

Resolving The Hidden And Intricate Canals- A Case Series

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Abstract:

Successful endodontic therapy relies on the objectives of accurate diagnosis, complete debridement and three dimensional obturation of root canal system. However complexities such as extra canals and root roots as well as canal intricacies determines the prognosis of root filled teeth. This case series presents four individual case reports depicting the variability of canal space.

Keywords: Extraneous root, Radix Entomolaris, C shaped canals, AH Plus sealer

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I. Introduction:

The successful progress of treatment and prognosis of endodontic therapy relies on clinician's anatomical knowledge of all the possible aberrations, appropriate diagnosis, treatment plan based on various risk factors, and proper disinfection of the root canal system. As stated earlier by Barret that "Of all the phases of anatomic study in the human system, one of the most complex is that of pulp cavity morphology" holds true as there is no single rule and prediction of root canal system.^{1,2}

The intricacies of the root canal system such as presence of extra canal, multiple foramina, apical delta, furcation accessory canals etc directly affect the clinical outcome of the endodontic treatment. Ingle stated apical percolation, Ignorance of internal anatomy and subsequent diffusion as most frequent cause of endodontic failure as it effects debridement of canal and three dimensional sealing. Out of all failures, missed extra roots accounts for about of 3% failure chances.³

Radix Entomolaris refers to presence of extra root, vastly associated with permanent mandibular first molars in 5% of Indians. However the exact mechanism of formation of Radix Entomolaris is still unclear. Its formation might have been related to environmental factors during odontogenesis, presence of an atavistic gene or polygenetic system.⁴ Radix Entomolaris is located distolingually, with its coronal third fixed to the distal root in about 68% of all extra roots. The dimensions of the Radix Entomolaris can vary from a short conical extension to a 'mature' root with normal length and root canal.^{5,6}

Carlsen and Alexandersen describes four different types of Radix Entomolaris according to the location of the cervical part: types A, B, C and AC. Types A-and B refer to a distally located cervical part of Radix Entomolaris with two normal and one normal distal root components, respectively. Type C refers to a mesially located cervical part, while type AC refers to a central location, between the distal and mesial root components. The inclination, the root can be straight or curved to the lingual.⁵

De Moor et al based on the curvature of the separate Radix Entomolaris classified variants in buccolingual orientation. Type I refers to a straight root/root canal, while type II refers to an initially curved entrance which continues as a straight root/root canal. Type III refers to an initial curve in the coronal third of the root canal and a second curve beginning in the middle and continuing to the apical third.⁶

Wang et al (2018) gave another classification for Radix Entomolaris depending on its radiographic appearance.

Type 1– Presents the most identifiable radiographic image

Type 2– A large beam angulation is necessary mesially or distally for their identification

Type 3– Merging of the adjacent distobuccal root makes identification extremely difficult.

The identification, location of Radix Entomolaris and its management is very critical and challenging as most of these roots acts as harbour for bacteria and leads to failure of endodontic therapy.⁷

II. Case Presentation:

Case 1:

A 37-year-old female patient reported to the department of conservative dentistry and endodontics, Mamata Dental College, Khammam with a chief complaint of pain in her lower right back tooth area since 5 days. Patient reported of pain which was lingering, spontaneous, radiating to angle of mandible, aggravated on biting and relieving on medication. On Clinical examination of the right mandibular first molar revealed the presence of deep carious lesion which was tender on vertical percussion. Electric pulp testing revealed a delayed response when compared to contralateral tooth suggestive of pulpal necrosis irt 46. The treatment proposed was non- surgical endodontic therapy followed by prosthetic rehabilitation irt 46.

After obtaining informed consent from the patient, 2% lignocaine with 1:80,000 epinephrine local anaesthesia was administered followed by conventional access to the pulp chamber revealed an additional canal orifice distolingually suggestive of radix entomolaris. Biomechanical preparation was done using Protaper gold rotary file system till F2 (25/0.06) size in all four canals, smear layer removal was done using 3% NaOCl followed by 17% EDTA, Single cone Obturation was done on same day using Zinc oxide Eugenol sealer followed by prosthetic rehabilitation using Zirconia crown.

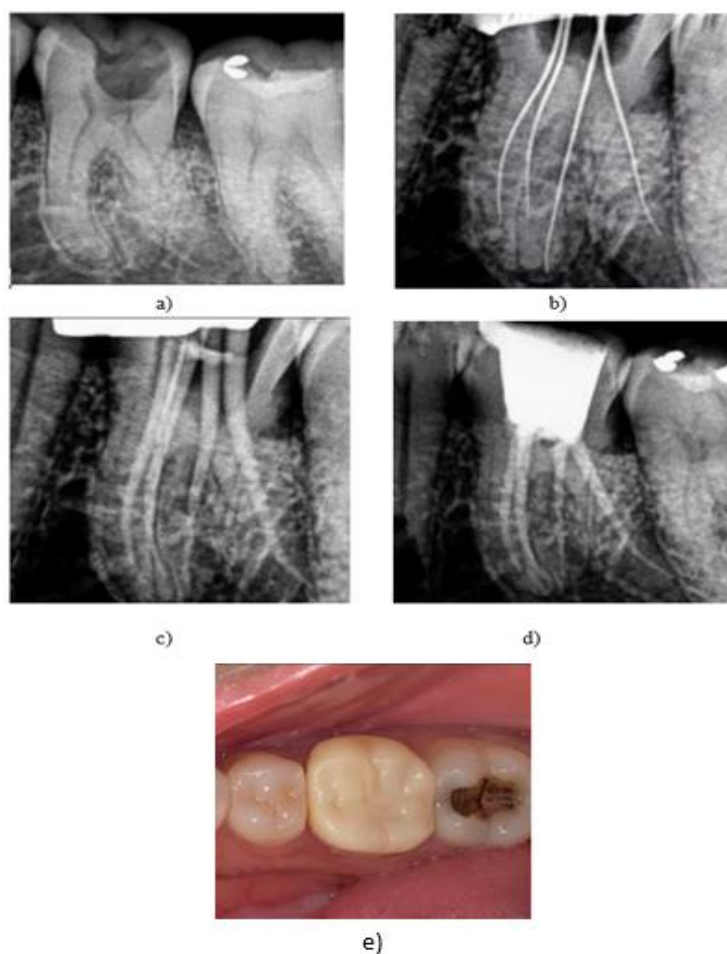


Figure 1: a) preoperative radiograph irt 46 b) Working length radiograph irt 46
c) Master cone radiograph irt 46 d) Obturation radiograph irt 46 e) Zirconia crown irt 46

Case 2:

A 28-year-old female patient reported to the department of conservative dentistry and endodontics, Mamata Dental College, Khammam with a chief complaint of pain in her lower right back tooth region since 2 days which was pricking type, continuous, non-radiating, aggravated on biting and not relieving on medication. On Clinical examination revealed deep carious right mandibular second molar which was tender on vertical percussion. Electric pulp testing revealed negative response when compared to contralateral tooth suggestive of pulpal necrosis irt 47. The treatment protocol was non- surgical endodontic therapy followed by prosthetic rehabilitation irt 47.

After obtaining informed consent from the patient, 2% lignocaine with 1:1,00,000 epinephrine local anaesthesia was administered followed by conventional access to the pulp chamber revealed an additional canal orifice within center of pulp chamber suggestive of an extra root. Initial Biomechanical preparation was done till 25k file size followed by Protaper gold rotary file system till F2 (25/0.06) size in all canals, Irrigation was done using 3% NaOCl followed by 17% EDTA and Saline, calcium hydroxide dressing was placed for 7 days sealed with ZOE temporary restorative material. During second visit, Calcium hydroxide dressing was removed using 2mL of saline followed by Single cone Obturation using Zinc oxide Eugenol sealer followed by prosthetic rehabilitation using Metal crown.

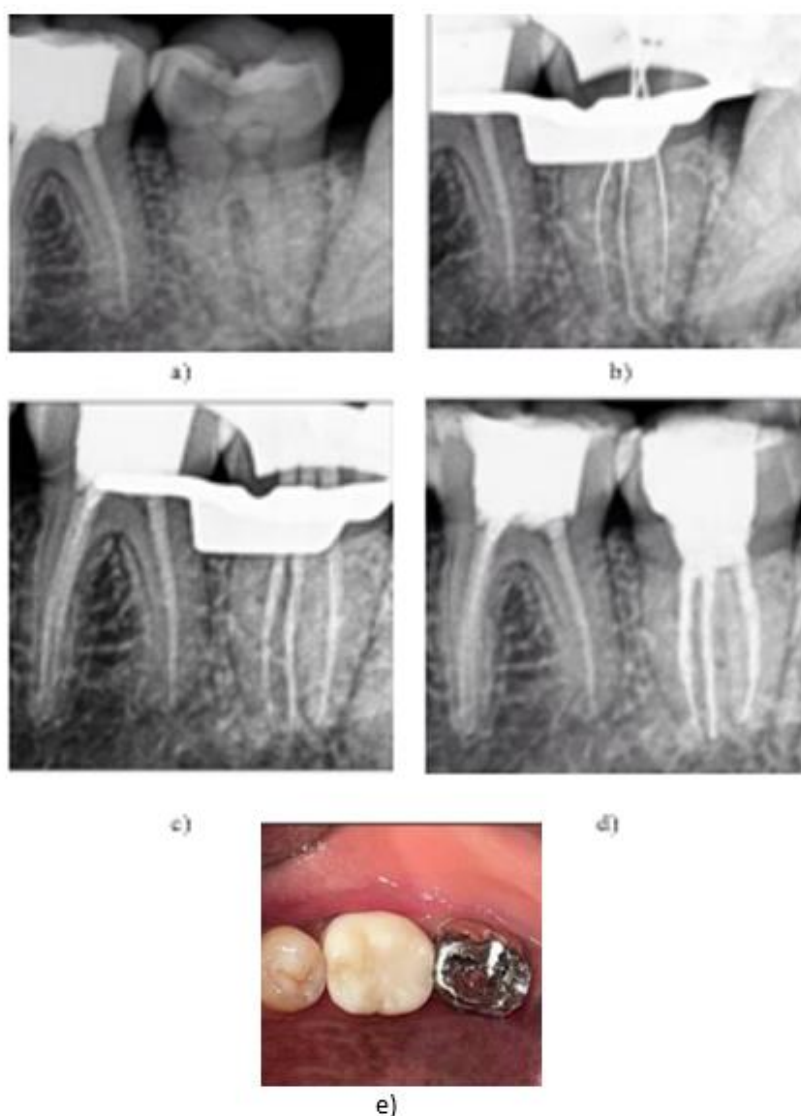


Figure 2: a) preoperative radiograph irt 47 b) Working length radiograph irt 47
c) Master cone radiograph irt 47 d) Obturation radiograph irt 47 e) Metal crown irt 47

Case 3:

A 50-year-old male patient reported to the department of conservative dentistry and endodontics, Mamata Dental College, Khammam with a chief complaint of fractured cusps in his lower left back tooth region since 4 months, and was asymptomatic with frequent episodes of gnawing, mild, non-radiating pain during night time. On Clinical examination revealed fractured distolingual cusp involving distal pulp horn in relation to left mandibular first molar which was mild tender on vertical percussion. Electric pulp testing revealed negative response when compared to contralateral tooth suggestive of pulpal necrosis irt 36. The treatment protocol was non- surgical endodontic therapy followed by prosthetic rehabilitation irt 36.

After obtaining informed consent from the patient, 2% lignocaine with 1:80,000 epinephrine local anesthesia was administered followed by conventional access to the pulp chamber, C Pilot files were used for glide path followed by Biomechanical preparation was done till 25k file size followed by Protaper gold rotary file system till F1 (20/0.06) size in all canals, Irrigation was done using 3% NaOCl followed by 17% EDTA and Saline, calcium hydroxide dressing was placed for 7 days sealed with ZOE temporary restorative material. During second visit, Calcium hydroxide dressing was removed using 2mL of saline followed by Manual dynamic agitation using F1 Gp cone and 3% NaOCl. Single cone Obturation was done using Zinc oxide Eugenol sealer. Patient presented with satisfactory results.

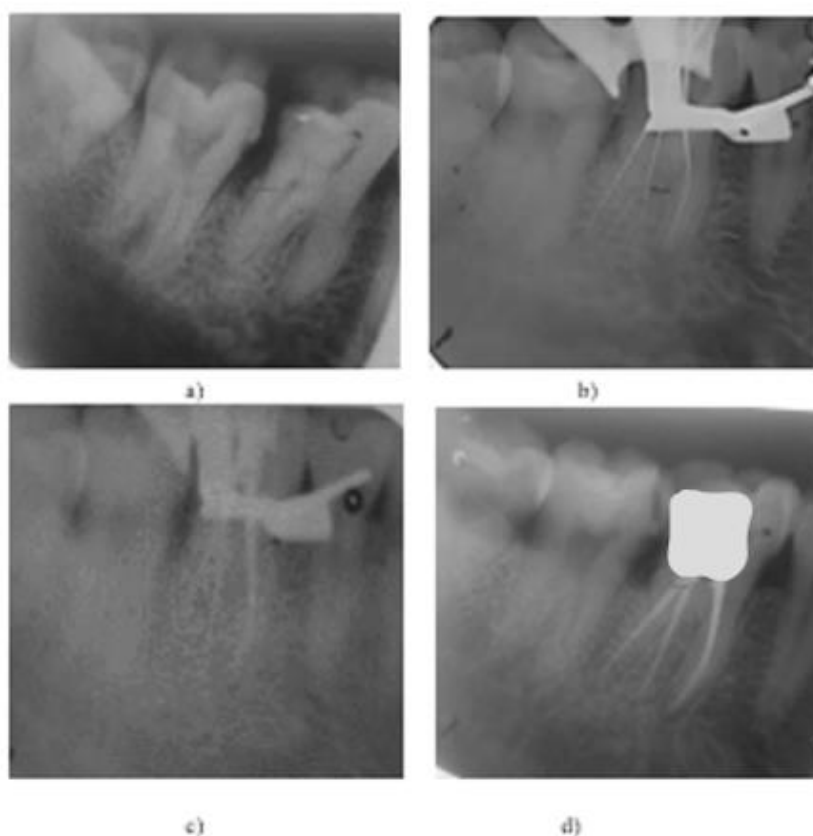


Figure 3: a) Preoperative radiograph irt 36, b) Working length radiograph irt 36, c) Mastercone radiograph irt 36, d) Obturation radiograph irt 36

III. Discussion:

For effective endodontic therapy, anatomical familiarity and ability of predictability and foreseeing possible canal variations plays a better prognostic factor. Literature witnessed varying morphology in mandibular molars which includes extra root, extra canals, lateral and furcation canals. Compared to the mesial canals, the single distal canal typically varies with 28% frequency of two distal canals where orifices are small and located either buccally or lingually.^{4,8}

An accurate identification of supernumerary roots can avoid failures caused by missed canals. The presence of additional root in mandibular molar located distolingually is termed radix entomolaris. The present case series represent Radix Entomolaris management. They should be evaluated clinically and radiographically for proper management.⁹

Various means of identification of Radix Entomolaris includes Clinical inspection of the tooth crown and cervical sounding of roots by means of periodontal probing, endodontic explorer, pathfinder, DG 16 , JW 17 probes, champagne effect using hypochlorite in pulp chamber. A dark line on the pulp chamber floor can indicate the precise location of the canal orifice, presence of an apical rarefaction on the lateral side of the root, the eccentric location of an endodontic file on a radiograph during working length determination and Conventional 2–dimensional radiographs might not reveal anatomical intricacies like fins, apical delta necessitating 3 dimensional CBCT, which can improve treatment efficiency.^{2,7,8} In the present case series, Radix Entomolaris was identified assessing preoperative radiograph, hence Conventional access was planned which revealed an extra canal orifice.

The radix canal orifice has the potential to be blocked by secondary or calcified, the use of magnification with appropriate illumination and straight-line access is critical. The Conventional access preparation enables identifying the atypical canals. A sound knowledge of the law of access opening, proper visualization of the coronal dentinal map and canal bleeding points can aid in diagnosing and locating extra canals.¹⁰ De Moor et al. studied the morphology of radix entomolaris and concluded that in the majority of cases, these canals were curved.⁶

Sodium hypochlorite, commonly used halogenated irrigant, endorsed as an pillar during endodontic treatments. The chlorine ion exists at pH values 4 and 7, as hypochlorous acid possess higher penetration ability of uninstrumented areas. 17% EDTA is commonly employed which employs by chelating with calcium ions and removes inorganic portion of smear layer.¹¹ Hence conventional irrigation protocol using NaOCl and EDTA was used in present case series.

Contemporary irrigants are delivered using syringe and a needle. But due to apical “vapor lock”, which impede optimal irrigant delivery with syringe affecting canal debridement. To overcome this various activation systems have been developed. Manual dynamic agitation is one such simple activation technique employing well-fitting gutta-percha master cone with 2–3 mm up-and-down strokes to improve exchange of the solution.^{12,13}

Several techniques have been used to obturate root canals in literature. Despite them, in cases of extra canals, the regular lateral compaction technique, hybrid technique has been commonly used due to simplicity. Vertical compaction and thermafill obturation technique have been created an effective apical plug and an excellent adaptation.^{7,14}

Single-cone technique with matched-taper gutta-percha cones is popular after root canal preparation with rotary instruments. Because it allows better adaptation in 3-dimensional preparation, and it reduces the time spent on the lateral compaction technique.¹⁵ Gordan reported similar percent gutta-percha-filled area when they filled curved canals using .06 tapered instruments.⁸

IV. Conclusion:

Through knowledge of canal intricacies and anatomical familiarity plays a pivotal role in diagnosis, management and prognosis of extraneous canals and Radix Entomolaris. The Newer technological advancements along with vigorous knowledge and employment of biomimetic materials made endodontic therapy a new perspective in field of dentistry .

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