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Case Report

Endodontic management of small molars

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Introduction

Root canal anatomy and the macro-morphology of any tooth is not a constant factor, variations can be presented and the clinicians should be acquainted with it to achieve the goal of endodontics, prevention and elimination of apical periodontitis.¹ Lack of adequate knowledge of these variations result in iatrogenic mishap of missed anatomy and can predispose to treatment failures resulting in orthograde and in some cases retrograde endodontic retreatment.²

The root canal and the macro-morphology of maxillary premolars are highly variable. One of the deviations includes the presence of an 'extra root' giving the nomenclature of 'small molars' or 'ridiculous molars' as their anatomy resembles the adjacent maxillary molars. The reported

incidence of the three root scenario is less and it ranges between 0 and 6% in maxillary first premolar and 0.3–2% in maxillary second premolar.^{2,3}

The presented case series describes an unusual macro-morphology of maxillary first premolars with three roots and its endodontic management.

Case report

Case 1

An 18-year-old male patient with non contributory medical history reported to the dental office with continuous pain in the maxillary right quadrant. Clinical examination revealed proximal carious lesion in the maxillary first premolar (14). Intra oral periapical radiographic (IOPA) examination revealed distal carious lesion approximating the pulp and the rare phenomenon of three rooted 14 (Fig. 1a). Pulp sensibility tests were positive. A diagnosis of irreversible pulpitis for 14 was proposed and orthograde endodontic treatment was planned.

After obtaining the informed consent, the tooth was anaesthetized and isolated using rubber dam. Access cavity was performed using cavity access set (Dentsply Maillefer, Ballaigues, Switzerland). The access cavity design was 'T', shaped rather than the usual oval and mesio-buccal (MB) and disto-buccal (DB) orifice were in close proximity to each other. The palatal orifice was located beneath the palatal cusp.

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Fig. 1 – (a) Preoperative IOPA showing ‘fast break’ sign. (b) IOPA showing working length determination. (c) IOPA showing master cone GP placement. (d) IOPA showing completed obturation.

The working length of the root canals was determined using electronic apex locator (Root ZX, J. Morita Corp., Tokyo, Japan) and authenticated with IOPA (Fig. 1b). The root canals were prepared using Mtwo (VDW GmbH, Germany) rotary instruments. 2.5% of sodium hypochlorite and 17% of EDTA were used as root canal irrigants. Calcium hydroxide (Metapex, Meta Biomed Co., Ltd.) was used as root canal disinfectant and the tooth was temporized (Cavit, 3MESPE, Minnesota, USA).

The patient was recalled after a week and tooth was re-entered and irrigated to remove the calcium hydroxide. Chlorhexidine 2% (Asep RC, Stedman Pharmaceuticals Pvt., Ltd.) was used as final irrigant. Gutta percha (GP) master cones

(Dentsply Maillefer, Ballaigues, Switzerland) of appropriate size were selected (Fig. 1c) and the root canals were obturated using AH-Plus (Dentsply DeTrey, Konstanz, Switzerland) resin sealer (Fig. 1d). The access cavity was restored using composite resin (LuxaCore Z, DMG, Germany). Eight month follow up showed the patient asymptomatic.

Case 2

A 32-year-old male patient with non-contributory medical history referred to the dental clinic for endodontic

Fig. 2 – (a) Preoperative IOPA showing poorly filled 14 root canals and missed anatomy of DB root. (b) IOPA showing working length determination. (c) IOPA showing master cone GP placement. (d) IOPA showing completed obturation.

retreatment of 14. IOPA revealed poorly obturated root canals (MB and P) and missed anatomy of DB root (Fig. 2a). The tooth was anaesthetized and rubber dam was applied. The access cavity was refined to 'T' shape to gain access to the DB root canal orifice.

The GP from the root canals were retrieved using protaper universal retreatment files (Dentsply Maillefer, Ballaigues, Switzerland) and gear reduction hand piece (X-smart, Dentsply Maillefer, Ballaigues, Switzerland) rotary endomotor.

Intraoperative IOPA were taken to confirm retrieval of GP. Working length was determined using electronic apex locator and authenticated using IOPA (Fig. 2b). Cleaning and shaping of the root canals was done using protaper (Dentsply Maillefer, Ballaigues, Switzerland) rotary system and calcium hydroxide was used as intracanal medicament.

In the subsequent recall visit the canals were irrigated with 2% of chlorhexidine and obturated with appropriate master-cones (Fig. 2c) by lateral condensation method using AH plus

resin sealer (Fig. 2d). Six months followup showed the patient was asymptomatic.

Discussion

The usual radicular-morphology of maxillary first premolar presents with one or two roots with Vertucci's type IV and type V canal configuration in 60–65% and 6–7% respectively. Few case reports had presented single root with a single canal. The occurrence of third root in maxillary first premolar is a rare clinical scenario and the incidence varies between 0 and 6%.^{2,3} The formation of an accessory root could be related to hyperactivity of Hertwig epithelial root sheath or an invagination of dental papilla at a pathological degeneration site in the root sheath resulting in an extra root.⁴ Moreover, Midtbø et al⁵ evaluated root length, crown height and root morphology of patient's with Turner's syndrome and reported incidences of three roots in maxillary first premolar as one of the macro-morphological radicular variant.

The three canalled maxillary premolars could have one of following occurrences (i) a single root containing three independent canals, (ii) a buccal root containing two canals and the palatal root containing one, (iii) three independent roots and three independent canals in it.⁶ According to the above criteria the presented case series could be categorized in the third type.

Adjuvant methods like methylene blue dye test, champagne bubble test, white line test and red line test had been used in literature to locate additional canal.⁷ Moreover use of contemporary diagnostic aids like CT (computed tomography) and CBCT (cone beam computed tomography) could provide valuable diagnostic data when canal aberrations are encountered.^{8,9}

According to Cantatore et al² missed root(s) and canal(s) had a negative impact on the outcome of endodontic treatment and maxillary first premolar presented with high incidence of lateral ramifications compared to molars making an increased risk of endodontic mishap of missed anatomy. In order to prevent the mishap of missed anatomy, their study advocated properly angled pre-operative radiograph, properly designed endodontic access cavity, use of magnification and ultrasonics.

In the presented case series eccentric location of root canal orifices and “fast break” (abrupt narrowing and disappearance of the pulp space) IOPA sign along with increased mesio-distal

width of the midroot compared to the crown provided the suspicion of an extra root. In both the case reports 20° mesial angulation of IOPA showed three roots of 14 with its distinct lamina dura. Moreover modification of the access cavity outline, careful examination of the developmental fusion lines and tactile sense of the exploratory files were valuable intra-operative aids in the management of this uncommon ‘small molar’ scenario.

Conflicts of interest

All authors have none to declare.

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