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ENDODONTIC TREATMENT IN A TOOTH AFFECTED BY FUSION: CASE REPORT

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Abstract: Literature reports that fusion is a developmental anomaly characterized by the union of two adjacent teeth. Coronal union is observed, however, the roots of the dental elements are independent. Endodontic treatment in fused teeth is challenging, and the dentist must be attentive in conducting the therapy. The objective of this study is to evaluate, through a case report, the endodontic treatment of a dental element affected by fusion. A patient was treated, diagnosed with pulp necrosis and fusion between two adjacent dental elements (27 and 28). In the first session, anesthesia, access surgery, absolute isolation, irrigation with 2.5% sodium hypochlorite, odontometry, instrumentation with Prodesign S₂ 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 and the root canals were obturated. This case study concludes that the pathological process was resolved, and the function and aesthetics of the fused teeth were preserved, thus avoiding the need for tooth extraction.

Keywords : Endodontics. Periradicular abscess. Fusion.

INTRODUCTION

The developmental process of a dental element is correlated with a complex biological process, resulting from a series of epithelial-mesenchymal interactions, and interference in these interactions can alter normal odontogenesis, causing a developmental anomaly. Depending on the stage of tooth development, various anomalies can occur involving the number, size, and/

or shape of the root/canal (Shreshtha). *et al.*, 2015).

The most common root malformations in humans arise from developmental disorders of the root alone, such as root dilaceration and taurodontism, or root developmental disorders as part of a general dental dysplasia, such as dentin dysplasia type 1. There is a direct association of such developmental variations with pulpal and periradicular diseases that may require a multidisciplinary treatment approach (Luder, 2015).

Currently, the classification of root anomalies focuses on describing the details of the anomaly and categorizing them into types based on severity or specific morphological characteristics (Zhang *et al.*, 2014). However, a practical classification addressing root/canal anomalies along with root morphology, main canal system, and accessory canals has not been developed. Furthermore, existing classifications do not address the concomitant occurrence of more than one anomaly in a tooth, such as the association of a palatogingival sulcus with a talon cusp (Fabra-Campos 1990), dens invaginatus with laceration (Gound & Maixner 2004) or with dens evaginatus (Satvati *et al.* 2014) or with gemination (Pallivathukul *et al.*, 2015) and the presence of multiple examples of the same anomaly in a tooth, such as multiple claw cusps (Shashikiran *et al.* 2005) and dilaceration of more than one root.

Tooth fusion is a developmental anomaly resulting from the union of two teeth originating from either the deciduous or permanent dentition (Neville, 1993). They are not considered common and have an occurrence frequency ranging from 0.3% to 3.8% in the general population (Yusof

, 1990). These teeth are primarily identified by their unique position and shape in the dental arch. They may be joined by enamel, dentin, and pulp, and the canals may be connected or separate depending on the developmental stage at which the fusion occurred. Epithelial and mesenchymal germ layers are involved in this process, culminating in the irregular morphology of the tooth (Brook, 1974).

The degree of fusion depends on the stage of tooth development, with dentin union being the main criterion (Rudagi et al., 2012). Fused teeth are predominantly found in the anterior region, and the incisors of the deciduous dentition are the most frequently affected (Duncan & Helpin, 1987). The union of two discrete dental germs results in fusion, leading to the formation of a single tooth, and these teeth are joined by hard dental tissue but have separate pulp cavities (Hernandez-Guisado et al., 2002).

It is necessary for dentists to have knowledge and understanding of the complexities of root canal systems, thus providing endodontic treatment with greater predictability (Vertucci 2005). With an increasing range of anatomical complexities being reported and the deficiencies of existing systems becoming more apparent, new systems for classifying root morphology, root canal morphology (Ahmed et al. 2017a), and accessory canal morphology (Ahmed et al. 2017b) have been proposed to provide detailed information. Therefore, the objective of this study is to evaluate, through a case report, the endodontic treatment of a tooth affected by fusion.

METHODOLOGY

This work is a basic, qualitative, and descriptive study of a clinical case report. CAAE: 87434225.5.0000.5516

The sample for this study will consist of 01 patient, who was selected from the patient records available in the Diagnostic and Comprehensive Clinical Practice disciplines of the Dentistry course at CEULP.

Initially, an anamnesis, tactile inspection (Figure 01) and periapical radiography of the dental element (Figure 02) were performed to confirm the diagnosis of pulp necrosis, complete rhizogenesis and involvement by the dental anomaly of fusion of elements 27 and 28. A computed tomography scan was also performed (Figure 03).

The treatment was performed in two sessions following this protocol:

1st session

Anesthesia was applied with Lidocaine 1:200000 (Dentsply / Sirona, Ballaigues - Switzerland). Subsequently, prophylaxis of the teeth was performed with a white straight CA brush (Microdont, Socorro - SP) and Herjos prophylaxis paste (Vigodent, Rio de Janeiro - RJ) and coronal opening with 1014 and 3082 burs (KG Sorensen, Barueri - SP) (Figure 04).

Figure 1 – Tactile inspection



Author: Myself

Figure 02 – Periapical radiograph



Author: Myself

Figure 3 - Tomographic images



A – Sagittal tomographic slice identifying the fusion of teeth 27 and 28. B – Axial slice identifying tooth 28 fused to tooth 27. C – Axial slice identifying the root canals.



Figure 04

Author: Myself

Absolute isolation was achieved using a rubber sheet (Madeitex , São José dos Campos - SP), an Ostby isolation arch (Prisma, São Paulo - SP), and a clamp for various types of isolation (KSK, Rio de Janeiro - RJ). The surgical field was disinfected with 2.5% sodium hypochlorite (A Fórmula compounding pharmacy, São Paulo - SP).

Initial exploration with a #10 K-file (Dentsply / Sirona , Ballaigues - Switzerland) was performed until the apical region of the teeth was reached. Subsequently, the cervical third was prepared with a Prodesign S₂ 15/10 rotary file, odontometry was performed with an apex locator, and the apical third was prepared with a 25/05 file.

Throughout the instrumentation, irrigation was performed with 2.5% sodium hypochlorite (Compounding Pharmacy – Fórmula e Ação – São Paulo – SP), using a Luer plastic syringe. Slip 10 mL (Advantive , Nanchang Jangxi - China) and a 25 x 0.55 disposable needle (BD, Curitiba - PR). 30 mL of solution will be used per experimental unit.

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

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

Anesthesia was administered with 1:200000 Lidocaine (Dentsply / Sirona , Ballaigues - Switzerland) and coronal opening was performed using 1014 and 3082 burs (KG Sorensen, Barueri - SP), absolute isolation was achieved, and irrigation with 2% chlorhexidine gel and physiological saline solution (compounding pharmacy – Fórmula e Ação – São Paulo – SP) was carried out using a Luer plastic syringe. Slip 10 mL (Advantive , Nanchang Jangxi - China) and a 25 x 0.55 disposable needle (BD, Curitiba - PR) and hand files compatible with the apical third of the teeth, for removing intracanal medication.

The root canals, after preparation was complete, were dried with capillary tips. Tips (Ultradent Products , Inc., South Jordan, Utah, USA) coupled to a high-power suction device and with absorbent paper cones (Tanari , Manacapuru - AM).

The final irrigation was performed with 3 mL of 17% EDTA (ethylenediaminetetraacetic acid) (compounding pharmacy – Fórmula e Ação – São Paulo – SP). First, 1 mL of 17% EDTA was introduced followed by ultrasonic vibration with a 25 IRRIS insert (VDW; Endo Ultrasonic Files , Endodontic Synergy , Munich, Germany) at a frequency of 30 kHz. The ultrasonic 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 20 seconds. This process was repeated twice more. After this process, irrigation was performed with 5 mL of 2% chlorhexidine gel and physiological saline (Fórmula & Ação Pharmacy, São Paulo – SP). The canal was dried with capillary tips. Tips (Ultradent

Products , Inc., South Jordan, Utah, USA) coupled to a high-power suction device and with absorbent paper cones (Tanari , Manacapuru - AM).

The obturation was performed using a thermoplastic technique (Figure 05). The definitive restoration was done with composite resin . A tomography scan was performed after obturation of the root canals (Figure 06).



Figure 05

Author: Myself

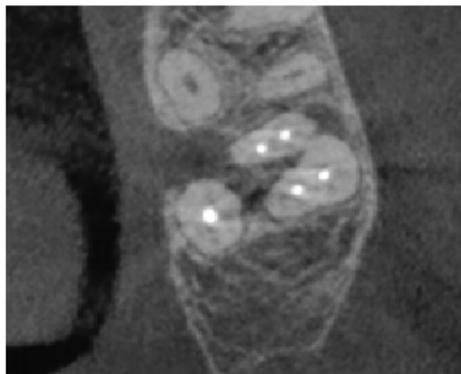


Figure 06

Author: Myself

Discussion

Fusion and gemination are developmental anomalies that are quite similar to each other, but can be distinguished from one another if properly assessed. Fusion and gemination have been described as resulting from developmental anomalies of dental tissues. The exact etiology is still unknown, but a genetic predisposition is suggested. (Krishnamurthy et al., 2018).

Dental fusion is a rare developmental anomaly, included among anomalies of tooth morphology or shape. Fusion can occur at the enamel level or between enamel and dentin, resulting in the formation of a single tooth with an enlarged clinical crown. Fusion is more common in the deciduous dentition. Incisors are reported as fused in both primary and permanent dentition, but bilateral fusion is a rare occurrence. The prevalence of bilateral fusion in the permanent dentition is less frequent than unilateral fusion and is reported to be around 0.05% (Kumar et al., 2011).

Zhu et al. (2015) reported a case of a 34-year-old patient complaining of spontaneous and radiating pain in the right posterior mandibular region. The tooth in question was an anomalous “double” mandibular second molar diagnosed as having necrotic pulp with a chronic apical abscess of endodontic origin. This case emphasizes the importance of identifying anatomical anomalies during the treatment of fused teeth with supernumerary teeth and the need for the use of advanced imaging modalities such as CBCT, which is a critical aid in the diagnosis of such cases. Fused teeth can be treated quite efficiently by a combined overall treatment, including endodontic and periodontal therapy.

Juneja & Kumar (2016) reinforce that teeth with atypical anatomy present a challenge to the endodontist. The use of cone-beam computed tomography assists in exploring the details of endodontic architecture in such cases. The objective of this case report is to highlight the advantage of CBCT in the endodontic treatment of teeth with multiple dental anomalies. A mandibular lateral incisor associated with an extraoral sinus tract revealed unusual clinical anatomy. A provisional diagnosis of dens in dente type III was made based on radiographic findings. Considering the complex anatomy, CBCT was advised to obtain a confirmatory diagnosis. The anatomical details revealed by CBCT differed significantly from the provisional diagnosis. A final diagnosis of concordance of fusion with a supernumerary tooth, talon cusp, and dens invaginatus type II was established, and endodontic treatment of the tooth in question was performed. Non-surgical endodontic treatment resulted in the successful resolution of the sinus tract and healing of the periapical lesion. CBCT, therefore, proves to be an excellent diagnostic tool for the treatment of teeth with unusual anatomy, paving the way for conservative and trouble-free endodontic treatment.

Ley et al. (2019) described the endodontic treatment performed on a permanent maxillary incisor fused to a supernumerary tooth. A 10-year-old female patient was referred for endodontic treatment of her left maxillary central incisor, which presented with a wide, bifid crown. Periapical radiographs showed that the tooth had two crowns with fused roots; the pulp chambers of the crowns communicated with each other in the cervical third of the tooth. Local anesthetic was administered, and a rubber

dam was used to isolate the tooth. The clinician then completed the preparation of the access cavity and examined the root canals of the fused teeth. After chemomechanical instrumentation, the clinician obturated the root canals using the Tagger hybrid technique. The pulp chamber was sealed with glass ionomer cement, and the patient was referred for restorative treatment. They concluded that teeth with morphological abnormalities should be treated with a multidisciplinary approach to ensure a better prognosis.

Conclusion

This case study concludes that the pathological process was resolved, and the function and aesthetics of the fused teeth were preserved, thus avoiding the need for tooth extraction.

REFERENCES

- Ahmed HMA, Versiani MA, De-Deus G, Dummer PMH (2017a) A new system for classifying root and root canal morphology. *International Endodontic Journal* **50**, 761–70.
- Ahmed HMA, Neelakantan P, Dummer PMH (2017b) A new system for classifying accessory canal morphology. *International Endodontic Journal* <https://doi.org/10.1111/iej.12800>.
- Amanda Mourão Ley, Francisca Lívia Parente Viana, Suyane Maria Luna Cruz, Bruno Carvalho Vasconcelos. Fused tooth: clinical approach to endodontic treatment. *Gen Dent*. 2019 Nov-Dec;67(6):59-61.
- Brook AH. Dental anomalies of number, shape and size: their prevalence in British school-aged children. *J Int Assoc Dent Child* 1974; 5:37-53.

Duncan WK, Helpin ML. Bilateral fusion and twinning. A literature review and case report. **Oral Surg Oral Med Oral Pathol** 1987; 64: 82-87.

Hernandez-Guisado JM, Torres-Lagares D, Infante-Cossio P, and Gutierrez-Perez JL. Dental gemination: report of a case. **Med Oral** 2002; 7: 231-236.

Fabra-Campos H (1990) Failure of endodontic treatment due to a palatal gingival groove in a maxillary lateral incisor with talon cusp and two root canals. **Journal of Endodontics** 16 , 342-5.

Gound TG, Maixner D (2004) Nonsurgical management of a lacerated maxillary lateral incisor with type III dens invaginatus : a case report. **Journal of Endodontics** 30 , 448-51.

Ruchi Juneja , Varun Kumar Endodontic Management of a Mandibular Incisor Exhibiting Concurrence of Fusion, Talon Cusp and Dens Invaginatus using CBCT as a Diagnostic Aid **J Clin Diagn Res** 2016 Feb;10(2):ZD01-3.

Luder HU (2015) Malformations of the tooth root in humans. **Frontiers in Physiology** 6,307

Madhuram Krishnamurthy , V Naveen Kumar , Ashok Leburu , Nadeem Jeddy Fusion of maxillary central incisors with mesiodens **J Oral Maxillofac Pathol** 2018 Jan;22(Suppl 1):S131-S134.

Manoj Kumar Hans , Shashit Shetty , Hitesh Chopra Bilateral fusion of permanent maxillary incisors **Indian J Dent Res** . 2011 Jul-Aug;22(4):603-5.

Min Zhu , Chao Liu , Shuangshuang Ren , Zintong Lin , Leiyang Miao , Weibin Sun Fusion of a supernumerary tooth to right mandibular second molar: a case report and literature review **Int J Clin Exp Med** . 2015 Aug 15;8(8):11890-5.

Neville BW, Damm DD, Allen CM, and Bouquot J. Abnormalities of the Teeth. Oral and Maxillofacial Pathology . 3rd edition . **Philadelphia : Saunders** 1993; pp. 54-119.

Pallivathukal RG, Misra A, Nagraj SK, Donald PM (2015) Dens invaginatus in a geminated maxillary lateral incisor. **British Medical Journal Case Reports** 2015 , <https://doi.org/10.1136/bcr-2015-209672> .

Rudagi K, Rudagi BM, Metgud S, and Wagle R. Endodontic treatment of a mandibular second molar fused to a supernumerary tooth using spiral computed tomography as a diagnostic aid: a case report. **Case Rep Dent** 2012; 2012: 614129.

Satvati SA, Shooriabi M, Sharifi R, Parirokh M, Sahebnaasagh M, Assadian H (2014) Co-existence of two dens invaginations with one den evagination in a maxillary lateral incisor: a case report. **Journal of Dentistry (Tehran)** 11,485-9 .

Shashikiran ND, Babaji P, Reddy VV (2005) Double facial and a lingual trace talon cusp : a case report. **Journal of Indian Society of Pedodontics and Preventive Dentistry** 23 , 89-91.

Shrestha A, Marla V, Shrestha S, Maharjan I (2015) Developmental anomalies affecting the morphology of teeth – a review. **South-Brazilian Journal of Dentistry** 12 , 68-78.

Yusof WZ. Non-syndromic multiple supernumerary teeth: a literature review. **J Can Dent Assoc** 1990; 56: 147-149.

Vertucci F. Root canal morphology and its relationship to endodontic procedures. **Endodontic Topics** 2005 10 , 3-29.

Zhang Q, Chen H, Fan B, Fan W, Gutmann JL (2014) Root and root canal morphology in maxillary second molar with fused root from a native Chinese population. **journal of Endodontics** 40,871-5 .