

Contemporary Approach in Successful Endodontic Intervention in 'Radix Entomolaris'

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ABSTRACT

The main objective of successful endodontic therapy is thorough mechanical shaping and chemical cleaning of the entire root canal system followed by three-dimensional obturation. Variation of the root canal morphology especially in multirouted teeth is a constant challenge for diagnosis and successful endodontic therapy. Mandibular molars can have an additional root located lingually (the radix entomolaris) or buccally (the radix paramolaris). An awareness and understanding of presence of additional root and unusual root canal morphology is essential as it determines the successful outcome of endodontic treatment. The present article focuses on the identification, access cavity modification and contemporary management of the distolingual root of mandibular 1st molars.

Keywords: Mandibular first molar, Radix endomolaris, Anatomical variation, WaveOne.

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INTRODUCTION

Knowledge of tooth and root canal anatomy is important for dental practice and for identifying features of anthropologic significance. According to Barrett, 'Of all the phases of anatomic study in human system, one of the most complex is that of pulp cavity morphology.' Knowledge of the common root canal morphology and its possible variations is fundamental because the nontreatment of one canal can lead to endodontic treatment failure.¹ Permanent mandibular first molars usually have two roots

mesial and distal and three root canals, but variations in the number of roots and in canal morphology are not uncommon.² The additional third root, (i.e. the supernumerary root) in permanent mandibular first molar variants that have three roots is typically distributed lingually. This was first described by Carabelli in 1844³ and was termed radix entomolaris (RE) by Bolk in 1915.⁴ Similarly an additional root at the mesiobuccal side of the distal root of the mandibular molar is called the radix paramolaris (RP). A RE can be found on the first, second and third mandibular molar, occurring least frequently on the second molar. Incidence of bilateral occurrence of RE varies between 50 to 67%.⁵

Ribeiro and Consolaro⁶ proposed a classification for radix entomolaris as follows (Fig. 1):

Type I refers to a straight root/root canal.

Type II to an initially curved entrance and the continuation as a straight root/root canals.

Type III to an initial curve in the coronal third of the root canal and a second buccally orientated curve starting from the middle to apical third.

Prevalence of Mandibular Molars with Three Roots

The prevalence of three rooted mandibular molars is 2.6% among mongoloids, 1.8% among Negros, 1.7% among Caucasians as per the study of Ferraz and Pecora in 1993. Costa Rocha et al in 1996 found the prevalence to be 1.5% in common population. In another study by J Segura-Egea et al in 2002, the prevalence was less than 5% in Caucasians,

Table 1: Prevalence of three rooted mandibular teeth

Authors	Year	Population	Prevalence of three roots (%)
Ferraz and Pecora	1993	Mongoloid	2.6
		Negro	1.8
		Caucasians	1.7
Costa Rocha et al	1996	—	1.5
J Segura Egea et al	2002	Caucasians, Africans, Eurasians, Indians	<5
Gulabivala et al	2002	Mongolian	5.40
FL Calberson,	2007	Thai	13
RJ De Moor		European	3.4-4.2
		Eurasian and Indian	<5
		Mongoloid	5.40

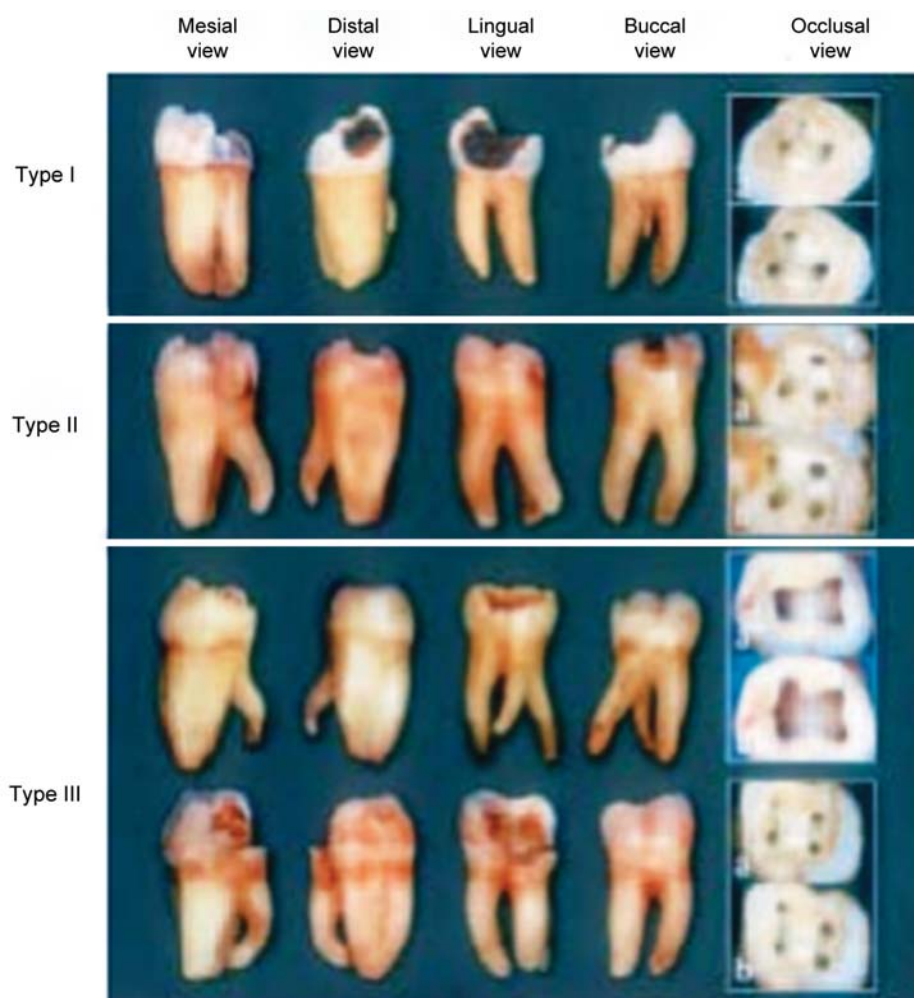


Fig. 1: Classification of radix entomolaris

Africans, Eurasians and Indians and 5 to 40% in mongoloids. According to Gulabivala et al there was 13% prevalence of three rooted mandibular molars in Thai population in 2002. In yet another study by FL Calberson, RJ De Moor the prevalence was found to be 3.4 to 4.2% in European population, less than 5% in Eurasian and Indian population and 5 to 40% Mongoloid population (Table 1).^{6,7} According to Quackenbush, extraroot occurred unilaterally in approximately 40% of all cases and was seen predominantly on the right side.

This article describes the diagnosis and nonsurgical endodontic management of series of cases with radix entomolaris.

CASE REPORTS

Case 1

A 32-year-old male patient was reported to the Department of Conservative Dentistry and Endodontics at YMT Dental College and Hospital, Kharghar with a chief complaint of pain in the lower right back region. On history taking the

patient gave a history of intermittent pain for 6 months that increased intensity for the past 2 days. On clinical examination the tooth presented an extensive occlusal carious lesion. The pretreatment radiograph showed deep occlusal caries involving the pulp and an additional root between the mesial and distal roots that showed apical radiolucency. Two radiographs with different horizontal angulations were made which confirmed that the additional root was located distolingual to the mesial root. He complained of pain while biting, tenderness to percussion, sensitivity to heat and cold and it was diagnosed as apical periodontitis and endodontic treatment was planned. The tooth was anesthetized and then isolated under rubber dam. Caries were excavated and a standardized trapezoidal access cavity was made using endoaccess burs. Two distal (one of which was located very lingually) and two mesial canal orifices were located using an endodontic explorer. The canal lengths were determined using radiograph and an apex locator. Initial glide path was prepared till 15# k-files in all the canals which were followed by use of Sx for opening orifice and final cleaning and shaping was performed using



Fig. 2A: Preoperative RVG

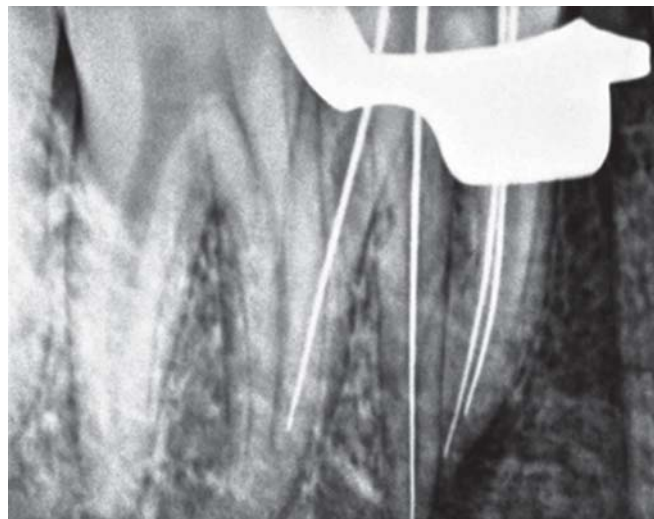


Fig. 2B: Working length RVG

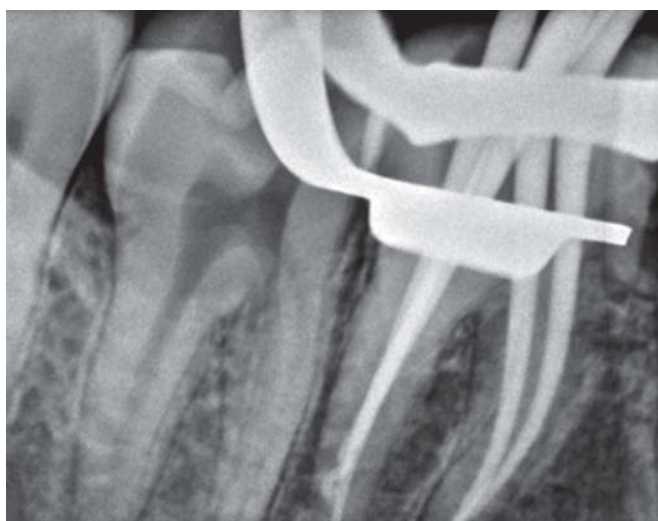


Fig. 2C: Mastercone RVG

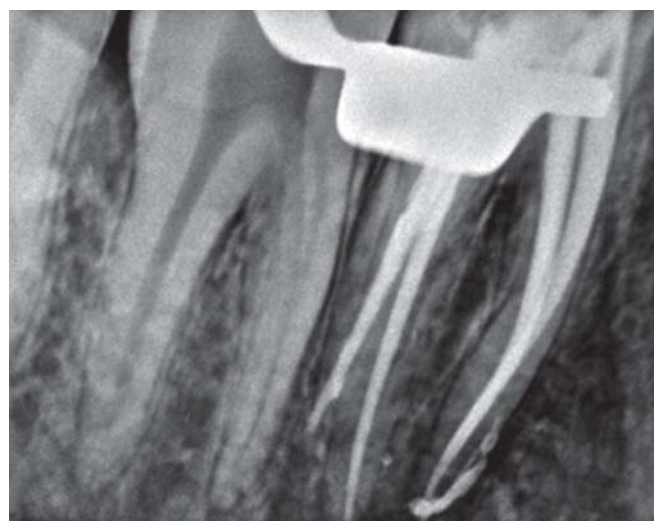


Fig. 2D: Postobturation RVG

single waveOne (red) primary reciprocating single file system. Irrigation between each instrument was done using 5.25% sodium hypochlorite and RC-Help was used as a lubricant for each file. A final rinse was done using sodium hypochlorite followed by 17% EDTA. After the master cone selection canals were obturated with laterally condensed gutta-percha and AH Plus sealer (Figs 2A to D).

Case 2

A 28-year-old female patient was reported to the Department of Conservative Dentistry and Endodontics at YMT Dental College and Hospital with the complaint of pain in the lower left back tooth region. Patient gave a history of pain since 2 weeks. Preoperative radiograph revealed deep occlusal caries involving the pulp with a faint outline of an additional root overlapping the mesial and distal roots. Clinical, radiographic examination and pulp testing of left mandibular first molar revealed that the tooth was symptomatic and endodontic treatment was planned. Patient had a severe gag

reflex on application of rubber dam and hence the treatment was decided to be undertaken under cotton roll isolation. The treatment followed the same way as in case 1 and the tooth was obturated (Figs 3A to D).

Case 3

A 32-year-old male patient reported to the Department of Conservative Dentistry and Endodontics at YMT Dental College and Hospital with chief complaint of pain in lower right posterior tooth 46. The medical history was non-contributory. Clinical examination revealed deep occlusal caries and substantial destruction of the crown part of the tooth. The preoperative radiographs revealed the presence of an additional distolingual root and an endodontic therapy was planned. Local anesthesia was administered and rubber dam isolation was done followed by the root canal treatment as in the same way as in case 1 and the tooth was obturated (Figs 4A to C).



Fig. 3A: Preoperative RVG

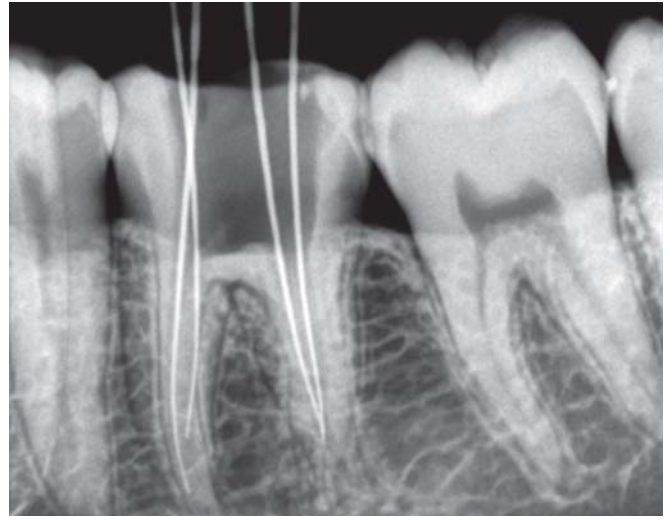


Fig. 3B: Working length RVG



Fig. 3C: Mastercone RVG



Fig. 3D: Postobturation RVG

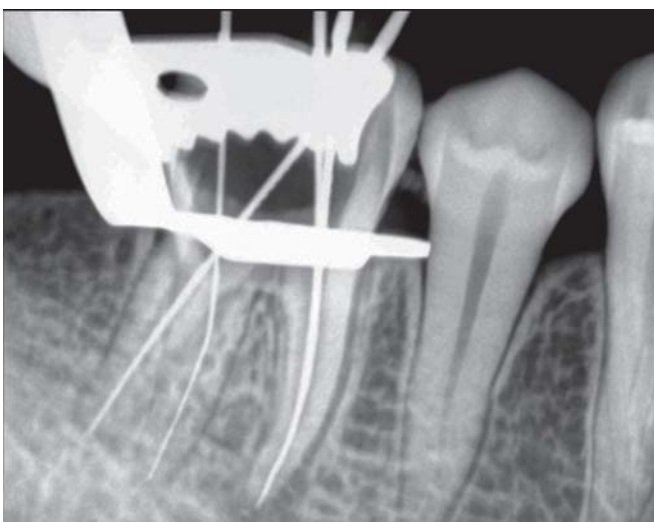


Fig. 4A: Working length RVG

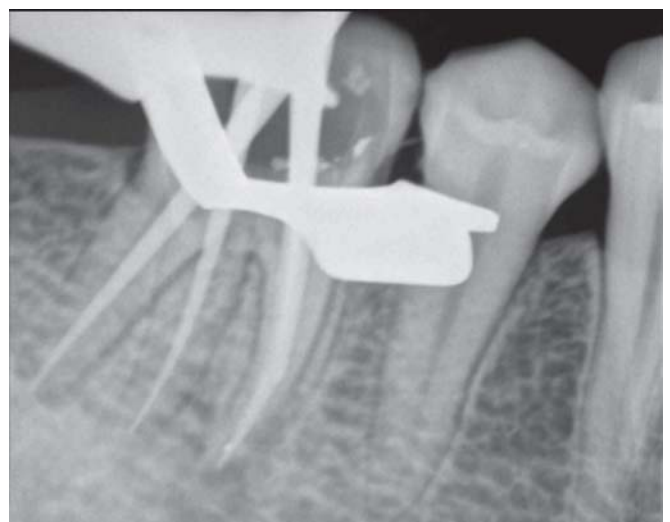


Fig. 4B: Mastercone RVG

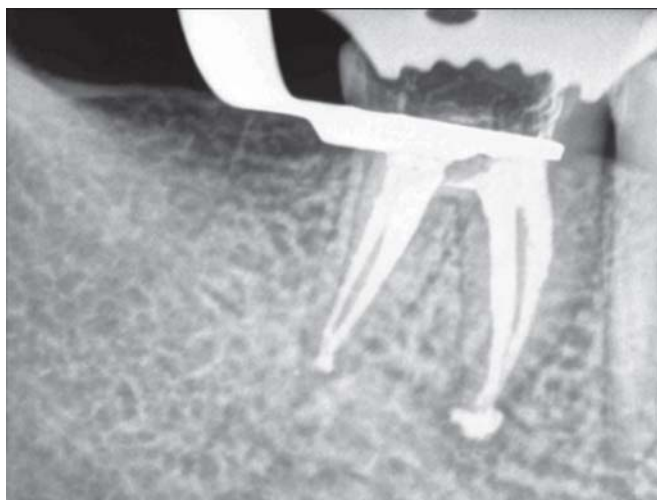


Fig. 4C: Postobturation RVG

DISCUSSION

Radix entomolaris can be found on the first, second and third mandibular molar, occurring least frequently on the second molar. Bilateral occurrence of the RE ranges from 50 to 67%.⁸ In a study by Garg et al it was concluded that the frequency of occurrence of an extraroot in the mandibular first molar is 5.27% in the Indian population.⁹ The presence of RE can predictably challenge the success of endodontic treatment if missed. An accurate diagnosis of these supernumerary roots can avoid complications and failure of the root canal treatment.¹⁰ According to Walker and Quackenbush,¹¹ normally a third root should readily be evident in about 90% of cases radiographically, but occasionally it might be difficult to see because of its slender dimensions. In addition, a file placed in such a root might give an artifactual appearance of a perforation. In such instances, an angled view (vertically and horizontally) is always beneficial.¹² With the distolingually located orifice of RE, a modification of the classic triangular opening cavity to a trapezoidal form is essential and attaining a straight line access is must.¹³ A thorough inspection of the preoperative radiograph and interpretation of particular marks or characteristics, such as an unclear view or outline of the distal root contour or the root canal, can indicate the presence of a 'hidden' RE. A second radiograph should be taken from mesial and distal angulations. With a good knowledge of law of symmetry and law of orifices, various methods like, visualizing the dentinal map and canal bleeding points, using DG-16 explorer, microopener, troughing of the grooves with ultrasonic tips, staining the chamber floor with 1% methylene blue dye, champagne bubble test, magnetic resonance microscopy, CBCT and microcomputed tomography will be useful to locate the canals.¹⁴

A severe root inclination or canal curvature, particularly in the apical third of the root can cause shaping aberrations, such as straightening of the root canal, ledge formation, root canal transportation resulting in loss of working length. Therefore, after the canal location, orifice enlargement, working length determination and glide path preparation till 15# K-files should be administered followed by completion of shaping and cleaning by flexible nickel-titanium rotary files or as in these case series by waveOne reciprocating files. All of these steps help the file to attain a more centered preparation with restricted enlargement of the coronal third of the root canal.

A reciprocating motion decreases the impact of cyclic fatigue on NiTi rotary instrument's life when compared with rotational motion.¹⁵ The waveOne NiTi file system is a single-use, single-file system to shape the root canal completely from start to finish. It is single NiTi instrument resulting in decreased shaping time, allowing the clinician to spend more time cleaning the root-canal system with enhanced irrigation techniques. No risk of cross-contamination as it is single use file which also eliminates procedural errors by using a single instrument rather than using multiple files.¹⁶

CONCLUSION

Not knowing the anatomy of the tooth we are treating is like setting out on an unknown journey without a road map. Skilled endodontist should always properly evaluate the radiographs to interpret the root canal anatomy and its variations or suspect the abnormalities needing further verification use of recent available Spiral CT and CBCT. Contemporary instrumentation not only effectively establishes the biomechanical preparation but also will reduce the incidence of complications thereby leading to successful endodontic intervention while dealing with rare anatomical abnormalities. Our experience is suggestive of waveOne that can be the best choice that would not only reduce the procedural errors during endodontic intervention but also establish a proper canal shape for 3D obturation.

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