Endodontic treatment of mandibular central incisor with unusual root dilaceration, following trauma to the deciduous predecessor: case report

Eduardo **NUNES**[1]
Graziele **DUARTE**[1]
Stéphanie Quadros **TONELLI**[1]
Janir Alves **SOARES**[2]
Frank Ferreira **SILVEIRA**[1]

DOI: https://doi.org/10.14436/2358-2545.11.2.063-068.oar

ABSTRACT

Introduction: The morphological changes in the pulp cavity and root anatomy can lead to difficulties in carrying out endodontic treatment. Dilaceration can be the result of trauma in primary dentition, in the root formation phase, provoking accentuated root or crown curvature in a permanent tooth. **Objective:** The present case report aimed to describe the endodontic treatment of tooth 41 with accentuated root laceration. Radiographically, the periapical region of tooth #41 showed an extensive radiolucent area, suggestive of periapical osteolysis due to pulp necrosis, which was confirmed by the lack of response and pulp tests. Endodontic treatment was realized. **Conclusion:** The follow-up at 90 months showed no signs or symptoms, and the radiographic examination provided evidence of periapical bone healing.

Keywords: Endodontics. Tooth Injuries. Tooth Root.

How to cite: Nunes E, Duarte G, Tonelli SQ, Soares JA, Silveira FF. Endodontic treatment of mandibular central incisor with unusual root dilaceration, following trauma to the deciduous predecessor: case report. Dental Press Endod. 2021 May-Aug;11(2):63-8.
DOI: https://doi.org/10.14436/2358-2545.11.2.063-068.oar

[1] Pontifícia Universidade Católica do Paraná de Minas Gerais, Departamento de Odontologia (Belo Horizonte/MG, Brazil).

[2] Universidade Federal dos Vales do Jequitinhonha e Mucuri, Departamento de Endodontia (Diamantina/MG, Brazil).

» The authors report no commercial, proprietary or financial interest in the products or companies described in this article.

» Patients displayed in this article previously approved the use of their facial and intraoral photographs.

Submitted: May 28, 2018. Revised and accepted: August 03, 2019.

Contact address: Eduardo Nunes
E-mail: edununes38@terra.com.br - frankfoui@uol.com.br

Introduction

Dental trauma in primary teeth can affect permanent teeth in different outcomes, such as prolonged retention of the primary predecessor tooth, non-eruption of the permanent tooth, malformation of permanent teeth, apical fenestration of the labial cortical plate, or it may be asymptomatic.[1,2]

The accentuated root curvature of a permanent tooth, with deviation from its typical axis, resulting from trauma during the root formation period, is referred like dilaceration.[3-5] The endodontic treatment can become difficult and the prognosis varies according to the degree of deformity.[1,4-6]

The prevalence of dilacerations constitutes 3% of total lesions in tooth development, and it is generally caused by intrusion or avulsion of the predecessors[5]. Its prevalence is 1,03% in permanent incisors.[6] However, maxillary incisors are the most frequently involved.[7,8] There are few reports of tearing in the lower incisors described in the literature. Furthermore, endodontic treatment in this dental group causes a greater degree of difficulty when compared to the maxillary incisors, especially due to the reduced proportions of these teeth.[2]

In this context, this case report aims to describe the endodontic treatment of a mandibular central incisor with uncommon root dilaceration originating from dental trauma to the primary teeth including extensive periapical alteration, with a 90-months follow-up.

Case Report

Patient MBS, 18 years old, female, pheoderm, arrived at the Pontifical Catholic University of Minas Gerais (PUCMinas) Endodontics Clinic complaining of swelling in the anterior mandibular region of the face. Clinically, it was noted mobility and positive percussion of the tooth 41. The initial radiographic exam was performed (Fig 1), and showed intense root dilaceration of teeth 31 and 41, accentuated apical curvature, and extensive radiolucent area confined to the periapical region of the 41, suggesting the diagnosis of periapical abscess. The patient reported that she had suffered a fall at 3 years old, resulting in the avulsion of primary central incisors.

In vitality pulp tests using cold (Endo-ice; The Hygienic Corporation, Akron, OH, USA) and electricity (Analytic Technology, Glendora, CA, USA), only the right incisor showed a negative response. The crowns of the teeth present inadequate composite resin restoration and signs of over-contouring.

Because of the change in the crown's anatomy as a result of the resin restoration and the accentuated root dilaceration, access surgery was carefully performed with a 1557 drill bit (Dentsply, Maillefer, Switzerland). The presence of prior restoration in composite resin modified the coronary anatomy of tooth 41 and difficulted the identification of the root canal entrance during the opening access, causing wear on the distal wall. Thus, it was decided to use magnification during all phases of treatment, with the aid of dental operating microscope (DF Vasconcellos, Rio de Janeiro, Brazil) and SD 10 insert (Osada, Tokyo, Japan) coupled to ENAC ultrasonic device (Osada).

Subsequently accessing the pulp cavity, a rubber dam (Hygenic®, Coltene® Switzerland) was placed on the tooth 41, fixed with Top Dam® gingival barrier (FGM, Joinville, SC, Brazil), and copious drainage of purulent exudate was observed. This finding in the intraoperative period confirmed the diagnosis of periapical abscess in the intraosseous phase. After identification of the correct canal position (Fig 2 e), a # 10 C PILOT file (VDW®, Munich, Germany) was introduced with clockwise movements, and the canal working length (WL) was confirmed by the Root Z X2 electronic apex locator (J Morita, Fushimi-Ku, Japan). The mechanical-chemical preparation was performed, with double flare-technique using Flexofiles (Dentsply), and Gates-Glidden nº 2, 3 and 4 (Dentsply). Extensive irrigation was carried out with 5% sodium hypochlorite (Lenza Farma, Belo Horizonte, Brazil). Due to the accentuated apical curvature, only the flexofile #15 achieved the WL. Calen PMCC (S.S. White Duflex, Rio de Janeiro, Brazil) was used as intracanal medication and provisional restorative dental sealant material was applied (Coltosol, Coltene-Vigodent, Switzerland).

The patient returned 7 days later, reporting an improvement in tenderness on palpation and, clinically, it was noted that the purulent exudate had disappeared. The dressing was removed and the canal was irrigated again with 5% sodium hypochlorite and dressed with Calen PMCC (S.S. White Duflex) (Fig 2).

After 90 days, a new radiographic exam was obtained (Fig 3). The clinical examination indicated no mobility or other signs and, in this context, it was de-

cided to conclude the endodontic treatment. After absolute isolation, further irrigation with 5.25% sodium hypochlorite was carried out as well as final EDTA irrigation (Neopharma, Belo Horizonte, Brazil). After canal drying, it was possible to bring the medium main cone (Odous, Belo Horizonte, Brazil) only 2 mm short of the WL. Pulp Canal Sealer (Sybron Endo, USA) was used as obturation cement employing the continuous wave of condensation technique (System B- Analytic Technology, Glendora, CA, USA) (Fig 4). In the final radiographic image, it was noted that lateral canals and apical curvature were filled in with the obturation material. Subsequently, the medium and cervical thirds of the canal were filled in with the aid of the Obtura II System (Spartan Earth City, MO, USA) (Fig 5).

In the 90-months follow-up, the patient was symptom-free, and no signs were observed. The radiographic examination provided evidence of reduction of apical radiolucency, suggesting periapical bone healing (Fig 6).

Figure 1. Initial radiography of tooth 41, showing a periapical radiolucent area and marked root dilaceration in 31 and 41.

Figure 2. Radiography of Calen PMCC intracanal medication on tooth 41.

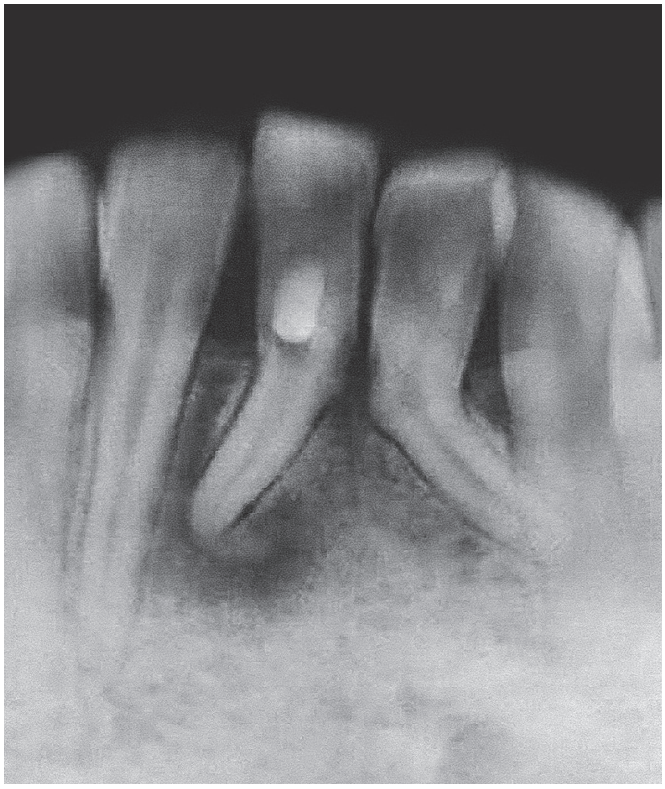

Figure 3. Ninety-days follow-up.

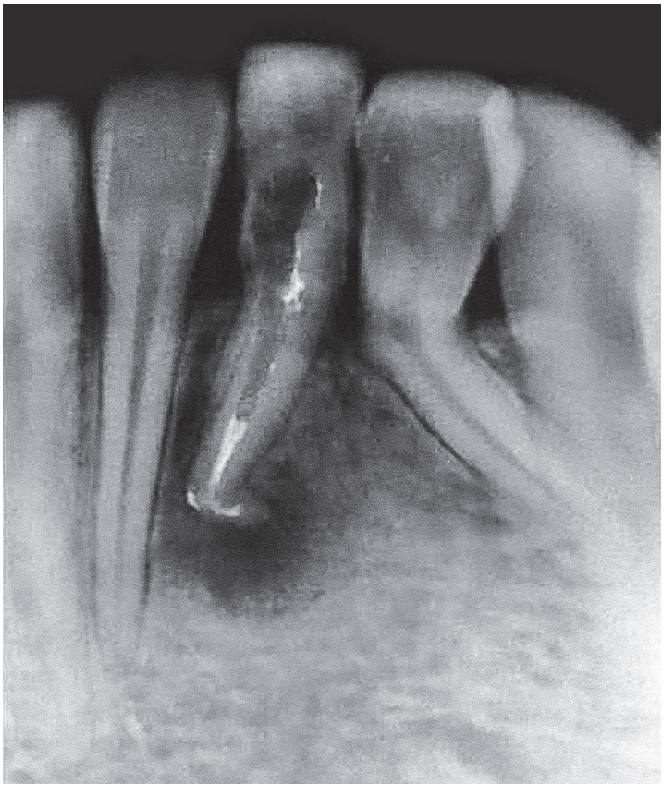

Figure 4. Obturation of the apical third of the root canal of tooth 41 - down pack.

Figure 5. Final obturation radiography.

Figure 6. Ninety-months follow-up.

Discussion

Trauma in the primary dentition can lead to a wide variety of development disorders in the permanent successors, such as dilacerations[1-8]. This type of manifestation may also be related to some development syndromes[1,6,9] or idiopathic causes.[4]

When associated with trauma, its etiology is in the incidence of intrusion or avulsion of the predecessor from the primary dentition that leads to the change in direction of the calcification dentin matrix, causing abrupt curvature of the crown or root in the permanent tooth.[1-3,5,7,8]

Different findings were reached in terms of dilaceration prevalence. A review of the literature[1] showed a greater involvement of posterior and maxillary teeth, results that were found in a later study of prevalence.[7] In addition, other studies confirm that dilaceration occurs most commonly in maxillary incisors when compared to their mandibular counterparts.[7-9] Our case refers to an uncommon dilaceration that affected the anterior mandibular teeth.

The diagnosis of dilaceration, in this case, was made through a radiographic exam, in which an abrupt change could be noted in the axial inclination between the crown and root of teeth #31 and 41.[1,7,8] However, criteria from the literature for recognizing root dilaceration may vary.[1]

A tooth with dilaceration may not erupt or it may erupt in an abnormal position, causing the displacement of adjacent teeth.[4,8,,9,11] Treatment options for root and crown dilaceration include endodontic therapy, followed by rehabilitation of the crown, surgery on the affected teeth, with or without orthodontic alignment, to achieve complete root formation or permanent restoration of the dilacerated crown.[1,8,9] Other treatments such as extraction followed by orthodontic treatment, dentures fixed bridge or implants are suggested.[3,4,11]

In this case, loss of pulp vitality was noted and, in light of this condition, non-surgical endodontic treatment was proposed. The mandibular incisors are frequently associated with difficulty in endodontic treatment due to the reduced size of the crown and complex anatomy of the root canal.[2,5]

In order to achieve adequate space between the crowns, it was necessary to open up more direct access to the canals and allow for the movement of the endodontic instruments inside the intracoronary cavity.[5] In dilacerated teeth, particularly in the event of abrupt root curvature, as with the tooth in question, the exploration and negotiation of the canals become complex, since the files may not follow the irregularities of the canal and, as a consequence, fracture.[2,5,10,12] Other problems, such as obstruction of the canal bed, the formation of steps, root perforations, and apical transportation can also be observed in the handling of these teeth.[2,5,11,13]

For the root canal obturation in teeth with dilaceration, the lateral compaction technique does not figure as the technique of choice.[5] The use of thermoplastic gutta-percha techniques is more applicable in these cases, notwithstanding the difficulty inherent in the curvature of the dilacerated canal.[2,5] As described in the case in question, the continuous wave of condensation technique (System B- Analytic Technology, Glendora, CA, USA) was employed, which allowed for the filling of ramifications and apical curvature with obturation material, followed by the filling of the canal's medium and cervical thirds, as suggested by Wankhade et al.[5]

The prognosis of dilacerated teeth that require endodontic treatment varies according to the severity of the deformity and the expertise of the specialist.[1,9,10-12] Besides this, it is also dependent on other factors, such as the reason for the treatment and state of pulp and periapical healing.[1,5,11,13] Although computed tomography images are considered the gold standard for monitoring periapical bone lesions, following the recommendation of the American Association of Endodontics and the ALADA (As Low As Diagnostically Acceptable) principle,[14,15] this exam was not requested, since the patient returned with no signs or symptoms and, on radiographic examination, it was possible to observe hard blade with regular contour, without discontinuity surround and the space of the adjacent periodontal ligament preserved.

Conclusion

The endodontic treatment of teeth with root laceration is still a challenge for specialists. In this 90-month follow-up, the patient was symptom-free and the radiographic examination provided evidence of reduction of apical radiolucency, suggesting periapical bone healing.

References

1. Jafarzadeh H, Abbott PV. Dilaceration: review of an endodontic challenge. J Endod. 2007 Sept;33(9):1025-30.
2. Tsurumachi T, Hirano Y, Hira A, Aida Y, Ogiso B. Developmental disturbance of a mandibular central incisor following trauma to the primary predecessor. J Oral Sci. 2015 Feb;57(2):157-60.
3. Xuan K, Zhang Y, Liu Y, Jun F, Jin F, Wei K. Comprehensive and sequential management of an impacted maxillary central incisor with severe crown-root dilacerations. Dent Traumatol. 2010 June; 26(6):516-20.
4. Topouzelis N, Tsaousoglou P, Pisoka V, Zouloumis T. Dilaceration of maxillary central incisor: a literature review. Dent Traumatol. 2010 May;26(5):427-33.
5. Wankhade AD, Pandey RK, Singh RK, Naphade MV. An endo aesthetic management of crown dilacerations in a permanent mandibular central incisor. BMJ Case Rep. 2013 Oct;14(10):1-4.
6. Silva BF, Costa LED, Beltrão RV, Rodrigues TL, Farias RL, Beltrão RTS. Prevalence assessment of root dilaceration in permanent incisors. Dental Press J Orthod. 2012 Nov-Dec;17(6):97-102.
7. Bolhari B, Pirmoazen S, Taftian E, Dehghan S. A case report of dilacerated crown of a permanent mandibular central incisor. J Dent (Tehran). 2016 Nov;13(6):448-52.
8. Allwani V, Pawar M, Pawar A, Abrar S, Ambhore S. Permanent maxillary central incisor with dilacerated crown and root and c-shaped root canal. J Clin Diagn Res. 2017 July;11(7):ZD03-5.
9. Raducanu AM, Didilescu AC, Feraru I, Dumitrache MA, Hantoiu TA, Ionescu E. Considerations on morphological abnormalities of permanent teeth in children with cleft lip and palate. Rom J Morphol Embryol. 2015 Feb;56(2):453-7.
10. Bodrumlu E, Gunduz K, Avsever H, Cicek E. A retrospective study of the prevalence and characteristics of root dilaceration in a sample of the Turkish population. Oral Radiol. 2013 Oct;29(10):27-32.
11. Muthumani T, Rajasekaran M, Veerabahu M, Indra R. Interdisciplinary management of impacted maxillary central incisor with dilacerated crown. J Endod. 2011 Feb;37(2):269-71.
12. Mellara T, Nelson-Filho P, Queiroz AM, Santamaria Júnior M, Silva RA, Silva LA. Crown dilaceration in permanent teeth after trauma to the primary predecessors: report of three cases. Braz Dent J. 2012 May;23(5):591-6.
13. Bhatia SK, Goyal A, Gauba K, Acharya S. Unusual root development following surgical repositioning of horizontally developing central incisor. Dent Traumatol. 2015 May; 31(5):413-7.
14. Rules of the International Commission on Radiological Protection: Amended by the ICRP Main Commission on 2018 April 29. Ann ICRP. 2018 Oct;47(3-4):363-413.
15. Jaju PP, Jaju SP. Cone-beam computed tomography: Time to move from ALARA to ALADA. Imaging Sci Dent. 2015 Dec;45(4):263-5.