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CASE PRESENTATION

Endodontic management of type C canal of the second lower molar using the anti-curvature technique

Manejo endodóntico de conducto tipo C del segundo molar inferior mediante técnica anticurvatura

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ABSTRACT

Introduction: the C-shaped canal system is an anatomical variation found in mandibular second molars. Its configuration is of particular interest due to its multiple possible variations. The anticurvature filing technique smooths canal curvatures, proving effective for endodontic management of C-shaped canals.
Objective:to present a clinical case of an adult patient with C-shaped canals in a mandibular second molar (tooth #37) managed via the anticurvature technique.
Case Presentation: a 56-year-old female patient presented to the Dentistry Department at University Regional Autonomy de los Andes in January 2024, with left mandibular molar pain. Clinical procedures included: medical history review and intraoral and extra oral examination. The clinical Findings included: missing teeth #35 and #36, triangular residual alveolar ridge gap, defective distal restoration on tooth #37 and occlusal restoration on tooth #38.
Conclusion: the anticurvature technique minimized perforation risks and preserved adequate root thickness. Multimodal diagnostics were critical for identifying the complex C-shaped canal anatomy. Complete symptomatic resolution was achieved.

Keywords: Dentistry; Cleft Palate; Surgery; Palatal Obturators.

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RESUMEN

Introducción: el sistema de conductos en forma de C es una anomalía anatómica que se observa en segundos molares inferiores, su configuración es de particular interés pues puede asumir muchas variaciones. La técnica de desgaste anticurvatura se basa en efectuar la acción de limado de manera que suaviza la curvatura, lo cual resulta eficaz en el caso del manejo endodóntico de los conductos tipo C.
Objetivo: presentar el caso de una paciente adulta con conductos tipo C del segundo molar inferior y el manejo endodóntico de 37 mediante técnica anticurvatura.
Presentación de Caso: paciente femenina de 56 años de edad que acude al Departamento de Odontología de la Universidad Regional Autónoma de los Andes en el mes de enero del 2024 con dolor en molar mandibular izquierdo, se procedió a realizar la historia clínica, examen intrabucal y extrabucal. Mediante la valoración clínica se observa pérdida de 35 y 36 presentando una brecha, con reborde alveolar residual de forma triangular, además, presenta restauración defectuosa en la cara distal del 37 y restauración en oclusal del 38.
Conclusión: mediante el uso de la técnica anticurvatura se logró minimizar el riesgo de perforación de las paredes y mantener un adecuado espesor radicular en el segundo molar inferior. La combinación de varios métodos de diagnóstico, fueron fundamentales para detectar la anatomía compleja del conducto tipo C, lo que permitió un abordaje especializado y evitar de esta manera el fracaso terapéutico. Se logró la resolución de los síntomas que fueron el motivo de la consulta.

Palabras claves: Odontología; Fisura del Paladar; Cirugía; Obturadores Palatinos.

INTRODUCTION

Successful endodontic treatment requires a thorough understanding of the internal morphology of the tooth. Detailed morphological information should be considered as a basis for understanding the three-dimensionality of the root canal system, thus revealing its significance for clinical endodontic treatment. The C-shaped root canal system is an anatomical variation usually observed in mandibular second molars. The main anatomical feature is the presence of a flap or tissue that connects the individual root canals, this feature has been observed in 70 % of individuals.[1]

Lower second molar variation appears to be genetically determined and may determine the ethnic origin of the subjects. A prevalence of 2,7 % to 7,6 % has been reported in the Caucasian population, 10,6 % in Central Asians in Saudi Arabia, and 19,14 % in Lebanese. Furthermore, a prevalence of 31,5 % in Chinese and 32,7 % to 44,5 % in Koreans has been reported.[2]

The configuration of the root canal has been described in the literature with different classifications; its variations in morphology are the most likely cause of failures in endodontic treatments, so it is a challenge for the professional. The primary morphological feature of this variation is that, instead of the pulp chamber having two or more root canal entrances, it has a single ribbon-shaped entrance forming an open 180° arch. This configuration occurs when the tooth presents fusion of buccal or lingual roots. Proper management of this type of root canal configuration complicates endodontic procedures.[2]

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The anti-curvature grinding technique is used during mechanical instrumentation of root canals, using clockwise rotational movements to remove dentin, or to perform a linear filing action by applying pressure toward the convex wall of the canal. This smooths the curvature, avoids the risk of thinning or perforating the concave canal wall, and minimizes apical transport. Anti-curvature grinding is the surgical act that aims to rectify the curvature of the root canal in its cervical and middle thirds, to offer direct and straight line access to its own apical curvature.[3] That is why it is proposed to use this technique in the management of type C canals.

Taking into account the above, the present investigation was developed, which aimed to present the case of an adult patient with type C canals of the second lower molar and endodontic management of 37 using the anti-curvature technique.

CLINICAL CASE REPORT

56-year-old female patient who comes to the Department of Dentistry of the Regional Autonomous University of the Andes. In January 2024, the patient presented with pain in her left mandibular molar. A clinical history and intraoral and extraoral examination were performed. The clinical assessment revealed loss of teeth 35 and 36, presenting a gap with a triangular-shaped residual alveolar ridge. In addition, she presented a defective restoration on the distal surface of tooth 37 and an occlusal restoration of tooth 38. The patient gave her informed consent and underwent vitality tests and x-rays.

The radiograph (Figure 1) showed widening of the periodontal ligament and the presence of a single root canal in 37 fused roots, resulting in the diagnosis of irreversible pulpitis.

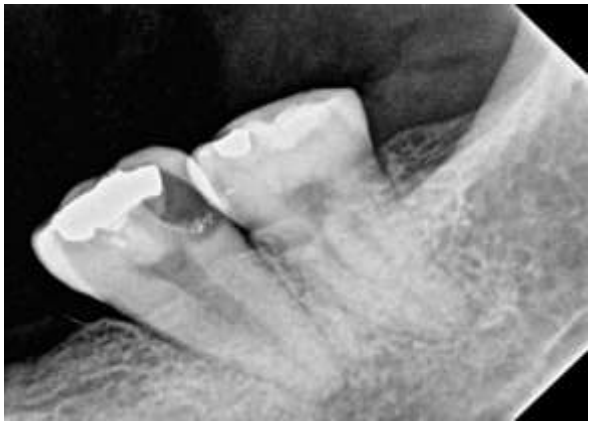

Fig. 1 Periapical radiograph of 37 and 38.

Treatment

First session: Working length was determined using an apical locator and radiographic canalectomy. The technique of truncal anesthesia with 2 % lidocaine was performed, and the chamber opening was performed (Figure 2), with absolute isolation of the irrigating substance 2,5 % sodium hypochlorite, chemical mechanical preparation (CMP), and application of intracanal medication (formacresol), leaving the medication on for 3 days.

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Fig. 2 Chemical mechanical preparation of 37 (first session).

Second session: Biomechanical preparation was performed again using the anticurvature technique, with intracanal medication of calcium hydroxide and propylene glycol (Figure 3). The C-shaped isthmus was prepared without a dentin defect, maintaining adequate dentin thickness to avoid significantly reducing root resistance.

Fig. 3 Intracanal medication of 37.

Third session: the single cone filling technique of the root canal is performed, with AH plus – coltosol – IRM filling cement (Figure 4).

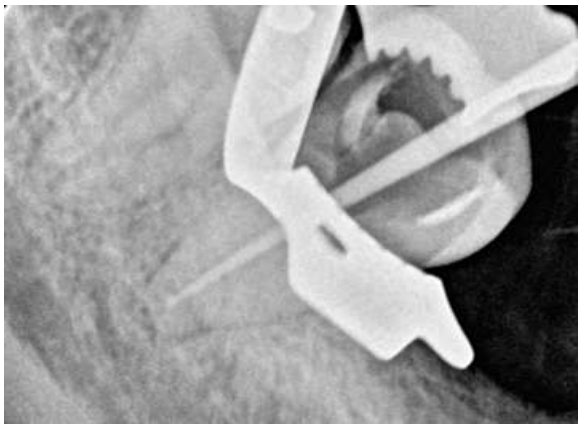

Fig. 4 Root canal filling of 37.

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To achieve a hermetic seal and contribute to the success of the endodontic treatment, a restoration using nanohybrid resins was performed. A consultation was held with the oral rehabilitation professional to proceed with the oral rehabilitation of 35 and 36 teeth, providing the patient with well-being, functionality, and aesthetics. The following instruments were used: Niti (25 mm diameter) and rotary files.# 20-40, chamber opening burs, compensatory wear burs, lapical locator and endodontic motor.

Favorable results were obtained, restoring the patient's overall health. Follow-up x-rays were taken (Figure 5). Clinically, it was observed that applying intracanal medication between sessions yields better results, along with proper biomechanical preparation and the anti-curvature technique. Hence, the importance of applying the various techniques and tools available today to increase the success rate of endodontic treatments.

Fig. 5 Control X-ray.

DISCUSSION

The anamnesis offers important information, depending on the characteristics of the pain, its origin or etiology can be known and therefore, its diagnosis and treatment can be established.[4] In the case under study, the questioning supported by the complementary examinations allowed the diagnosis of irreversible pulpitis to be established and the definitive treatment of radicular pulpitis to be planned.

On the other hand, searching for a missing canal can lead to common iatrogenic mishaps such as perforation of lateral walls or false pathways. This error can be avoided if the practitioner has a general understanding of the variations present in the root canal system. Tooth type, root canal anatomy, the characteristics of the endodontic instruments, and the clinician's experience are risk factors for perforation that must be taken into account.[5]

A research conducted by the Regional Autonomous University of Los Andes Ambato in Ecuador suggests that the clinical use of the Electronic Apex Locator reduces patient exposure to ionizing radiation and improves the determination of working length compared to the radiographic technique.[6]

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When compared with other case reports, they speak of the complexity of endodontic management of type C canals.[7] The prevalence of presenting a single canal in the mandibular second molar reported in the literature varies according to the detection technique and the type of study. It is recommended to use specialized techniques such as cone beam computed tomography (CBCT) or ultrasound to detect the number of root canals present in mandibular molars.[8]

The pulp chamber of C-shaped teeth may be located deeper; its main anatomical feature is the presence of a curtain connecting the individual canals, with irregular areas that may contain pulp tissue, microorganisms, or debris.Detailed diagnosis of the number of canals and their morphology are crucial prior to endodontic treatment.The analysis for the correct choice of the technique will depend on the radiographic evaluation of the case, arrangement of canals, estimation of the remaining dentin of each canal.[9,10]

C-shaped canals can be treated with either manual instrumentation or mechanized techniques; therefore, the anti-curvature technique was used in the case presented. The thinness of the walls must be taken into account even before instrumentation, so this fact must be taken into account to avoid procedural errors that could lead to endodontic treatment failure.(11)

The authors of a case from Iran consider the anti-curvature technique useful for preparing C-shaped anatomy. They also believe that perforation or fracture is more likely when the dentin is thin. They also point out that using large instruments during the preparation process and not avoiding the danger zone can lead to perforation. Furthermore, this oversight may even go unnoticed until after the defect sealant has been extruded, which was not observed in this case.[10]

Galicianand collaborators,[12] state that all root canals have some curvature, even those apparently straight, in most cases, are curved in the apical third. These curvatures sometimes go unnoticed in conventional radiographic angulations, since the radiograph is a two-dimensional representation of a three-dimensional object, and can lead to errors in determining the working length, over-instrumentation, foramen translations and step formation.[10]

Variations in the technical preparation of curved root canals have been developed, with special attention to the cervical enlargement technique, by enlarging the diameter at the entrance and canal, direct access is created to the middle and apical thirds, in order to provide anti-curvature wear, mainly to the large areas or safety zones. This is an alternative to overcome apical curvature, of wear compensation.[12]

In the authors' opinion, endodontic management of second molars with type C root canals presents its challenges; however, the treatment was successfully completed, addressing the patient's complaint. It is also of utmost importance to seal the root canals as tightly as possible, either through thermomechanical or thermal techniques, allowing for the most three-dimensional sealing of the endodontic space.

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CONCLUSION

The presented clinical case demonstrates that the anticurvature technique is an effective alternative for the endodontic treatment of type C canals in mandibular second molars, as it minimizes the risk of wall perforation and maintains adequate root thickness. The combination of several diagnostic methods was essential for detecting the complex anatomy of type C canals, allowing for a specialized approach and thus avoiding therapeutic failure. The symptoms that were the reason for the consultation were resolved.

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