

Root Canal Treatment of a 32-mm Length Maxillary Canine - A Case Report

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ABSTRACT

Introduction: Permanent maxillary canines can present with an unusual length exceeding 31 mm. This case report describes the root canal therapy of permanent maxillary canine with an unusual length.

Case Report: A 52-years Saudi female patient was reported to endodontic postgraduate clinics of Riyadh College's Dental Hospital suffered from pain upon biting on tooth #13. Root canal treatment was performed, and the tooth was found to have an unusual length of 32 mm. The use of an alternative reference point was made to correspond the working length with the available endodontic instruments.

Conclusion: Successful root canal treatment in extremely long teeth is suitable if modifications in treatment procedures are utilized.

Keywords: Root Canal Anatomy, Maxillary Canine, Root Canal Treatment.

INTRODUCTION

The knowledge of the anatomy of root canal system and its morphological variations play a significant role in all the steps of endodontic treatment. Therefore, the clinician should have a thorough understanding of the detailed anatomy of the root canal to be able to utilize the most appropriate treatment techniques and protocols and thereby increasing the percentage of success rate.¹

Studies on dental anatomy report different mean lengths for different tooth types. In maxillary canines, they have been associated with normal mean lengths of 26.5 mm², 27.3 mm³, and 26.8 mm.⁴ Moreover, varying lengths have been reported in several case reports which indicated lengths of 41 to 52 mm for extracted maxillary canines.⁵⁻⁷ Additionally, reports of an unusual lengths include 33.5 mm⁸, 39 mm⁹, 39.5 mm¹⁰, 41 mm¹¹, and even 47 mm.¹²

Treatment becomes more complex in such cases, because there are no endodontic instruments longer than 31 mm commercially available. The present case report describes a nonsurgical root canal treatment of a maxillary cuspid a 36-mm long with an emphasis on the alternative technique employed in root canal preparation and filling.

CASE REPORT

A 52-years-old Saudi woman with a non-contributing medical history was reported to endodontic postgraduate clinics of Riyadh College's Dental Hospital, Riyadh, Saudi Arabia for nonsurgical endodontic treatment of maxillary right canine (number #13). The chief complaint was painful sensation on upper right canine upon biting. Clinical examinations revealed carious palatal and mesial

walls on tooth #13. The tooth was sensitive to percussion and palpation and revealed no response to cold test. Periapical radiographs have been taken (HELIODENT^{PLUS}, Sirona, Germany) and revealed normal periapical area and an irregular root morphology consisting of a very long root with an apparent length of 32 mm for tooth #13 [Figure 1]. Based on the clinical and radiographic findings and according to American Association of Endodontics consensus,¹³ the tooth was diagnosed as necrotic pulp with symptomatic apical periodontitis.

Following the delivery of local anesthesia (2% lidocaine and 1:100,000 epinephrine) and isolation with rubber dam, removal of caries and access opening were made, and the access was enlarged using Gates-Glidden drills (No. 2, 3, and 4).

Then, the estimated working length was 32 mm, but the longest files available were only 31 mm in length. So, it was found that the use of a cingulum reference point would be possible. By using the palatal cingulum as a reference point, the overall working length could be reduced by 5 mm and the 31 mm length files would be long enough for the appropriate cleaning and shaping of the root canal system. The working length from this cingulum reference point was established using Root ZX II (J. Morita, Tokyo, Japan) electronic apex locator and confirmed radiographically [Figure 2].

The canal was prepared with hand files (Flexfiles, Dentsply-Maillefer, Ballaigues, Switzerland) up to size #25 and then instrumentation was achieved with ProFile rotary files (Dentsply Maillefer, Ballaigues, Switzerland) up to size #25 0.04 to the full working length, then subtracting of 5 mm from the working length and instrumentation to size #40 0.06 using crown-down technique. Copious irrigation with 2.5% sodium hypochlorite (NaOCl) followed by 17% ethylenediaminetetraacetic acid (EDTA) was carried out during the instrumentation phase.

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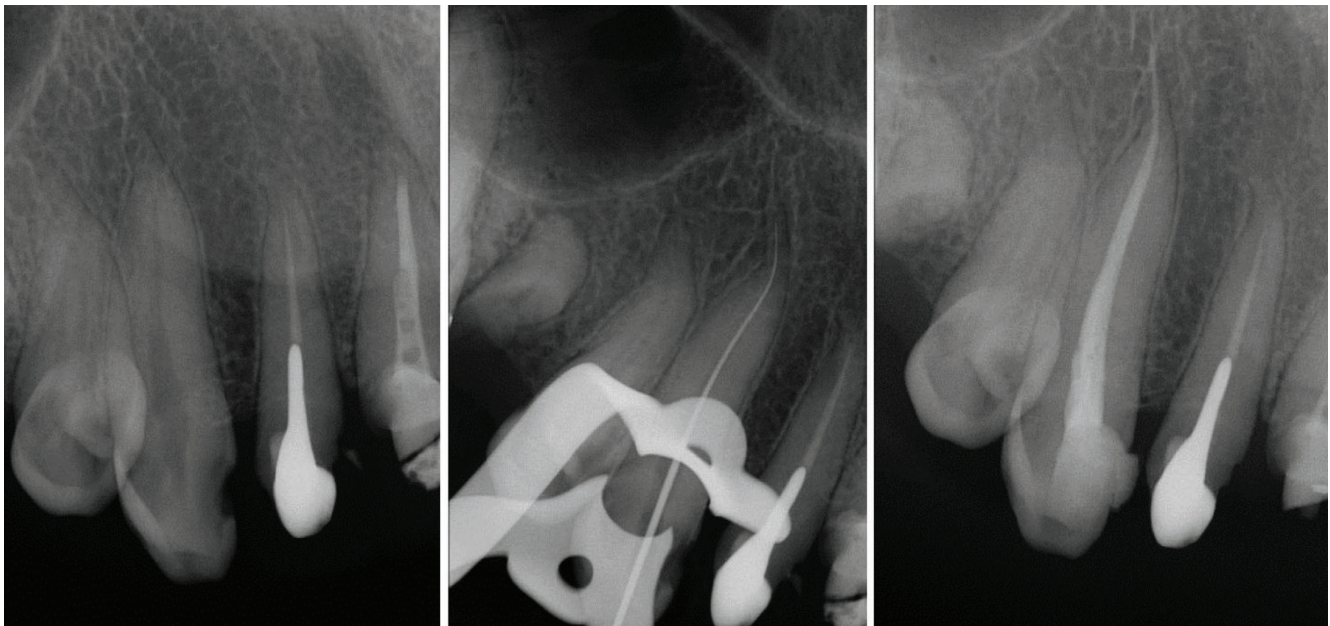


Figure-1: Preoperative radiograph. **Figure-2:** Working length determination. **Figure-3:** Postoperative radiograph.

The root canal was dried with sterile paper points (Maillefer, Dentsply, Ballaigues, Switzerland) and filled with cold lateral compaction technique by gutta-percha (Maillefer, Dentsply, Ballaigues, Switzerland) and AH26 sealer (Maillefer, Dentsply, Ballaigues, Switzerland). The access cavity was sealed with Coltosol temporary filling material (Coltosol® F, Coltene, Switzerland), and the patient was referred to receive final restoration [Figure 3].

DISCUSSION

A proper locating, cleaning, shaping, and obturating the root canal system is an adequate measure for long-term success of root canal therapy. Therefore, failure of any of these principles could compromise the treatment success end up with post-treatment disease, pain, and/or complications of the treated tooth.^{1,14}

It is widely known that the maxillary canines are the longest teeth in the human dental arch. they are flattened in the cervical region and should be flared to allow adequate instrumentation.¹⁵ The cleaning and shaping of maxillary canines longer than 32 mm long is extremely difficult because of the size of the instruments commercially available.¹⁶

In root canal treatment of teeth with this length, some modifications must be made in the treatment technique due to restrictions in length of files, endodontic burs, Gates Glidden burs, sonic/ultrasonic instruments, obturating materials, and spreaders.¹⁷ The use of an alternative reference point, located at the cervical limit of the access cavity, proved to be an excellent approach in this case which allowed the use of a standardized 31-mm length files for canal preparation, master and accessory cones without customization for obturation, and a spreader with adequate length to reach within 2 mm of the working length.

Zmerner et al.¹⁸ reported that from 280 human maxillary teeth extracted at several Argentinean hospital services, 13.21% of the teeth observed were longer than 31 mm, with higher

lengths in teeth with curved canals, which is in accordance with the present case report.

Root canal treatment in teeth with such obstacle faced during the treatment procedures could be compensated by using a 2.5% sodium hypochlorite solution with a greater concentration of active chlorine when compared with the concentration of 1%.¹

It is important to point out that Maillefer (Dentsply, Ballaigues, Switzerland) produces the Vetinox series of endodontic instruments, designed for veterinary use, with higher lengths, reaching 40 mm and even 60 mm.¹⁶

The case reported here reveals that extremely long teeth can be successfully treated endodontically if suitable modifications in treatment procedures are utilized. A single-visit root canal treatment is possible if the appropriate cleaning, shaping, and obturating materials are available.

CONCLUSION

Cases of extreme length can occur and in case it is not possible to use another alternative technique, it could compromise the treatment by the risk of having to wear the coronary sound structure. The technique used in the present case not only provided adequate cleaning, shaping, and obturation of the root canal, but also allowed the preservation of the remaining tooth structure. After seeing these case reports of the maxillary canines which showed length measures that can reach the maximum measure of the longer endodontic instrument available or even go beyond, the availability of longer endodontic instruments in the market becomes evident.

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