AN ALTERNATIVE TECHNIQUE TO ENDODONTIC TREATMENT FOR LONG TEETH: A CASE REPORT

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ABSTRACT

Endodontic treatment aims to promote conditions to enable the organism in the repair process. Proper instrumentation of the root canals and complete debridement is one of their primary goals. The present study aimed to describe a technique for instrumentation of a right upper canine with a length of 34mm. Patient MLPG, female, 32 years old, in good general health, attended the particular dental clinic complaining of discomfort to chewing and darkening of the dental crown in the right upper canine. Clinical and radiographic examinations were performed: chromatic alteration, absence of pain in vertical and horizontal percussion tests, negative response to sensitivity tests, periodontal probing with normality pattern and the absence of a periapical image. The chemical-mechanical preparation was performed by the "crown-down" technique with manual and rotary instruments. The new technique employed was titled "Instrument Cable Cutting Technique" (ICCT), allowing adequate mechanical disinfection and the use of the foraminal locator. Therefore, a conservative and safe alternative to being used in the root canals with a total length superior to 31mm.

KEYWORDS: Preparation techniques, root canal treatment, anatomical variation.

1.INTRODUCTION

Endodontic treatment aims to promote conditions to enable the body to repair the periapical tissues, allowing the reestablishment of dental functions through the cleaning and shaping the root canal system[1,2]. The natural anatomy of the canal system creates new challenges, emphasizing the need for adequate disinfection[3] since the presence of debris adhered to the walls of the root canal after mechanical instrumentation can lead to failures in the cleaning process[4,5].

Proper instrumentation of the root canals, and complete debridement is one of the primary endodontic objectives[6]. However, in long canals there is a difficulty in reaching the total length of the tooth[7]. Extremely long teeth are uncommon and make the complete mechanical cleaning of the root canal a challenging step. Therefore, it is of fundamental importance, during the planning of the case to be treated, that the clinician has the knowledge of the morphology of the root canal[8], as well as equipment used during endodontic treatment. Endodontic instruments are tools used as mechanical agents in the root canal instrumentation. It consists of cable and body (intermediate and active part)[9]. Since there are no endodontic instruments with a length of more than 31 mm, it is necessary to use alternative techniques in order to guarantee the success of the treatment, respecting the biological and mechanical principles of endodontics.

Therefore, the objective of this study was to report the endodontic treatment of a right upper canine with a total length of 34mm and present an innovative, simple and safe technique of endodontic instrumentation.

2. MATERIAL AND METHODS

Patient MLPG, female, 32 years old, in good general health, attended the particular dentistry clinic complaining of discomfort to chewing and darkening of the dental crown of the right upper canine. Clinical examination revealed a chromatic alteration of the upper right canine, the absence of pain in the vertical and horizontal percussion tests. There was no painful sensitivity to the sensitivity tests and periodontal probing with normality pattern. At the radiographic examination (Figure 2A), it was possible to observe an apparent 34mm length of the tooth, presence of restorative material near the pulp chamber and the absence of

radiolucent image in the periapical region. The diagnosis of necrosis was established.

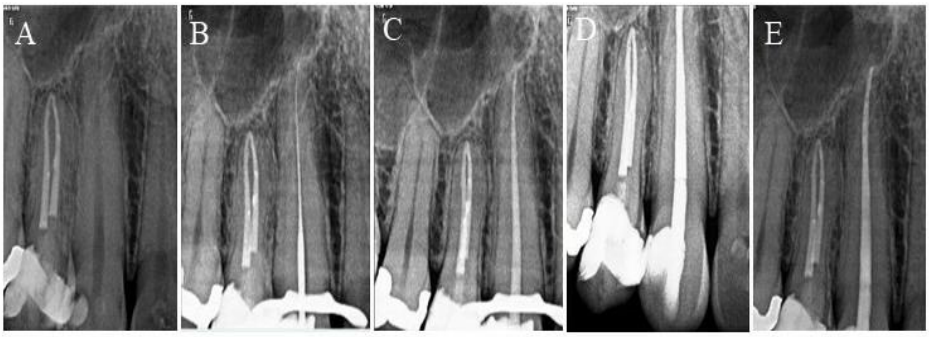

Figure 1. Technical Demonstration of the Cable Cut of the Instrument. A and B: Partial cable cut of the endodontic instrument, C: Final aspect of the instrument cable.

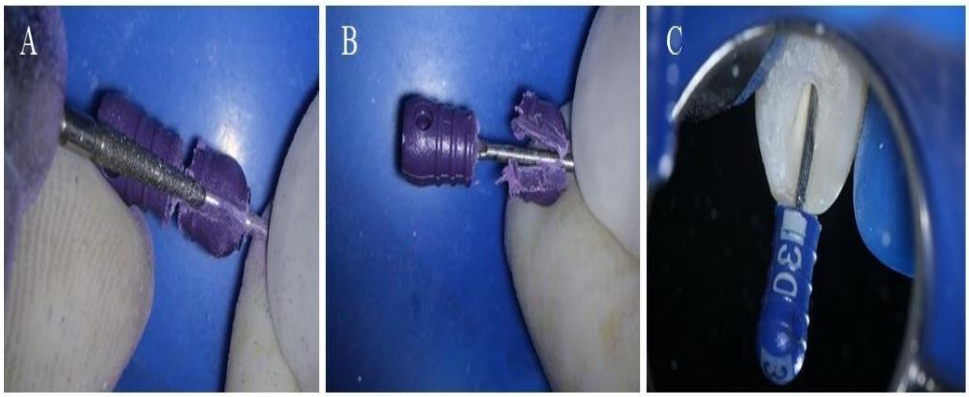

Figure 2. A: Initial periapical radiography. B: Odontometry. C: Gutta-percha Proof. D and E: Final periapical radiographs.

After the local anesthesia with 2% mepivacaine with adrenaline 1: 100,000 by the infiltrative technique, the restoration and carious tissue were removed, later coronary access was performed with a high-speed spherical diamond tip, followed by rubber dam placement. After coronary opening, pulp necrosis was visually confirmed. After abundant irrigation with 2.5% NaOCl, the root canal was explored with K # 10(31mm) (Dentsply / Maillefer, Ballaigues, Switzerland). The chemical-mechanical preparation was performed by the crown-down technique with ProDesign Logic 40 / .05 system (Easy Dental Equipment, Belo Horizonte, MG, Brazil) up to a length of 25 mm. Afterwards, considering the need to correctly determine the working length(WL), the cable of the instrument(#10, 31mm) was cut(Figure 1A and B)(ICCT Technique) to make it possible to reach the WL(Figure 1C).

The WL could be determined electronically, without interference, and confirmed by radiographic (Figure 2 B).Then, all the cables of the instruments in the sequence were sectioned so that the apical third could be worked mechanically. The final apical instrument #30 was up to the WL and the scaling performed up to the length of 25 mm. Throughout the endodontic treatment, the irrigation was done with 2.5% sodium hypochlorite solution. Before the obturation, the radiographic test of the main gutta-percha (Figure 2 C) was performed to confirm the appropriate limit.

After performing these steps, the canal was dried with sterile absorbent paper tips and filled with AH Plus endodontic sealer (Dentsply / Maillefer, Ballaigues, Switzerland) using the lateral condensation technique. Due to the difficulty of visualizing the complete tooth extension, two final periapical radiographs were performed (Figures 2D and 2E).

3. DISCUSSION

The most effective way to remove biofilm is mechanically[10]. However, the impossibility of reaching the apical foramen using the most extended instruments available on the market (31 mm), could severely compromise the success of the treatment. In the case described, the upper right canine was 34 mm long. The canine is the longest tooth in the dental arch, has a sharp crown and a relatively straight and long root canal. Most canines require instruments measuring 25 mm in length or more, since teeth longer than 31 mm are not uncommon[11]. Thus, longer endodontic instruments are needed so that they can reach and locate the apical foramen of these teeth.

Given this limitation, a safe and conservative technique was proposed to perform the mechanical disinfection in a predictable manner and within the appropriate limits. The Instrument Cable Cutting Technique(ICCT) is based on cutting about 3 mm from the plastic part of the cable with a diamond tip in order to gain additional millimeters during the root canal preparation to reach namely the apical foramen. It is important to note that the amplitude of the rotational movement, used in manual files, as well as the application of the apical force during the preparation must be reduced.

Barletta *et al.* (2010)[9] described an endodontic treatment of a superior canine measuring 36 mm in length. In the technique, the authors decided to change

the traditional reference point, adopting as reference the cervical limit of the access cavity to guarantee a correct cleaning and shaping of the canal, with preservation of the remaining dental structure, because the tooth presented an intact crown, without prosthetic rehabilitation. The technique, however, required a more complex chemical-mechanical root canal preparation, due to the difficulty in holding the instrument handle and using the NiTi oscillatory instrumentation. Besides, the WL was established at 1.5 mm from the radiographic apex.

The location of the apical constriction within the clinical perspective is challenging, mainly due to its position and conformation, which are highly variable[12,13]. Measurement of the WL performed radiographically is not reliable and is subject to observer interpretation[14]. In this way, histological studies show that the apical locators are more predictable than the radiography to determine the position of the apical constriction[15,16]. In the present report, through the technique used, the gain of 3mm of the instrument body enabled, safely, the use of the foraminal locator to correctly determine the WL.

Vieyra *et al.* (2009)[16] evaluated the accuracy of Root ZX and Elements-Diagnostic electronic apical locators comparing to radiographs for localization of the minor root canal foramen. A total of 482 canals in 160 maxillary and mandibular teeth were located in vivo with both electronic apical locators and radiographs. After extraction, the actual location of the small foramen was determined visually and with magnification. There was no statistically significant difference between the two locators, but there was a significant difference between them and the radiographs. For all teeth, the measurements made by the apical locators were within ± 0.5 mm of the minor foramen in 100% of the cases, whereas for the radiographs the measurements were within that range only in 15%. They concluded that measuring localization of the minor foramen using the two apical locators was more accurate than using radiographs, and their use would reduce the risk of instrumentation and root canal filling beyond the apical foramen.

Saatchi *et al.* (2015)[17] performed an in vitro study to determine if tooth length influenced the accuracy of the Root ZX device. They analyzed forty maxillary canines extracted with lengths of 27-29 mm. They concluded that the Root ZX device was more accurate on shorter teeth compared to the longer ones.

2.CONCLUSION

Cases such as the one we report, not uncommon, show the need for the availability of longer endodontic instruments in the market. Meanwhile, endodontic treatment of teeth longer than 31 mm requires creativity of the professionals. The Instrument Cable Cutting Technique is the best way to overcome this failure.

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