3.1.7. Dentistry / 3.1.7. Стоматология

Expect the unexpected

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Будьте готовы к неожиданностям

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预料之外的事情总会发生

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A clinician must be familiar with the expected and unexpected root canal morphology that might be encountered during treatment. It plays the most significant role in determining the prognosis of the endodontically treated tooth. This article presents two cases reports of the endodontic treatment of upper first molar and retreatment of mandibular second premolar with a variable root canal anatomy.
Key words: molar, premolar, variation, morphology

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Клиницисту необходимо владеть информацией об ожидаемой и необычной морфологии корневого канала, которая может встретиться во время лечения. Она играет наиболее важную роль в определении прогноза эндодонтического лечения. В данной статье представлены два случая эндодонтического лечения верхнего первого моляра и повторного лечения второго премоляра нижней челюсти с вариантной анатомией корневого канала.
Ключевые слова: моляр, премоляр, разнообразие, морфология

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Авторы несут ответственность за оригинальность представленных данных и возможность публикации иллюстративного материала – таблиц, рисунков, фотографий пациентов.

临床医生必须熟悉在治疗过程中可能遇到的根管形态的预期和非预期情况。这在决定经过根管治疗的牙齿的预后中起着最重要的作用。本文介绍了两个病例报告，分别是上颌第一磨牙的根管治疗和下颌第二前磨牙的根管再治疗，这两个病例都展示了根管解剖的变异。
关键词：磨牙，前磨牙，变异，形态学

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作者负责所呈现数据的原创性以及出版插图材料的可能性——包括表格、图画、病人照片

Introduction

A thorough knowledge of root canal morphology is an important aspect of root canal treatment. Failures to detect extra canals are one of the main causes for failure in the endodontic therapy [1]. Human premolars and molars demonstrate relatively high anatomic variations and abnormalities with respect to number of roots and root canals [2].

The frequency of a maxillary first molar with two palatal canals is very low being one percent [3]. Mandibular premolars have gained a reputation for having aberrant anatomy. Different studies have looked at the root canal morphology of mandibular premolars over the years and reported a fairly high percentage of these teeth to have more than one canal. The occurrence of three canals with three separate foramina in mandibular premolars is very rare [2].

The following cases report the endodontic treatment and retreatment of maxillary first molar with two palatal canals and mandibular second premolar with three canals respectively.

Case report 1

A 54 year old male patient came to our clinic with the complaint of sharp, shooting and intermittent pain in upper right teeth while biting and taking fluids since 4 days. A careful clinical examination revealed crack in upper right first molar and hyper responsiveness to hot and cold stimuli. The tooth was tender to vertical percussion and gave a positive response on the bite test.

The IOPA revealed a crack extending deep into dentin and widening of PDL with respect to palatal root (Figure 1). A diagnosis of acute irreversible pulpitis with apical periodontitis was made and endodontic treatment was planned out.

After proper anaesthesia administration (2% Lignocaine with 1:100,000 epinephrine), the tooth was isolated with rubber dam and access cavity was made under operating microscope such that the crack was completely included in the cavity. Clinical examination with a DG-16 endodontic explorer (Hu-Friedy) revealed 5 distinct orifices: two palatals, MB1, MB2 and DB. After scouting the canals with no.10 and no.15 K-files (Mani INC), working lengths were estimated by means of an apex locator (Root ZX, J. Morita Mfg Corp) and confirmed with a perapical radiograph (Figure 2).

The canals were prepared with Hyflex CM files (Coltene Endo) upto size 35 and .04 taper under copious irrigation with 2.5% sodium hypochlorite. All canals were dried with paper points and obturated using cold lateral compaction of standardized (Coltene Endo) and non standardized gutta-percha cones (Gapadent) and AH 26 sealer (Dentsply). The access was restored with posterior restorative GIC (Ketac Molar, 3M ESPE) and tooth was secured with PFM crown. A final radiograph (Figure 3) was taken post operatively.

Case report 2

A 32 year old male patient reported to the clinic with moderate intermittent and spontaneous pain on lower left side of jaw since one month. Patient gave a history of root canal treatment done one year back in the same area. A clinical examination revealed crowns in lower left mandibular second premolar and first molar which were also mildly tender on vertical percussion. Radiographic examination revealed inadequate root canal fillings and periradicular radiolucencies in relation to both teeth. Also, unusually more than one root canal could be well appreciated with in second premolar (Figure 4). A diagnosis of failed root canal treatments with chronic periradicular periodontitis was made. Nonsurgical endodontic retreatment was planned in both 35 and 36 over multiple visits with the use of calcium hydroxide as inter-appointment, intra-canal medicament. After the administration of the local anaesthetic (2% Lignocaine with 1:100,000 epinephrine), both crowns were removed carefully. Under rubber dam isolation, both 35 and 36 were accessed using operating microscope. On entry into the pulp chamber of 35, one main canal orifice was found. After probing for any catch with pre-curved SS 15K file, it was found that the main canal was splitting into three different canal orifices at the coronal third root level. One buccal and two lingual canals (lingual 1 and lingual 2) were located. Gates Glidden drills 4, 3, 2, with a brushing motion were used in a crown down fashion to enlarge the main orifice to the level of the trifurcation to obtain straight line access to all the three canals. 2.5% sodium hypochlorite and 17% EDTA were used alternately as irrigants. Working length was established with the use of an Apex locator (Root ZX, J. Morita Inc) and confirmed radiographically (Figure 5). It could be appreciated that both lingual canals merged in apical third before exiting whereas buccal canal had a close separate exit. The canals of premolar were cleaned and shaped with hand K files upto size 30 while those of molar with Hyflex CM files (Coltene Endo) upto size 30 and .04 taper. Patency was achieved in all the canals and was maintained with a 10 k file. Calcium Hydroxide (RC Cal, Prime Dental) was used as intracanal medicament and the access cavities were sealed with IRM between appointments.

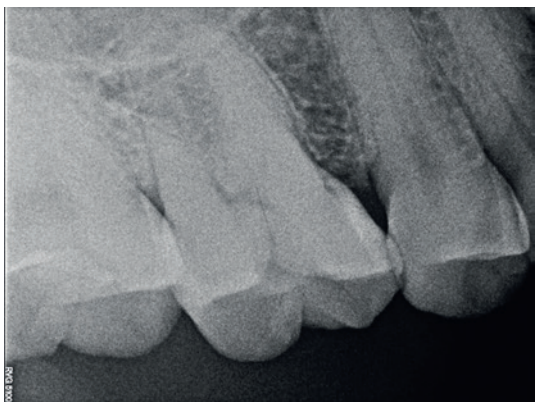

Fig 1 Preoperative IOPA of tooth 16

Рис. 1. Предоперационная внутриротовая периапикальная рентгенография (ВРПР) зуба 16

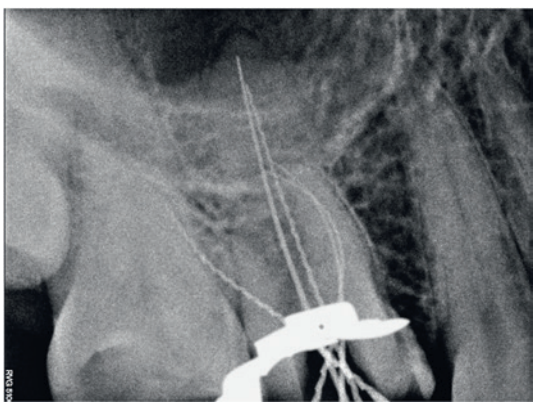

Fig 2. Working length radiograph confirming 2 palatal canals

Рис. 2. Рентгенограмма рабочей длины, подтверждающая наличие 2 небных каналов

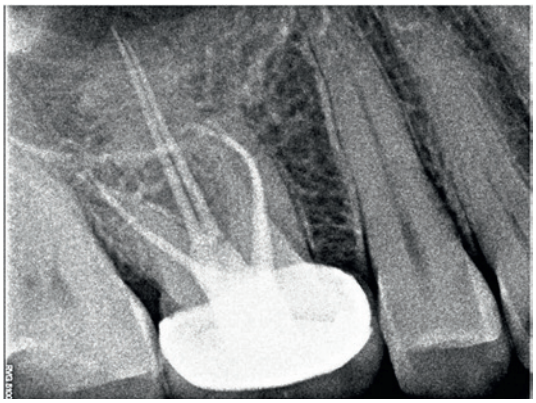

Fig 3. Post operative IOPA of tooth 16
Рис. 3. Послеоперационная ВРПР зуба 16

Fig 4. Preoperative IOPA of tooth 35 and 36 showing previous treatment
Рис. 4. Предоперационная ВРПР зубов 35 и 36 с признаками предыдущего лечения

The patient was seen after 4 week for the completion of the treatment when all the symptoms had ceased. Calcium hydroxide was removed from the canals with ultrasonic activation of 17% EDTA (Dent Wash, Prime Dental) and 2.5% hypochlorite. After drying the canals with paper points, both teeth were obturated with non standardized gutta-percha points and ZnOE sealer. Cold lateral condensation technique and warm vertical compaction in combination was used to fill the individual canals while the main canal of premolar was filled solely with warm vertical compaction. Old crowns were fixed and patient was kept on follow up (Figure 6). A radiograph after ten months showed considerable healing (Figure 7).

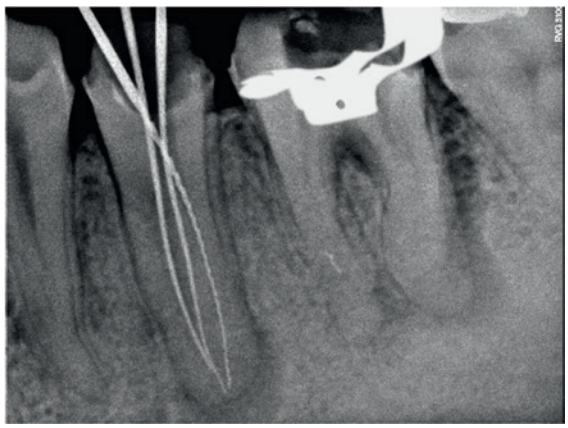

Fig 5. Working length radiograph confirming 3 canals in trifurcated tooth 35
Рис. 5. Рентгенограмма рабочей длины, подтверждающая наличие 3 каналов в зубе 35 с трифуркацией

Discussion

According to Cohen and Burns, canals are often not treated because they are not located [4]. The knowledge of tooth internal anatomy along with clinical and radiographic examination must be considered to locate the atypical canals. Clinically, proper access, any color change of pulpal floor, bleeding on the pulp chamber floor, endodontic explorer, champagne bubble test and the laws of orifice location as defined by Krasner and Rankow are helpful in diagnosing such canals [5]. Whereas radiographically, a sudden break of continuity of the main canal, indistinct image of the root, an off-centered file placed during working length determination suggest possibilities of unusual canal system. Careful interpretation of the periodontal ligament space can also indicate the presence of an extra root or canal. Mesial and distal angled views will often reveal the presence of a bi/trifurcation of the root canal. The use

Fig 6. Post operative IOPA of tooth 35 and 36
Рис. 6. Послеоперационная ВРПР зубов 35 и 36

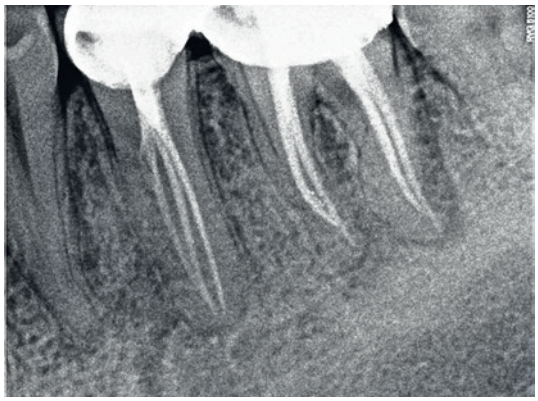

Fig 7. Follow up IOPA of tooth 35 and 36 after 10 months
Рис. 7. Послеоперационная ВРПР зубов 35 и 36 через 10 месяцев

of magnification and fiber optic illumination offers a tremendous advantage in locating and treating 'extra' canals [6].

The Surgical Operating Microscope has been found to be particularly helpful especially for appreciating the hypochlorite bubbling in the extra canal, marking its presence. On occasion, dyes or trans-illumination may be helpful in locating additional canals [6]. Missing the extra canal with separate foramina increases the chances of failure of endodontic therapy when compared to the extra canal with a common foramen [7].

Many clinicians have located three orifices in the pulp chamber of the lower second premolar, with one orifice in the lingual side and two in buccal. However here in mandibular premolar of Case 2, unusual anatomy was observed with a single canal divided into three canals, one in buccal and two in lingual side [8].

The cervical half of the root canal before trifurcation was wider than usual, with little or no taper. To get the straight line access to all three canals, Gates-Glidden drills were used in crown down fashion, reducing the stress on the files used subsequently to shape the canals and minimize the risk of instrument separation and canal transportation. For instrumentation, rotary Ni-Ti files were used since shaping outcomes with nickel-titanium instruments have been found to be most predictable [9]. Small, slightly pre-curved k- files and nickel titanium hand files were used to debride and shape the canals. During obturation of premolar, the three canals were filled one by one at first. Use of plugger ensured the patency of the canals adjacent to the one being obturated. Lastly, the main canal was obturated with warm vertical compaction to get a three dimensional seal.

Conclusion

These case reports describe the endodontic management of two teeth with variation in root canal system. A clinician should consider thorough assessment of radiographs, both pre treatment and during course of treatment to judge the canal tooth anatomy. Also, a proper access preparation under magnification along with knowledge and various methods mentioned can help in locating such canals. At last but not the least, special techniques can be used for preparing and obturating these canals, which is very important for the success of root canal therapy.

Statement

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