

Endodontic Treatment of a Maxillary First Premolar with an Unusual Working Length: A Clinical Case Report

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Abstract

Purpose: To report a clinical case of unusually long maxillary first premolar submitted to non-surgical endodontic treatment.

Case presentation: A 32 year old male patient that presented on account of severe toothache in upper right quadrant of 3 weeks duration. His medical history was not contributory. Clinical examination revealed no soft tissue abnormality in relation to the tooth, however there was distooclusal carious lesion which affected less than one third of the crown of the maxillary right first premolar. There was severe tenderness to digital percussion. Periapical radiograph showed unusually long tooth 14 with coronal radiolucency communicating with the pulp, there was minimal periapical radiolucency and widening of periodontal ligament space. Diagnosis of apical periodontitis secondary to class II dental caries was made and patient planned for root canal treatment with subsequent Porcelain Fused to metal crown. Anaesthesia was achieved by infiltration technique using (2% lidocaine 1:100,000 adrenalin) and access cavity made on tooth 14 after appropriate isolation. Palatal and buccal canals were located and working length determined by tactile method confirmed radiographically to be 29 mm and 28 mm respectively which required using the longest files 31 mm available for the biomechanical preparation. Tooth was obturated with Gutta percha using the cold lateral compaction technique.

Conclusion: This case described a maxillary first premolar with unusual working length of 29 mm during a routine non-surgical endodontic procedure as compared to the mean value of 21.5 mm reported in the literatures.

Keywords: Maxillary first premolar; Anaesthesia; Endodontic treatment

Introduction

The main objective of endodontically treated tooth is to restore it to proper form and function in the masticatory apparatus. Knowledge of the normal or unusual possible configurations of the pulp and root morphology along with proper determination of working length of the root canals are of utmost importance in the endodontic treatment success and prognosis [1]. These objectives can be achieved by adequate knowledge of the normal tooth anatomy and existing anatomical variations of the tooth under treatment [2]. However, lack of knowledge of internal configuration, morphology and length of the tooth will undoubtedly lead to an error in localization, instrumentation and obturation of root canal and thereby affect the overall outcome of the treatment [1]. Factors contributing to the variations found in the root canal studies include race, age, gender, height among others [3,4].

Dental anatomy studies report different mean lengths for different tooth types. Upper cuspids, for example, have been associated with normal mean lengths varying from 25 to 27.2 mm. In some cases, upper cuspids may reach unusual lengths, above 30 mm [5]. A study has shown that the average tooth length for upper first premolar was 21 mm with minimum and maximum tooth length 17.52 mm and 24.69 mm respectively [6]. Another study reported that the average tooth length for maxillary first and second premolar were 20.6 mm and 21 mm respectively which is similar to that of Pecora et al on Brazilian population who reported the mean length as 21.0 mm [7].

It has generally been accepted that there is a possible relationship between the tooth dimension and body size. It is assumed that in proportion to the body growth the facial growth and tooth development follow a pattern [3,8]. However, various study on this issue dwelt with differing results [3,8,9].

Case Presentation

A 32-years old male computer technician presented to the conservative clinic on account of pain on a tooth on the upper right quadrant of 3 weeks duration. Prior to this presentation, there was history of presence of cavitation with subsequent associated intermittent moderate pain in the past. Present episode of pain was said to be severe, spontaneous, disturbs sleep and lasts longer than five minutes. Aggravating factors included cold weather and mastication, but no associated swelling or discharge. Patient's medical history was not contributory. Examination revealed no soft tissue abnormality but distooclusal carious lesions on the tooth 14 (Figure 1), which was severely tender to digital percussion. Periapical radiograph showed distal coronal radiolucency on the right maxillary first premolar that was communicating with the pulp. Canals were patent and there was associated crescent-like periapical radiolucency with widening of periodontal ligament space. All other adjacent teeth that appeared on the radiograph were also seen to be very long, which were initially thought to be a distorted elongated image (Figure 2). Diagnosis of apical periodontitis of the upper right first premolar secondary to Black's class II distooclusal caries was made. Patient was planned for

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Received July 20, 2018; Accepted August 20, 2018; Published August 27, 2018

Citation: Sulaiman O, Adebayo G (2018) Endodontic Treatment of a Maxillary First Premolar with an Unusual Working Length: A Clinical Case Report. Clin Med Case Rep 2: 114.

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non-surgical endodontic treatment with subsequent porcelain fused-to-metal crown restoration.

Treatment was explained to the patient and informed consent obtained. Local anaesthesia was achieved by local infiltration technique using 2% lidocaine 1:100,000 adrenalin. Proper tooth isolation done and access cavity made. Buccal and palatal canals were located and vital pulpal tissue extirpated. An estimated working length of 21 mm established with files and the working length radiograph taken. However, tooth still appeared elongated with files falling short of the



Figure 1: Preoperative photograph of the upper right premolar.

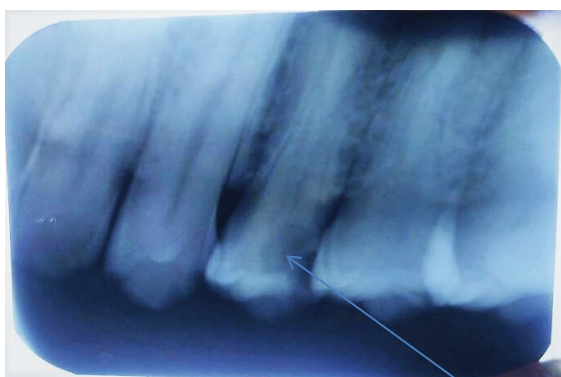


Figure 2: Preoperative periapical radiograph.

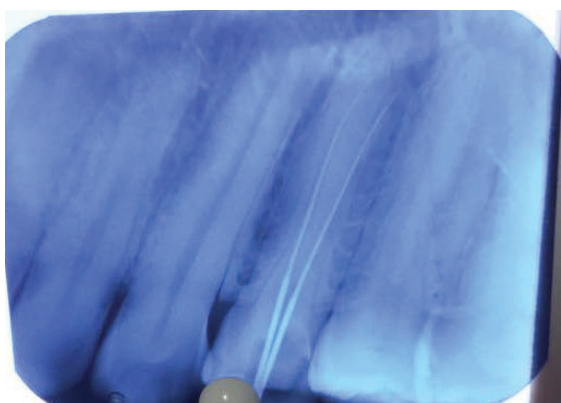


Figure 3: Working length radiograph for upper first premolar.



Figure 4: Post obturation radiograph.



Figure 5: Final definitive restoration (PFM crown) at six month.



Figure 6: Six month follow up radiograph.

radiographic apex by about 7-8 mm. We therefore decided to place the longest file available with the length 31 mm and retook another periapical radiograph. Working lengths were then determined to be 29 mm and 28 mm for palatal and buccal canals respectively (Figure 3). Biomechanical preparation was done manually using step back technique and tooth obturated with Gutta percha and endoseal using cold lateral compaction method at the subsequent visit (Figure 4). Tooth was finally restored to function with post-retained porcelain-fused-to metal crown (Figure 5). Six months follow up was done with intra oral examinations and periapical radiograph (Figure 6), there was no symptom of any kind and tooth still functional in the mouth.

Discussion

This case report demonstrates an unusually long root of a maxillary first premolar with 29 mm and 28 mm working length for the palatal and buccal canals in a young man of 1.89 m tall.

Variations in morphology of teeth need to be put into consideration when dealing with clinical and radiographic evaluations during endodontic treatment [10] as this will save the clinicians a lot of stress and time. Clinical management involving maxillary first premolar tooth with unpredictable root and canal morphology may pose some challenges [11]. Usually those problems tend to be related to number of roots and canals but rarely tooth length. The first maxillary premolar may have 3 or more canals in which any of the canals could be missed during treatment. However, this present report of a rare tooth length of maxillary premolar is pointing out the fact that variation in tooth and root length should be considered as well especially in relation to the height of an individual [3].

Several studies [2,12,13] have described the morphology of root canal systems of the maxillary first premolar with respect to numbers of canals, however; there is scarcity of study on variation of the root length of upper first premolar especially with regards to the stature of an individual unlike the root length of the upper cuspid which had been over flogged by many studies [5,14-16]. The length of the maxillary first premolar in this report was 29 mm which is far greater than the average length reported by many studies [6,7]. Also, the patient was about 1.89 m tall, which was greater than the average height of the Nigerian population reported to be 1.67 m [17]. This corroborate the fact that height/stature is a factor that can determine the length of teeth and should be a guide in working length determination of an individual tooth scheduled for endodontic treatment.

Conclusion

This case describes a maxillary first premolar characterized by a rare working length of 29 mm for palatal canal and 28 mm for buccal

canal in a tall young man of 1.89 m high. In keeping with this, tooth length of an individual scheduled for endodontic treatment especially in those with height greater than the average for that population should be assessed with a radiographic technique that will show the actual length of the tooth. In the same manner, the endodontist should be equipped with this unusual variation so as to save time and stress in arriving at exact working length.

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