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Anatomical aspects and endodontic treatment in the mandibular second molar with internal anatomy in the shape of a "C"

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ABSTRACT
Introduction: The C-shaped molar is an anatomical variation that, due to its characteristics and peculiarities, deserves meticulous attention when performing endodontic treatment. Objective and case reports: This study aimed to discuss the characteristics of the morphological changes that occur in this type of anatomy of the Root Canal System, reporting some clinical cases of endodontic treatment of the second molar with this anomaly. Conclusion: Good planning of all stages of treatment is essential to achieve the success of endodontic therapy in the treatment of "C" shaped molars.

Keywords: Root Canal Anatomy, Endodontics, Cleaning, Root Canal Shaping.

INTRODUCTION

The mandibular second molar has a crown that is slightly smaller and more symmetrical than the crown of the mandibular first molar. This tooth is characterized by the proximity of its roots. The two roots often extend apart in a gradual curve, with the apexes always together. In some cases, they have only one root. The degree of curvature of the canal and its configuration were studied in the mesial and distal roots, and 100% of the specimens showed curvature in both the vestibulolingual and mesio-distal directions1.

In a few seconds mandibular molars with a fused root or roots, a file positioned in the buccal mesium canal may appear to be in the distal canal. This is because the two canals are sometimes connected by a semicircular slit, a variation of the canal in C2.

The C-shaped molar is an anatomical variation that, due to its characteristics and peculiarities, deserves meticulous attention when performing endodontic treatment.

Its morphology consists of the configuration of a cleft-shaped anatomy, which makes it difficult to identify it radiographically and also to treat it, whether in cleaning, preparation, or filling of the root canal system[3].

The endodontic treatment to be performed on a mandibular molar with "C – Shapper" anatomy requires special care from cleaning and modeling the canal system of said tooth to its

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complete sanitation. Root canal filling also requires special care, since the anatomy of the Root Canal System of "C" canals is more complex due to the amount of communications, deviations and obliterations that occur in this type of SCR

"C" Channel System was first reported in 19794.

The "C"-shaped root canal system can have many anatomical variations and can vary in the depths of the roots, so that the appearance of the canal entrance hole does not predict well the effective anatomy of the canal5, being classified into five categories, according to their anatomical details:

Category I: The shape is of an unbroken "C", without any separation or division;

Category II: The shape of the Channel System resembles a semicolon as a result of the interruption of the contour of the "C";

Category III: Two or three separate channels;

Category IV: Only one canal, circular or oval in shape, is in the cross-section;

Category V: The light from any canal cannot be observed, and only the apical third can be observed.

The literature shows that the mandibular second molars with the internal anatomy in C-Shaped that prevail in the different configurations of cross-sections are those of types C IV, followed by those with configurations C III, C I and C II6.

All these precautions aim at effective and safe endodontic treatment, also avoiding possible accidents that may occur during the performance of the necessary procedures. Therefore, it is necessary to have a good planning of all stages of treatment, from a careful radiographic analysis and change in the way the preparation is performed, in order to promote a good sanitation of the root canal system and, consequently, a hermetic endodontic filling.

MATERIAL AND METHOD

After anesthetizing the patient, absolute isolation is performed with a rubber dam and surgical access is made through the point of choice. It is very important, after the technical opening, to promote an abundant irrigation of the pulp chamber, in order to carry out good sanitation prior to penetration into the root canals, effecting their disinfection.

For many years, it was believed that the main factor involved in the success of endodontic treatment was the performance of a compacted filling of the root canal. This concept became popular after the revelation of the findings of the retrospective Waschington Study, which reported that more

than 60% of endodontic therapy failures, radiographically verified, were related to inadequate root canal fillings8. However, it should be borne in mind that the fact that two events (chemical-mechanical preparation and filling) occur simultaneously does not represent a cause-and-effect relationship. It is assumed that most of those 60% failed due to insufficient cleaning and preparation, leaving irritants inside the Root Canal System.

The anatomical complexity of the SCR, including and especially the internal anatomy of the "C" canal, makes it impossible to remove all organic and inorganic content, contaminated or not, from its interior by means of mechanical instrumentation. According to Prof. Carlos Bueno (personal information) "There is currently no doubt in the endodontic literature regarding the superiority of mechanized instrumentation over manual instrumentation in the modeling of the Root Canal System" however, due to its excisional capacity of dentin, it makes cleaning deficient, requiring the enhancement of irrigation[9,10].

With the advent of electric motors, which produce rotational and reciprocating movements, in which we use intracanal instruments made of nickel-titanium alloys that reduce the instrumentation time, facilitating the work of the endodontist, irrigation began to be optimized in order to improve cleaning and disinfection throughout the SCR, especially in areas of difficult access such as apical deltas, accessory channels, lateral channels and isthmus that are not reached by the instrument.

DEVICES AND TECHNIQUES USED TO ENHANCE SCR IRRIGATION

When observing the current scenario of endodontics, we can see that endodontic instrumentation techniques have undergone modifications, making the procedure, in general, more precise and with less operative time. The time spent on instrumentation can be used to enhance the effectiveness of irrigation. Some devices and techniques are used for this purpose:

MECHANICAL STIRRING: EASYCLEAN

The advent of electric motors, especially when alternating rotational movements, also called reciprocating movements, provided a new modality of mechanical agitation of the irrigating liquid. Based on the mechanism of the reciprocating function, an instrument based on ABS (acrylonitrile butadiene styrene) polymer called EasyClean (Easy Equipamentos Odontológicos, Belo Horizonte, Brazil) was developed with the objective of promoting constant agitation of the irrigating chemical substance. The instrument operates in an alternating (reciprocating) rotation movement in clockwise and counterclockwise directions, has a tip (tip) 25, taper .04 and cross-section in the shape of an airplane wing. Because it does not have cutting blades, the direction of the reciprocating movement

does not influence the performance of the instrument, allowing it to be used in any electric motor available on the market.

SONIC STIRRING: ACTIVATOR SYSTEM

The sonic activation of the irrigating agents is based on the creation of a hydrodynamic phenomenon obtained by means of systems that operate at low frequency and high range of motion with the objective of promoting a uniform circulation of the irrigating agent and its penetration in regions of difficult access and recesses within the SCR. Among these systems, Endo-Activation stands out, an apparatus developed by Clifford Ruddle and marketed by Dentsply (Tulsa Dental Specialites, Tulsa, USA) composed of a sonic-generating handpiece and flexible polymer-based tips in three different diameters and conicities, without cutting power: Small (15/.02), Medium 24/.4) and Large 35/.04). The operating principle consists of agitating the irrigating liquid through sonic waves that, when they travel through the plastic tips, qualify the cleaning process.

ULTRASONIC AGITATION

Ultrasonic agitation, unlike other activation methods, occurs from the creation of two physical phenomena: microacoustic current formation and cavitation[15]. These phenomena are possible in equipment that operates with a piezoelectric transducer (formed by quartz crystals), which allow an appropriate oscillation frequency of the insert (ultrasonic tip) of around 30 KHz and generate a lower range of motion of the instrument tip.

Thermoplasticized Filling

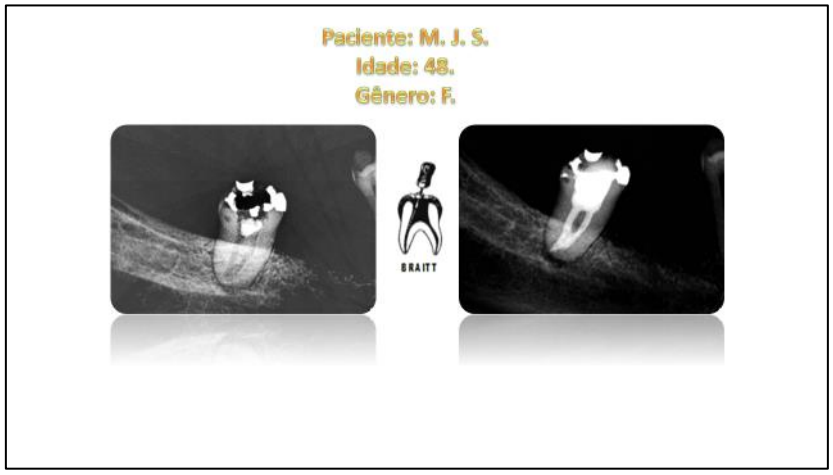
Although desirable, filling the SCR in its entire extension, completely isolating it from the periodontal tissues is a challenge that, in endodontic practice, has not yet been overcome. Three-dimensional obliteration of a lower "C" molar during obturation becomes even more worrisome due to its anatomical complexity.

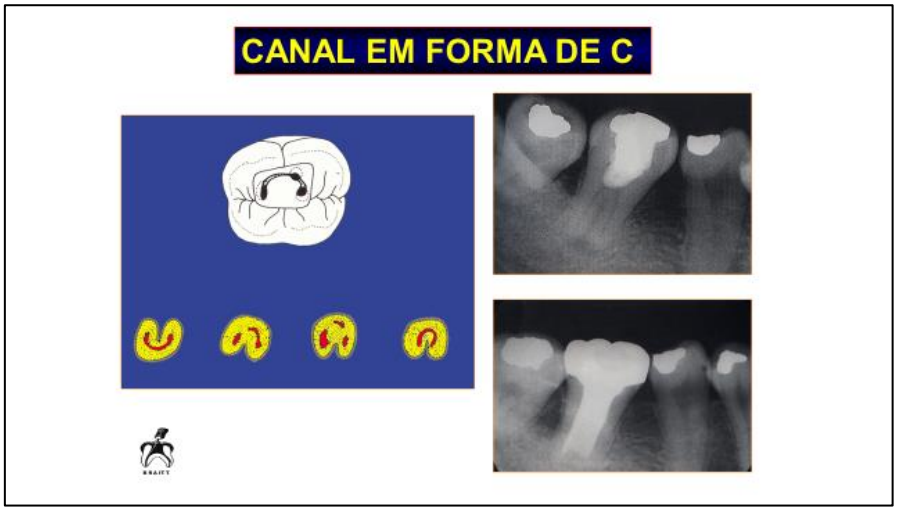
There are different techniques for thermoplasticizing the gutta percha that aim to reduce as much as possible exudative percolation or reinfection by molding the heated gutta percha to the internal anatomy of the tooth. Among them, we can mention the Vertical Condensation Technique of Heated Gutta Percha (Schilder), Continuous Wave Condensation Technique (Buchanan), Automated Thermal Condensation Technique of Gutta Percha (McSpadden), Hybrid Tagger Technique, among others.

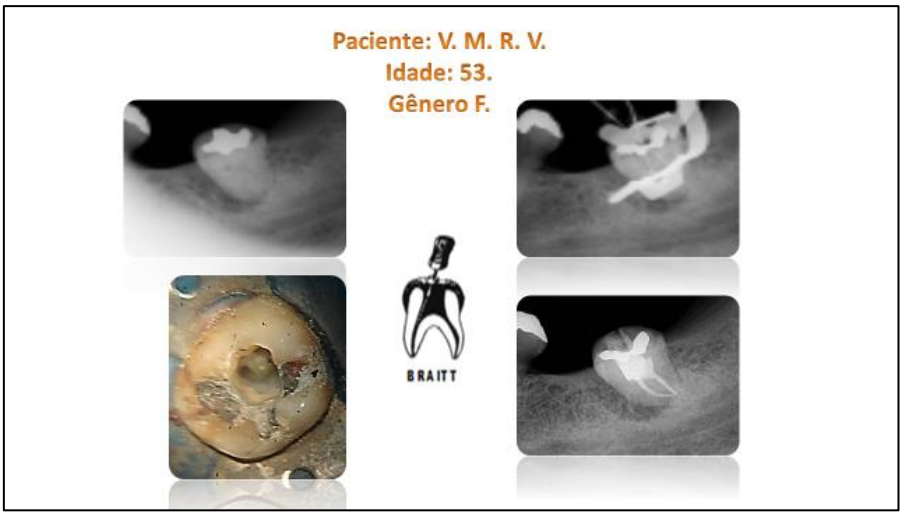
We chose to use the McSpadden Technique, with the modifications recommended in Endo – Centro de Estudos Endodonticos Itabuna - Bahia: Use an accessory gutta-percha cone instead of the

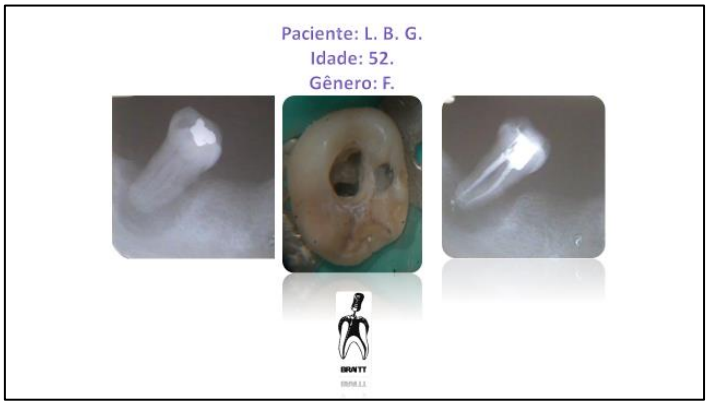
standardized cone, as tight as possible, combining with the last rotating or reciprocating instrument used. The gutta percha cone should be more plasticizable (Little Zinc Oxide and Rosin) and use a Gutta Condenser numbers #60, 70 or 80, not reaching the apical third of the root so as not to cause extravasation of the gutta percha.

Clinical Cases






Paciente: V. M. R. V.
Idade: 53.
Gênero F.
BRAITT


Paciente: L. B. G.
Idade: 52.
Gênero: F.

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Paciente: I. V. O. F. F.
Gênero: F
Idade: 37
Anatomia interna em "C" Shaper


2º Molar inferior com os canais em "C Shaper" (4 canais)
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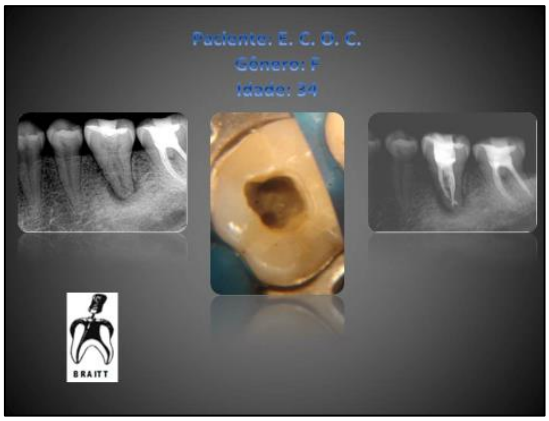

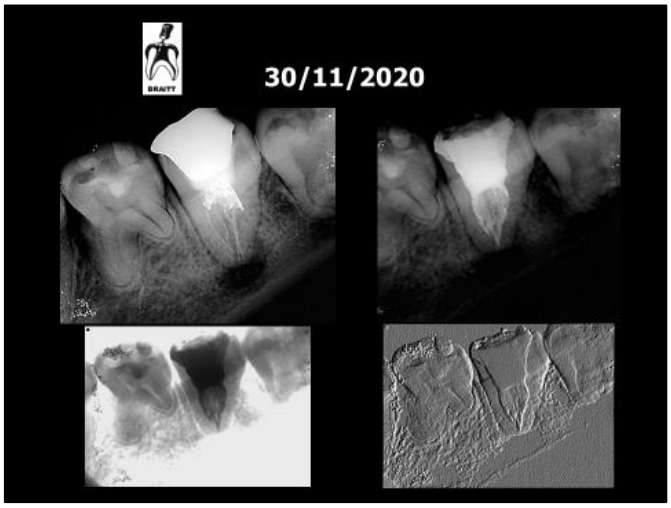

Courtesy of Dr. Karine Baldo

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