge for reasons such as: difficulty in managing the behavior of children, which requires shorter clinical care, the complexity of root canal morphology and the lack of an ideal obturator material (Pinky et al., 2011; Nanda 2014). Although none of the currently available filling materials fulfills all desirable requirements, different materials have been researched for filling root canals of primary teeth (Chawla, et.al., 2008; Rajamanickam, et.al., 2015). Commonly used materials include pastes based on zinc oxide and eugenol, iodoform and calcium hydroxide (Fuks, 2000; Fuks, 2002). However, all pastes studied have some limitations, such as: prolonged retention of the treated tooth, ectopic eruption of the permanent successor, different reabsorption rate of the paste when compared to root physiological, discoloration of the tooth (Najjar, et.al., 2019). Pastes based on calcium hydroxide and iodoform are the most used in research and clinical practice today (MG B et.al., 2014). However, the intra-root resorption of these pastes has been observed, in addition to a low antibacterial effect (Ozalp et al., 1005; Tchaou, et.al., 1995).

In recent years, non-instrumentation techniques have been highlighted, including the “Lesion Sterilization and Tissue Repair” (LSTR) technique (Grewal et.al., 2018; Lokade et.al., 2019; Duarte et al., 2020). This technique suggests that the repair of damaged tissues should occur if the lesions are disinfected (Takushige et al., 2004). It is an approach that uses the introduction of a mixture of antibacterial drugs in the pulp chamber, without the need for mechanical instrumentation. This technique typically employs a mixture of the antibacterial drugs Metronidazole, Ciprofloxacin, and Minocycline, with the propylene glycol and macrogol vehicles (Takushige et al., 2004).

LSTR is simpler because it does not involve mechanical instrumentation, has reduced clinical treatment time, requiring only one session (Nanda et.al., 2014). Clinical trials have demonstrated the success of LSTR when compared to conventional endodontic treatments (Grewal et.al., 2018; Aminabadi et al., 2016). A study demonstrated higher success rates for the LSTR method when this technique was associated with a light instrumentation of the root canals for the removal of necrotic remains (Prabhakar 2008). However, this study followed the patients for only 12 months, and it is not possible to assess their long-term success.

This case report demonstrates the successful endodontic management of a deciduous necrotic molar using the modified LSTR technique with 36-month follow-up.

2. Methodology

Ethical aspects

This work was submitted and approved by the Ethics Committee for Research with Human Beings of the Federal University of Vales do Jequitinhonha e Mucuri (UFVJM) under protocol number 523457. The patient's mother agreed with her daughter's participation in the study and signed an Informed Consent Form.

Case description

The present study is the case report of a 5-year-old female patient with a chief complaint of pain in the lower right back tooth region. Upon clinical oral examination, the patient had caries on tooth 85 with pulp involvement. Radiographic evaluation revealed a large carious lesion involving the pulp. The interradicular region showed great radiolucency. The tooth was diagnosed as a case of chronic periapical abscess (Figure 1a). The decision to save 85 was made after discussing several treatment options with parents. The mother was the child's primary caregiver and sought professional care only in cases of pain. Regarding hygiene habits, it was reported that the child herself performed mouth brushing more than twice a day with fluoride toothpaste and flossed at times. The patient's mother reported that the child was not sensitive to chemicals or medications and the informed consent was obtained from the parents prior to the clinical procedure.

All stages of endodontic treatment were performed by an experienced operator who employed the following protocol:

At the first appointment, after application of benzocaine 20% w/v topical anaesthetic gel (Benzotop, DFL Industry and Commerce S.A., Brazil) at the injection site, an inferior alveolar block was administered using lidocaine 2% with epinephrine 1:100.000 (Alphacaine, DFL Industry and Commerce S.A., Brazil).

Initially, prophylaxis was performed on the tooth to be treated with a Robinson brush and prophylactic paste, followed by disinfection of the tooth surface and surrounding areas with 2% Chlorhexidine Digluconate, twice for 3 minutes each, then absolute isolation was performed with rubber dam. After removal of decayed tissue using sharp sterile curettes (Duflex®; SSWhite, Rio de Janeiro - RJ, Brazil), complete access to the pulp chamber and root canals was achieved with a 1014 spherical diamond tip (KG Sorensen, Cotia - SP, Brazil) and Endo Z drill Angelus®, Londrina - PR, Brazil). For decontamination, 2% chlorhexidine was used again. The mesial (11mm) and distal (13mm) working lengths were determined according to the position that the permanent germ was in relation to the roots of the deciduous molar. Preoperative radiography was used to verify this position, and as the successor's germ was between the roots, odontometry was performed from the occlusal plane of the deciduous molar to the beginning of the successor's germ or successor's cusp tip).

Necrotic root pulp were removed with light filing movements Lima Kerr 15; Dentsply Sirona, Switzerland) at the previously determined working length. Irrigation of the root canals was performed with 5 ml of 2.5% sodium hypochlorite (Nakornchai et.al., 2010) followed by aspiration of the solution with a suction cannula. The root canals were dried with sterile absorbent paper tips. A triple antibiotic paste consisting of Ciprofloxacin, Metronidazole and Minocycline (100µg / mL each 1: 1: 1), using propylene glycol and macrogol as pharmaceutical vehicles, was inserted into the root canals over the entire working length with the aid of a lentulous drill (Dentsply Sirona, Switzerland). The handling of the folder was performed at the time of service. The paste was also inserted into the pulp chamber floor. After cleaning the rest of the pulp chamber with cotton soaked in 70% alcohol, the cavity was lined with Zinc Phosphate Cement and the cavity was finally sealed with light-cured composite resin. The treatment time was counted at 53 minutes.

During T1 (Preoperative) the patient had fistula, abscess, edema and pain. The radiographic aspect showed a large inter-radicular lesion, but which did not break the bone crypt of the germ of the permanent successor (Figure 1A). The child's behavior was negative (-) during the treatment according to the Frankl scale (Frankl and Fogels 1962).

During the follow-up periods T2 (one month), T3 (6 months), T4 (12 months) and T5 (36 months), the patient did not

present pain, fistula, abscess, edema, erythematous gingiva, pathological mobility or physiological mobility. However, the crown appeared darkened.

Regarding the radiographic aspects in the follow-up period, it can be noted that in T2 (fig 1B) bone formation started near the distal root. In T3 (Figure 1C) there was a considerable amount of bone restored in the inter-radicular region. In the follow-up of T4 (Figure 1D) and T5 (Figure 2A) the lesion was radiographically extinct.

3. Discussion

In recent years, emphasis has been placed on non-instrumental technique. Such techniques are considered promising due to the success of treatment and the shorter operative time, which is considered extremely important in child care (Grewal et.al., 2018; Nakornchai et.al., 2010). It is believed that children's behavior is more positive when the clinical care time is reduced. Thus, studies involving non-instrumentation techniques are necessary. The present study demonstrated success in the endodontic treatment in primary teeth treated by the non-instrumentation technique "Lesion Sterilization and Tissue Repair" (LSTR) after 36 months of follow-up.

The success demonstrated in this case report of endodontic treatment performed through the LSTR technique corroborates previous reports (Pinky et.al., 2014; Duarte et.al., 2020; Takushige et.al., 2004). Clinical studies have also found positive results for the use of the LSTR technique when compared to conventional techniques (Grewal et.al., 2018; Lokade et.al., 2019). These studies demonstrated that the success rate of the LSTR technique showed no significant difference when compared to conventional techniques. However, LSTR has the advantage of being simpler and faster (Grewal et.al., 2018; Nakornchai et.al., 2010). A study carried out by Prabhakar et al., 2008 proposed the modification of the technique adopted in the present study, involving the removal of necrotic remnants of the root canals using H-files, and also found the technique had good results after 12 months of follow-up. In addition, a recent study has demonstrated better results through the technique of non-instrumentation with triple antibiotic paste standard or modified technique), when compared to the non-instrumentation technique with another antibiotic paste based on Chloramphenicol, tetracycline and zinc oxide and eugenol (CTZ) (Lokade et al., 2019).

The success of the LSTR technique, even without involving root canal instrumentation, can be attributed to the broad-spectrum and bactericidal efficacy of antibiotic paste consisting of Metronidazole (effective against anaerobic and protozoa), Ciprofloxacin bactericidal activity against Gram-negative microorganisms) and Minocycline derived from tetracycline, broad spectrum and effective against (Gram-positive and Gram-negative organisms) (Anila et al., 2014). Due to the complexity of primary teeth infections, it is important to match different antimicrobials to successfully encompass the diversity of bacterial flora associated with this infection (Pinky et.al., 2011).

Among the antibiotics used, it is noteworthy to point out the use of Minocycline, derived from tetracycline, which has the ability to be incorporated into the dentin tissue promoting staining of the structure (Huang, 2008). The proteins of this drug adhere to iron ions and form insoluble compounds accumulated in dental tissue, leading to the occurrence of blue-gray or green-gray pigmentation (Lacerda et al., 2011). This explains why the tooth treated with the LSTR technique presented alteration in the color of the dental crown. Due to this staining, the literature suggests drug options to replace Minocycline such as Amoxicillin, Cefaclor, Cefroxadine, Fosfomycin or Rokitamycin in order to avoid crown darkening (Sato et al., 1993); however, these substitutions have been little investigated to date.

The LSTR protocol used recommends only one-session treatment, which represents another advantage of the technique. The endodontic treatment performed in a single session becomes less stressful for the anxious child, besides presenting an advantage in the prevention of root canal recontamination in between sessions (Sato et.al., 1993; Bharuka & Mandroli, 2016). A study carried out by Brustolin et al. (2017) demonstrated that the failure rate of endodontic treatment is

higher when two or more sessions are required. However, the number of ideal sessions in the conventional endodontic approach for necrotic teeth is still being discussed. Regarding permanent dentition, systematic reviews (Manfredi et.al., 2016; Moreira et.al., 2017) did not show worse success rates in the single session protocol for the treatment of necrotic teeth when compared to two treatment sessions. Still, with regard to primary teeth, there is not yet strong evidence that indicates conventional endodontic treatment for necrotic teeth in only one session (Triches et.al., 2018). Although, in some studies, differences were not found in the success rates of necrotic teeth treatments in one or two sessions, calcium hydroxide paste was used as an intracanal medicament. However, this medication remained in the root canal system only for a period of 5 to 7 days (Jia et.al., 2019), and the ideal time of effect of these drugs is at least 15 days (Zancan et.al., 2016).

4. Conclusion

In general terms, LSTR showed satisfactory results. Due to the high antibacterial efficacy of the paste used in the technique, this may be adequate in cases of poor prognosis, besides being performed in a shorter operative time, which may be useful in the treatment of children with negative behavior. However, controlled clinical trials with long-term follow-up are needed to indicate this procedure for clinical practice. Investigations are also necessary to verify the reaction of periapical tissues and the amount of drug absorption in the systemic circulation.

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