CASE REPORT

Treatment of a second maxillary molar with six canals

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Abstract

Variations in the dental anatomy are found in all teeth. Knowledge of these variations, particularly concerning the location and treatment of all canals, is very important for the success of the endodontic therapy. The purpose of this study is to present a clinical case of a maxillary second molar with three palatal canals, two mesio-buccal and one disto-buccal canal. This report serves to remind clinicians that such anatomical variations should be taken into account during endodontic treatment of the maxillary molars.

Introduction

The treatment of the entire root canal system is essential to maximise the possiblility of obtaining success in the endodontic therapy. It is necessary for the clinician to have a thorough knowledge of the dental anatomy, as well as of its variations.

Pécora *et al.* (1) studied the internal anatomy of 370 maxillary molars by diaphanisation and found that the maxillary first, second and third molars displayed three canals in 75%, 58% and 68% of the teeth respectively, while there were four canals in 25% of maxillary first molars, in 42% of second molars and in 32% of third molars. The fourth canal was found in the mesio-buccal root of the teeth in 100% of these cases.

Most studies in anatomical variations of maxillary molar teeth appear to deal with the first molar. There are references to teeth with four to six canals, and in the mesio-buccal and in the palatal roots, the number of canals can vary between one and three (2–8). There are also reports of two canals found in the disto-buccal root (9,10).

Anatomical variation studies in the second maxillary molars are not so numerous. Fava *et al.* (11) reported the presence of just one canal and one root in the second maxillary molars of the same patient, while Alani (12) encountered four roots in the second maxillary molars of the same patient bilaterally. Baratto-Filho *et al.* (13) carried out an *in vitro* study of two maxillary second molars with four canals and two different palatal roots. In the same year, Barbizam *et al.* (14) reported a similar study of a second maxillary molar also with four canals in four distinct roots.

It is worth mentioning that Benenati (15) presented a clinical case of a second maxillary molar with two palatal roots and a groove located at the side of the tooth.

The purpose of the present study is to report a clinical case of a second maxillary molar with six canals.

Case report

A 51-year-old male patient with melanoderma was directed to the dental clinic with acute irreversible pulpitis in the right second maxillary molar.

A preoperative radiograph (Fig. 1) was taken and, after anaesthesia and rubber dam placement, a conventional coronal access was made. It was initially possible to locate the mesio-palatal canal as well as the mesio-buccal, disto-buccal and palatal canals. These four canals were explored using a size 15 Flexofile file (Dentsply-Maillefer, Ballaigues, Switzerland). After the cervical preparation of the canals with Gates-Glidden drills numbers 1 and 2 (Dentsply-Maillefer, Ballaigues, Switzerland), a bleeding occurred at the centre of the pulp chamber floor. After the irrigation with 1% sodium hypochlorite (Dermus, Florianópolis, Brazil) and aspiration, two more orifices were discovered. These orifices were also explored and two more palatal canals were detected. Although being distinct, the canals were not very well defined due to a flattening of their outlines (Fig. 2). The radiographs taken

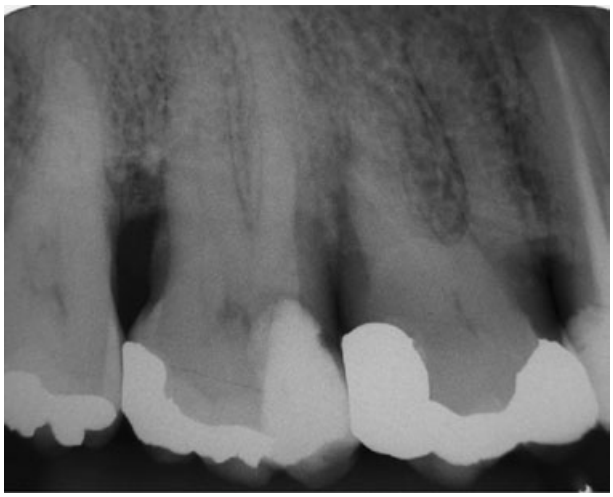

Figure 1 Preoperative radiograph.

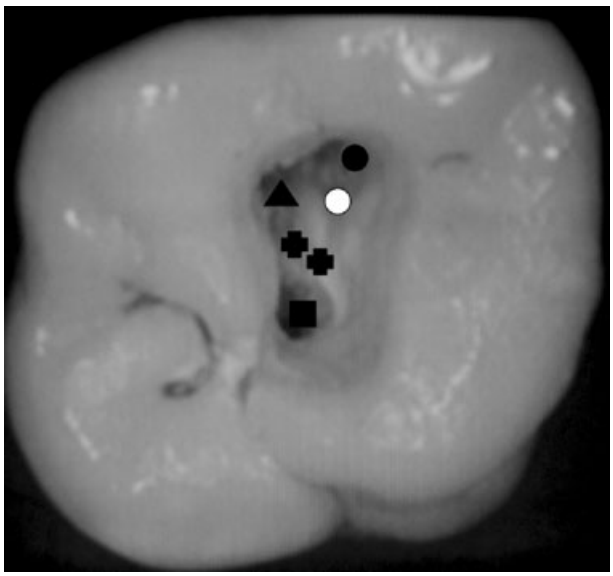

Figure 2 Illustration showing the location of orifice openings: mesio-buccal (black circle), mesio-palatal (white circle), disto-buccal (triangle), palatal (square) and palatals with orifice opening in the pulp chamber (cross).

during the working length determination (Figs. 3,4) aided in the understanding of the internal anatomy of this tooth and were taken with size 15 Flexofile files in the canals. The appointment was then concluded with the insertion of intra-canal corticosteroids (Otosporim, GlaxoWellcome, São Paulo, Brazil).

After 3 days, the correct working lengths of each canal were established by means of an apex locator (Bingo 1020, Engineering Technologies Forum, Rishon-Lezion, Israel).

Biomechanical preparation was performed with a size 35 file for the buccal canals and size 40 file for the palatal

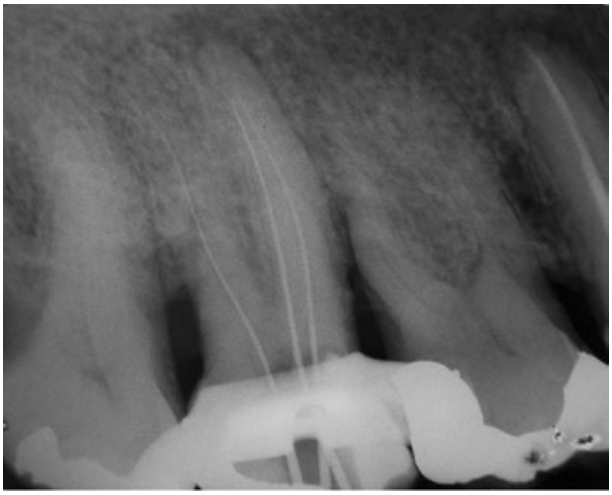

Figure 3 Radiographs taken during length determination.

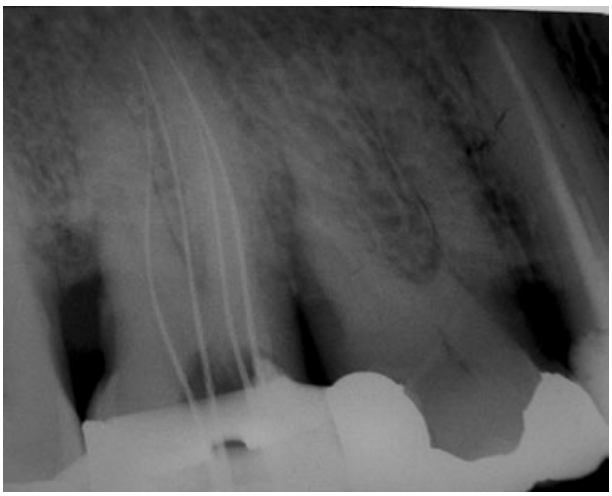

Figure 4 Further radiographs taken during length determination.

canals. Calcium hydroxide (Calem, SS White, Rio de Janeiro, Brazil) was used as the intra-canal medicament and it remained therein for 7 days. All canals were obturated with gutta-percha cones (Tanari, Manacapuru, Amazonas, Brazil) and Sealapex sealer (Sybron Endo, Glendora, CA, USA) using the Tagger hybrid technique (Figs. 5,6). The patient returned after 1 year for the clinical and radiographic follow-up (Fig. 7).

Discussion

Based on the literature and this clinical case, it is evident that knowledge of the anatomical variations of the maxillary molars is extremely important for the success of endodontic treatment. According to Cohen and Burns (16), canals are often not treated because they are not located.

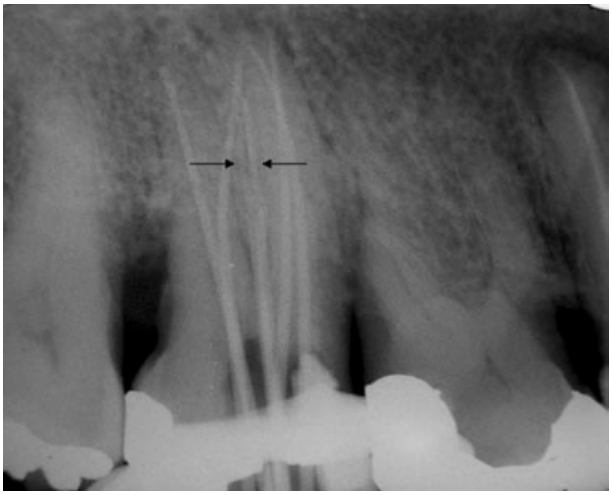

Figure 5 Fitting of gutta-percha points of the six root canals. Two palatals with orifice opening in the pulp chamber (*arrow*).

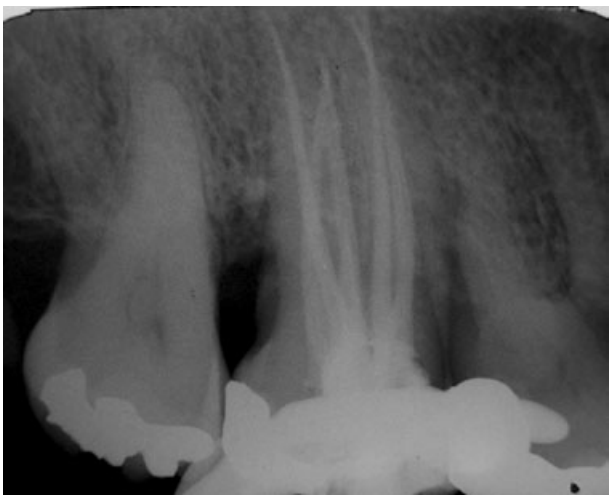

Figure 6 Obturation radiograph.

The clinician should give special attention to the evidence of the occurrence of anatomical variations throughout the procedure. In the present case, during access, removal of the coronal pulp and exploration of the canals, the presence of the bleeding on the pulp chamber floor was indicative of more canals and aided in the location of the two remaining palatal canals. Although they had three different orifice openings, these canals had a single apical foramen. The two mesio-buccal canals of the mesio-buccal root had separate apical foramina.

Despite Krasner and Rankow (17) having defined the laws of orifice location of the root canals, drawing conclusions that the orifices of the root canals are always located at the junction of the walls and the floor, at the angles in the floor-wall junction and at the terminus of the root developmental fusion, in the case described herein and as shown in Figure 2, two palatal canals were located at the centre of the pulp chamber floor. Despite such general suggestions about access, it is most important that careful attention is paid to any evidence of additional canals.

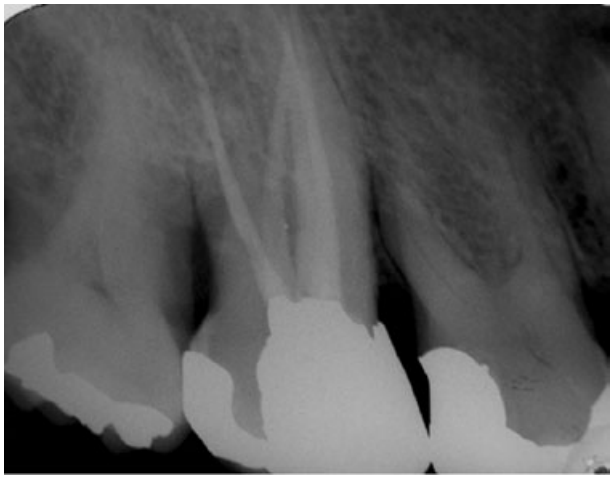

Figure 7 One-year radiographic follow-up.

A palatal root with two or more different canals has rarely been described (13,14,18). The current study showed the presence of three palatal canals, although in the final radiograph, two canals are more clearly observed, probably due to the flattening of these canals centrally located on the pulp chamber floor.

Another outstanding clinical observation in this case report is the length of the tooth, which was 26 mm; this value being an above-average length for second maxillary molars that have a maximum reported length of 24 mm (16). The length of the tooth can hinder the biomechanical preparation and filling.

The possibility of a palatal root with one or more canals, as well as the existence of two palatal roots should be considered when treating maxillary second molars. A variety of radiographic angulations should be used and, if this anomaly is confirmed, a broad coronal access will allow for correct localisation of root canals. Furthermore, the clinician should be attentive to the signs of anatomical variations, as in the present case, where the pulp chamber floor bleeding revealed the presence and the location of the palatal canals.

References

1. Pécora JD, Woelfel JB, Sousa Neto MD, Issa EP. Morphology study of the maxillary molars part II: internal anatomy. Braz Endod J 1992; 3: 53–7.

2. Slowey RR. Root canal anatomy: road map to successful endodontics. Dent Clin North Am 1979; 23: 555–73.
3. Cecic P, Hartwell G, Bellizzi R. The multiple root canal system in the maxillary first molar: a case report. J Endod 1982; 8: 113–18.
4. Martinez-Berna A, Ruiz-BadanellI P. Maxillary first molars with six canals. J Endod 1983; 9: 375–81.
5. Beatty RG. A five-canal maxillary first molar. J Endod 1984; 10: 156–7.
6. Wong M. Maxillary first molar with three palatal canals. J Endod 1991; 17: 298–9.
7. Jacobsen EL, NIIC. Unusual palatal root canal morphology in maxillary molars. Endod Dent Traumatol 1994; 10: 19–22.
8. Maggiore F, Jou YT, Kim S. A six-canal maxillary first molar: case report. Int Endod J 2002; 35: 486–91.
9. Bond JL, Hartwell G, Bellizzi R. Maxillary first molar with six canals. J Endod 1988; 14: 258–60.
10. Hulsmann M. A maxillary first molar with two disto-buccal root canals. J Endod 1997; 23: 701–8.
11. Fava LRG, Weinfeld I, Fabri FP, Pais CR. Four second molars with single roots and single canals in the same patient. Int Endod J 2000; 33: 138–42.
12. Alani AH. Endodontic treatment of bilaterally occurring 4-rooted maxillary second molars: case report. J Can Dent Assoc 2003; 69: 733–5.
13. Baratto-Filho F, Fariniuk LF, FerreiraEI, Pécora JD, Cruz-Filho AM, Sousa-Neto MD. Clinical and macroscopic study of maxillary molars with two palatal roots. Int Endod J 2002; 35: 796–801.
14. Barbizam JVB, Ribeiro RG, Tanomaru Filho M. Unusual anatomy of permanent maxillary molars. J Endod 2004; 30: 668–702.
15. Benenati PW. Maxillary second molar with two palatal canals and a palatogingival groove. J Endod 2004; 11: 308–10.
16. Cohen S, Burns RC. Pathways of the pulp. 7th ed. Missouri: Mosby; 1998.
17. Krasner P, Rankow HJ. Anatomy of the pulp-chamber floor. J Endod 2004; 30: 5–17.
18. Christie WH, Peikoff MD, Fogel HM. Maxillary molars with two palatal roots: a retrospective clinical study. J Endod 1991; 17: 80–4.