

Atypical external root anatomy in permanent second molar: Case Report

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Abstract

Most observed external root canal morphology of permanent maxillary second molar is with three roots and permanent mandibular second molar with two roots but variation like single root are observed. Occurrence of single rooted all four permanent second molars in same patient is a rare anatomic appearance and reported scarcely in literature. Reporting such findings contributes towards enhancing basic knowledge of tooth morphology, its variations and enhanced endodontic management.

Keywords: Aberrant anatomy, Permanent second molars, Single canal, Single root

Introduction

Variations regarding external root configuration and internal pulp canal morphology are observed in diverse patterns in different human races and different in individuals of same race.¹ Presence of one single root can be observed in any of permanent molars but routinely seen with second and third molars with more of female predilection.²

Current report presents with a case of atypical external root anatomy in all permanent second molars i.e. single root and most probably single canal as appeared in radiographic evaluation (Vertucci's class I). Such rare finding is scarcely documented and one such by Fava and et al.³ Such variations are frequently associated with mandibular molars. Most of the researches regarding anatomic variations are focused on maxillary first molar as variations in second molars are considered to be rare.⁴

Case Series

Case 1: A 26 year male patient reported to the Department of Conservative and Endodontics with the chief complaint of occlusal caries with 36 and presented with history of orthodontic treatment and extraction of 46 prior to orthodontic treatment. Orthopantomograph (OPG) revealed that all the second molars present with single, conical and tapering external root configuration (Fig. 1).

Case 2: A 34 year female patient reported with the chief complaint of pain in maxillary posterior teeth. On examination deep carious lesion was seen with 26. It was observed on OPG that all the second molars present with single, conical and tapering external root configuration. (Fig. 2) Radiographic evaluations in multiple angulations revealed presence of single root canal system or may be on clinical exploration c shaped configuration could have been revealed. The tooth 26 was further evaluated for deciding the treatment protocol.

Case 3: A 18 year female patient reported with the chief complaint of decayed tooth in mandibular right posterior

tooth. Clinical examination revealed presence of impacted 38 and OPG revealed single root configuration with all permanent 2nd molars. (Fig. 3)

Case 4: A 17 year female patient reported with the chief complaint of malaligned tooth. Clinical examination revealed multiple impacted tooth and OPG was advised. On OPG single root configuration was seen with all permanent 2nd molars. (Fig. 4)



Fig. 1: OPG showing all molars with single root configuration with 2nd permanent molars



Fig. 2: OPG showing all molars with single root configuration with 2nd permanent molars



Fig. 3: OPG showing all molars with single root configuration with 2nd permanent molars



Fig. 4: OPG showing all molars with single root configuration with 2nd permanent molars

Table 1: Various population studies on root and root canal anatomy of 2nd permanent molar

Sr. No	Author	Year	Population	2 nd Permanent Molar	Total Sample	Single root or one fused root
1.	Manning ⁵	1990	Australia	Mandibular	149	14
2.	Gulabivala et al ⁶	2001	Burma	Mandibular	134	06
3.	Gulabivala et al ⁷	2002	Thailand	Mandibular	60	00
4.	Ahmed et al ¹	2007	Sudan	Mandibular	100	04
5.	Peiris et al ⁸	2007	Sri Lanka	Mandibular	100	00
6.	Rahimi et al ⁹	2008	Iran	Mandibular	139	06
7.	Rwenyonyi et al ¹⁰	2009	Uganda	Mandibular	223	00
8.	Al-Qudah AA and Awawdeh LA ¹¹	2009	Jordan	Mandibular	355	08
9.	Neelakanta et al ¹²	2010	India	Mandibular	345	00
10.	Neelakanta et al ¹³	2010	India	Maxillary	205	02
11.	Park et al ¹⁴	2013	Korea	Mandibular	710	13
12.	Jahromi et al. ¹⁵	2013	Iranian	Mandibular	100	06
13.	Nur et al. ¹⁶	2014	Turkey	Mandibular	1165	116
14.	Rouhani A et al ¹⁷	2014	Iranian	Maxillary	125	00

Table 2: Reported cases of 2nd Molar with single root and single canal

Sr. No	Author	Year	Case reported	Unilateral /bilateral
1.	Neeta shetty ¹⁸	2009	Mandibular	Unilateral
2.	Manul Thomas ¹⁹	2009	Mandibular	Unilateral
3.	Naveen Kumar ²⁰	2010	Mandibular	Unilateral
4.	Puneet Ahuja ²¹	2012	Maxillary	Unilateral
5.	Deepak Sharma ²²	2012	Mandibular	Unilateral
6.	Sharddha Choksi ²³	2013	Mandibular	Unilateral
7.	Anna Roy ²⁴	2013	Mandibular	Unilateral
8.	Sahli Singh Thakar ²⁵	2014	Mandibular	Bilateral
9.	Ajeti ⁴	2015	Maxillary	Unilateral

Discussion

Various studies are performed to evaluate external root and root canal morphology of maxillary and mandibular second permanent molars on various populations. Prevalence rate for presence of single rooted second permanent molars according to most of the studies is least in number. Table 1 represents studies done on various populations and table 2 presents with various case reports.

Endodontic success begins with proper estimation of external tooth configuration and intricate internal anatomy, any possible deviation from the normal external root configuration presents with the fact that there may be possible internal variation too. Role of visualisation in endodontics has increased form past to present in many folds. With the appearance of devices like cone beam volumetric tomography(CBVT), radiovisiography(RVG), endodontic microscopes, surgical loupes and potentially emerging endoscopes and magnetic resonance imaging achieving proper success and enhanced prognosis of endodontic therapy has increased.

Routinely the first line of imaging modality comes as intra oral periapical radiograph(IOPA) but with many disadvantage mainly, two dimensional image of a three dimensional object. Due to various clinical constrains application of higher imaging modalities are always not possible to be used, in that case multiple plane IOPAs can be used to identify the possible variations.

Single root and single canal configuration observed in 2nd molars presents with difficult endodontic configuration to treat and three dimensionally obturate. It is reported that very often single canals are c-shaped in configuration,²² it is also observed that Chinese, Korean and Indian population shows more prevalence of c-shaped configuration,^{26,27} in which cleaning and shaping and obturation is potentially difficult. Reporting of such cases is of prime importance so as to enhance knowledge of clinician for better management.

Conclusion

Presence of single root and single canal in mandibular and maxillary second molars is a rare configuration that too presence in one single patient. Current case emphasises on enhancing basic knowledge of external root aberrations and possible internal root canal anatomy variations so as to improve the quality of endodontic therapy.

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