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Endodontic Treatment of the first Maxillary Molar with 7 Root Canals: Case Report

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Abstract**—** *The anatomical complexity of the root canal system is an ongoing challenge for the endodontist. The morphology of the permanent maxillary first molar contains numerous variations regarding the number of roots and canals. Thus, the success of endodontic treatment is related to the domain of anatomy. The aim of this study is to present a case report on a maxillary first molar with seven root canals.A 17-year-old female patient, melanoderm, was seen at the multidisciplinary clinic for a routine examination. In the clinical examination, a extensive carie was found in element 14. Radio graphically, radiolucent area was observed circumscribing the root apexes of this dental element. The following steps were performed. Anesthesia with 2% lidocaine, access surgery, absolute isolation and irrigation with 2.5% sodium hypochlorite. With the aid of ultrasonic vibration with an E7D insert at a frequency of 30 kHz for 20 seconds, connected to a piezoelectric device, the pulp chamber floor was refined. After this procedure it was found, through the exploration of a 10 K file and magnification with operative microscope, atypical anatomy with extra canals: mesiobuccal canal 1, mesiobuccal canal 2, vestibular mesio 3, distobuccal 1, distobuccal 2, palatine 1 and palatine 2.Cervical third preparation was performed with the aid of a Logic 25/05 rotary instrument, confirmation of working length with foraminal locator, apical third preparation and intracanal medication insertion: calcium hydroxide. Soon after the consultation, a computed tomography was requested to confirm the root canals. In the second session, after removal of intracanal medication, rotary files were recapitulated, 2.5% sodium hypochlorite irrigation, final irrigation with agitated EDTA with 25 IRRS ultrasound insert and thermoplastic obturation.The dental element was restored and a new CT scan was requested for follow-up. In this context, it can be concluded that the dental surgeon must be aware of the anatomical diversity, thus avoiding failures. The patient remains asymptomatic and dental element performing its functions.*

Keywords**— Endodontics, Anatomy, Anomaly.**

I. INTRODUCTION

Endodontic treatment enables the maintenance of the dental element in the stomatognathic system through chemical-mechanical preparation and obturation of root canals (Ulin et al., 2019). However, the failure of this therapy may be related to persistentor secondary infections through untreated roots (Alkadi; Alsalleeh, 2019).Variations in the root canal system may contribute to the failure of endodontic treatment, especially in multiradicular teeth. Among these, the maxillary first molar has been studied due to its variation internal anatomy (Martins et al., 2019).

The upper first molars exhibit a frequent root anatomy of3 roots and 3 or 4 root canals. In addition, the roots may be ovoid, which considerably interfere with root canal visualization and detection specially during radiographic procedures (Zurawski et al.,2018). However, variations in its morphology are reported in the literature, such as the case of an upper first molar with two palatal roots and the roots fused buccal lesions, or the presence of two palatine roots and two totally independent vestibular roots (Venumuddala et al., 2017).

Studies have shown that the occurrence of the third canal in the mesiobuccal entrance exams are between 1.3% and 0.1% (Deepa et al., 2015; Sharma et al., 2016). However, Lee et al., 2011 and Kim et al., 2012, described the occurrence of two root canals at the distobuccal root in 1.9%. Some studies have shown upper molars with palatal roots with two canals in 2% to 5.1% of cases (Nayak et al., 2015; Badole et al., 2014).

Mamoun (2016) reports that the use of the operating microscope combined with ultrasound in the access surgery, help in the identification of the root canals. In this way, minimizing the non-identification of root ducts. Second Rover et al. (2017) the microscope and refinement of the pulp chamber walls and floor with ultrasound inserts are

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fundamental for the location of thesecond canal in the mesiobuccal root in the upper first molars.

Radiographic interpretation of an endodontic pathological conditionis an integral part of the diagnosis and prognostic determination in endodontics (Jang et al., 2019). The limitations of conventional radiography createdthe need for the acquisition of three-dimensional images, called tomographycone-beam volume (TVCB), which is a non-invasive and viable method for identification of conventional, complex and atypical anatomy (Amin et al., 2019).The aim of this study is to make a case report about a first molarsuperior with seven root canals.

II. CASE REPORT

Clinical Procedures

A 17-year-old female patient attended the dental clinic of Ceulp / Ulbra-To (Brazil) for the endodontic treatment of element 26. the treatment was asymptomatic. Clinical examination showed no symptoms in the cold sensitivity test and negative percussion test. Radiographic examination revealed extensive coronary caries and radiolucent area circumscribing the mesiobuccal and distobuccal roots (Figure - 01).

Anesthesia was performed with Lidocaine 1: 200000 (Dentsply / Sirona, Tulsa Oklahoma, USA), tooth prophylaxis with straight white CA Brush (Microdont, Socorro - SP) and Herjos prophylaxis paste (Vigodent, Rio de Janeiro - RJ), removal of caries with low rotation spherical drills (Dentsply / Sirona Tulsa Oklahoma, USA), coronary opening with diamond burs 1014 and 3082 (KG Sorensen, Barueri - SP) and E7D pulp chamber floor refinement (Helse, São paulo, Brazil).

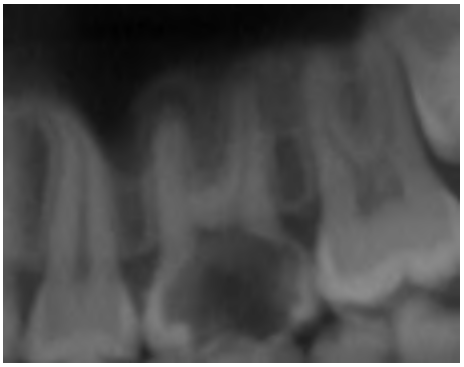

Fig.1 –Initial Radiography

Absolute isolation was made with rubber sheet (Madeitex, São José dos Campos - SP), Ostby insulation arch (Prisma, São Paulo - SP) and various isolation clamps (KSK, Rio de Janeiro - RJ) and field disinfection. treatment with 0.2% chlorhexidine (Pharmacy Manipulation Formula A, São Paulo-SP).

Initial exploration was performed with K file # 10 (Dentsply / Sirona Tulsa Oklahoma, USA) and the use of the operating microscope for root canal identification and atypical anatomy with extra channels were detected: mesiobuccal canal 1, mesiobuccal canal 2, mesium vestibular 3 (A), distobuccal 1, distobuccal 2 (B), palatine 1 and palatine 2 (C) (Figure 02).

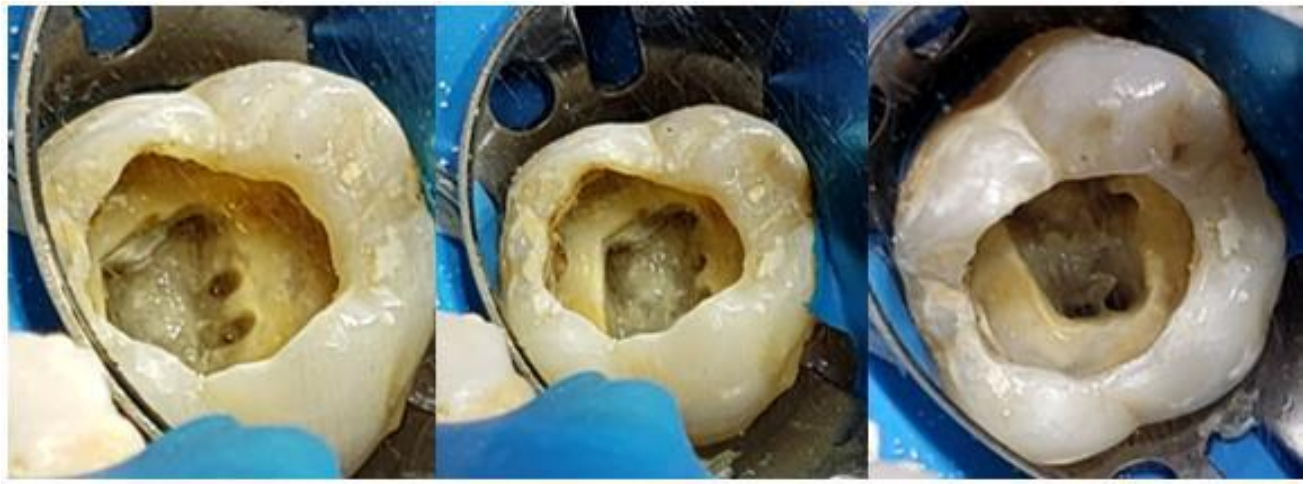

Fig.2 - Mesiobuccal canal 1, mesiobuccal canal 2, labial vestibular canal 3 (A), distobuccal canal 1, distobuccal canal 2 (B), palatine 1 and palatine 2 (C)

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Instrumentation Technique:

It was performed with the Logic motor and rotary system (Easy, Belo Horizonte - Brazil), followed by the preparation of the cervical third with 25/05 Logic file (Easy, Belo Horizonte - Brazil) crown - apex direction respecting the anatomy of the canal, always maintaining a minimum distance of 5mm from the apical limit on radiography. Next, Root ZX foramen locator odontometry (J Morita, Kyoto - Japan) was performed, obtaining the real length of each root canal. Foraminal patency was performed with the rotary file 25/01 Logic (Easy, Belo Horizonte - Brazil) 1 mm beyond the actual tooth length, defined by an electronic foraminal locator. File patency check (10 or 15). Subsequently, a 5/25 file instrumented 1mm short of the actual length of each root canal.

Irrigation with 2.5% sodium hypochlorite (Pharmacy Manipulation - Formula and Action - São Paulo - SP), Lüer Slip 10 mL plastic syringe (Advantive, Nanchanc Jangxi - China) and disposable needle were performed throughout the instrumentation. x 0.55 (BD, Curitiba - PR). 30 mL of solution per experimental unit were used. The needle was introduced throughout the instrumentation process until it reached 2 mm below the working length. At the end of preparation, the canals were dried with capillary tips (Ultradent Products, Inc., South Jordan, Utah, USA) coupled with a high-power sucker and absorbent paper cones (Tanari, Manacapuru - AM). Immediately afterwards, intracanal medication - calcium hydroxide was introduced and provisional restoration with glass ionomer was performed. The patient was asked for a computed tomography to evaluate the root canals (Figure 03).

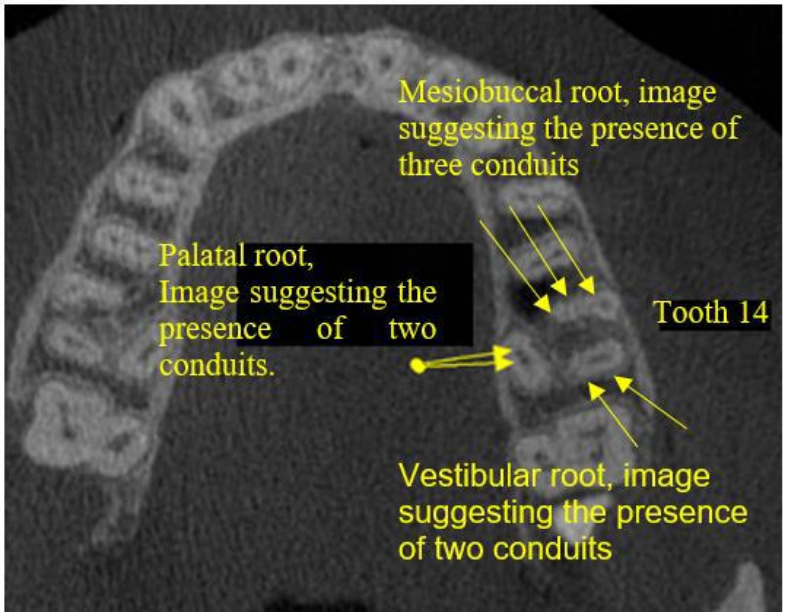

Fig.3 - Computed tomography for root canal evaluation

In the second session, after removal of intracanal medication, recapitulation of rotary limes and irrigation with 2.5% sodium hypochlorite. Final irrigation was performed with 3 mL of 17% EDTA (Pharmacy Manipulation - Formula and Action - São Paulo - SP). First, 1 mL of 17% EDTA was introduced, followed by ultrasonic vibration with 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, Sao Jose dos Campos, SP, Brazil), set at power level 3, over a period of 20s. This process was repeated 2 more times. After this process, 5 mL of sodium hypochlorite was irrigated (Pharmacy Formula & Action, São Paulo – SP). The canals were dried with capillary tips (Ultradent Products, Inc, South Jordan, Utah, USA) coupled to a suction high power and absorbent paper cones (Tanari, Manacapuru - AM).

After manipulation of the endodontic cement the channels were filled by the Continuous Condensation Wave technique (Buchanan, 1994) following the principles of the Schilder technique (1967) using the Touch'n Heat equipment. For this purpose, M and FM accessory cones (Tanari, Manacapuru - AM) were selected. These were calibrated using an endodontic caliper (Dentsply / Sirona, Tulsa

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Oklahoma, USA) and adjusted to the working length. The Thermoplasticizer of the Touch'n Heat apparatus was cut, plasticized and condensed by gutta percha within the canals until 5 mm of gutta percha remained. This phase of the shutter is called Down Packing. Thereafter, thermoplasticized gutta percha was introduced to perform the Back Fill.

Definitive restoration with composite resin or glass ionomer cement was performed after treatment and final radiography was performed with radiographic positioner (Indusbello, Londrina - PR) (Figure 04). New tomography was performed for endodontic treatment analysis (Figure 05).

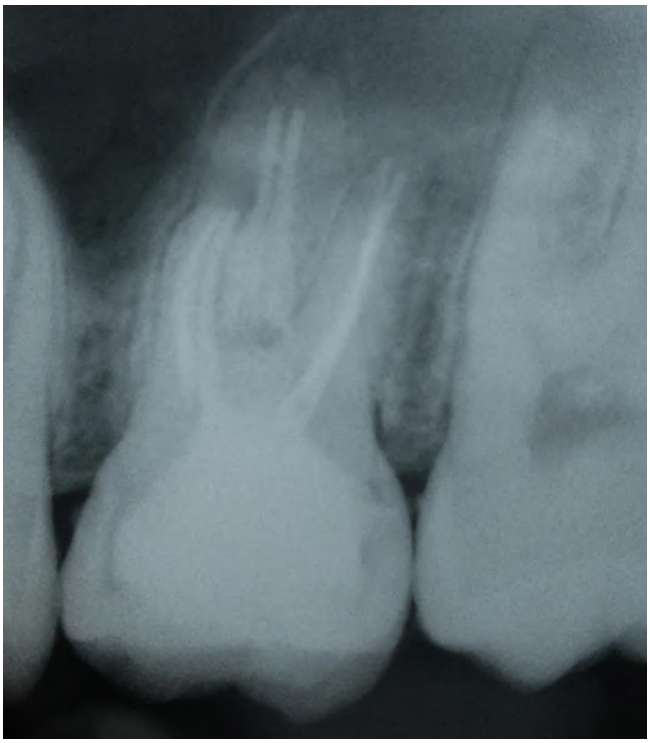

Fig.4 – final radiography.

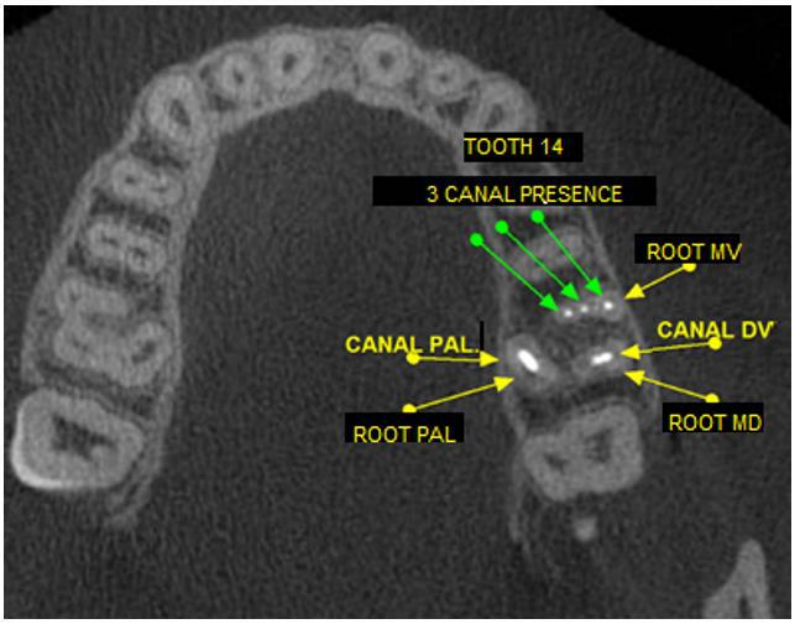

Fig.5 - Tomography was performed for endodontic treatment analysis.

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III. DISCUSSION

Although the endodontic therapy remains viable and successful, cases of failure can be observed due to the complexity of root canal anatomy and variations found in root morphology (Chung et al., 2019).

Fernandes et al. (2019) reported that the upper first molar, in 92% of the cases, has two root canals in the mesiobuccal root, one in the distobuccal root and one in the palatal root. However, Guo et al (2014) report the prevalence of the second root canal in the mesiobuccal root can be reduced by the influence of the age of the individual. This can happen as a result of the structural changes that the dental element over the years. Continuous deposition of secondary dentine, leading to dentin and pulp recession sclerosis (Milcent et al., 2019). Thus, the canals become obliterated because there is a reduction in pulp volume, making the location of the second mesiobuccal canal, if present. In the present study, however, the patient was young, 17 years old, with 7 root canals, 3 in the mesiobuccal root, 2 in the distobuccal root and 2 in the palatal root. This type of anatomy was also found in a patient of 26 years in a study by Badole et al., 2014.

Sinha et al (2016) reported that in 2.4% of cases there may be 5 canals: 2 canals in the mesiobuccal root, 2 in the distobuccal root and 1 in the palatal canal. However, Zheng et al., 2010 observed that the incidence of six canals is 0.31%, with two canals being observed in the mesiobuccal root, two in the buccal root and two in the palatal root. In the present study, two were also found in the buccal root and two in the palatal root, but 3 in the mesiobuccal root, in agreement with the study by Badole et al (2014). However, Kottoor et al. (2011) published a study of an 8-canal upper first molar: 3 on the mesiobuccal root, 3 on the distobuccal root and two on the palatal root.

One of the difficulties in access surgery is the location of root canals. Currently, the operative microscope combined with ultrasound inserts help in the identification of these canals (Rover et al., 2017). de Oliveira et al (2019) clinically evaluated the impact of a dental operating microscope on the clinician's ability to locate a second canal in the mesiobuccal root 2. In teeth treated without the use of the dental operating microscope, only 26.67% of In these cases, the mesiobuccal canal 2 was located; however, when used, 77.78% of the cases were identified. They concluded that the use of the operating microscope significantly improved the identification of extra canals in the maxillary first molars. In the present work it was very useful to use this technology to put in the mesiobuccal root to have 3 root canals. According to Deepa et al (2015) and Sharma et al (2016) the occurrence of the third canal in the mesiobuccal root is between 1.3% and 0.1%.

Computed tomography can provide the clinician with additional information on the different root canal configurations for successful root canal treatment. Kashyap et al (2017) observed through computed tomography that 72.5% of the maxillary first molars had 4 root canals, and in 76.5% 2 canals in the mesiobuccal root. Kottoor et al. (2011), Sinha et al (2016) and Kim et al (2012) used computed tomography in their studies and reported that this type of exam was crucial in identifying extra root canals. In the present study, computed tomography was requested soon after the first consultation, to certify the identification of root canals and to verify the existence of others that could exist. After completion of the endodontic treatment, another tomography was requested to verify root canal filling.

IV. CONCLUSION

It can be concluded from this study that the dental surgeon must be aware of the anatomical diversities, thus avoiding failures. The patient remains asymptomatic and dental element performing its functions.

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