ENDODONTIC MANAGEMENT OF MANDIBULAR THIRD MOLAR WITH RADIX ENTOMOLARIS

Almedin Berisha[1], Edona Buleshkaj[1], Hekuran Sahatçiu*[1], Krenar Kozhani[2], Armira Totaj Kozhani[2], Shkëlqim Azizi[3], Nol Cena[4]

[1] Private Dentistry Clinic "Dr. Berisha", Pejë, Kosovo.

[2] Private Dentistry Clinic "White dent", Prizren, Kosovo.

[3] Private Dentistry Clinic "Dentex", Prishtinë, Kosovo:

[4] Private Dentistry Clinic "Dental C", Prishtinë, Kosovo:

***Corresponding author**

Dr. Hekuran Sahatçiu
Private Dentistry Clinic
"Dr. Berisha", Pejë, Kosovo
Email:
hekuransahatqiu@gmail.com

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Authors' contribution:

Almedin Berisha *contributed to the preparation of the manuscripts, the collection of data and data interpretation, dr.almedin.berisha@gmail.com;*

Edona Buleshkaj *contributed to the data analysis and manuscript preparation, edonabuleshkaj@outlook.com*

Hekuran Sahatçiu *contributed to data collection, hekuransahatqiu@gmail.com;*

Shkëlqim Azizi and Krenar Kozhani *contributed to the literature research, dr.shkelqimazizi@gmail.com & krenarkozhani@gmail.com; and*

Armira Totaj Kozhani and Nol Cena *to the manuscript editing, almiratotaj170@gmail.com & Nolcena@gmail.com.*

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ABSTRACT

This article provides two case reports representing endodontic management of mandibular third molar with radix entomolaris. Radix entomolaris is a supernumerary root located disto-lingually in mandibular molars. The endodontic treatment (ET) involves the removal of pulpal and necrotic tissue, preparing the root canals for sealing with inert filling material. The operator must have an in-depth knowledge of the morphology of root canal system and its variations that may affect the outcome and the success of the treatment. This study presents two cases of endodontic management of mandibular molar with radix entomolaris with a clinical diagnosis of irreversible pulpitis of one case and symptomatic apical periodontitis of another case. RC preparation in this case was performed using a new generation of rotary files with crown down technique. After following the standard irrigation protocol, the RCs were obturated using the warm vertical condensation technique. Knowledge of RC system variations, with their preparation and 3D obturation, is the appropriate qualification for ET.

Keywords: root canal, radix entomolaris, mandibular molar, crown down, vertical condensation, endodontic treatment.

Introduction

Mandibular molars usually present with two roots having two mesial and one distal canal. [1] One of the major variations in mandibular molars is the occurrence of this root presented lingually or buccally. Radix entomolaris was first described in 1844 by Carabelli as a supernumerary root located disto-lingually in mandibular molars. [2] Radix entomolaris is mostly shorter and curved compared to mesial and distal roots and can appear separately. The highest occurrence of radix entomolaris (RE) was found among the Mongolian race, including Chinese, Taiwanese and Koreans. In African, European and Asian demographics, the frequency ranges from 3% to 5%v, while in the Mongoloid populations it can reach a frequency of 40%. [3] The endodontic treatment involves the removal of pulpal and necrotic tissue, preparing the root canals with proper irrigation and sealing the prepared canals with inert filling material. The location of all root canals (RCs) and their adequate preparation, disinfection and obturation play an important role in successful endodontic treatment (ET) [4]. The operator must have an in-depth knowledge of the morphology of root canal system and its variations that may affect the outcome and the success of the treatment. Understanding the anatomical variations of root canal system is a must to achieve the main goals of the treatment. [5]

The root canal system is highly complex and its mandatory for the clinician to have thorough knowledge of varied types of root canal anatomies. The main aim of endodontic treatment is the elimination of microorganism from infected tissue from entire root canal system which is mainly achieved by thorough cleaning and shaping of root canals followed by tri-dimensional obturation with a coronal fluid tight seal. [6] The endodontic treatment needs an adequate chemical-mechanical preparation procedures and especially irrigation plays a crucial role in achieving effective disinfection and debris removal within the complex root canal anatomy. [7] An appreciate diagnosis, treatment plan, correct, debridement, disinfection and root canal system obturation are needed for successful treatment. [8] The root canal preparation must be done without procedural errors while respecting the root canals working length (WL) and maintaining its natural path. [9] This can be achieved with the correct selection of instruments in terms of their size and design. [10] Also, for a successful RC treatment the operator must have knowledge of internal RC morphology to locate all RCs and properly clean, shape and obturate RC space in three dimensions. [11] The radix entomolaris presents the major challenge to the clinician during the endodontic treatments. Despite all of this knowledge, RC preparation and obturation is still challenging due to the variety and complexity of RCs caused by different genetics, ethnicity, gender and age, as well as the existence of lateral or accessory canals and isthmus and curvatures.

Case Presentation

Case 1 (Figures 1 and 2):

A 35-year-old male patient came to the Private Dentistry Clinic "Dr. Berisha" in Pejë, Kosovo describing that he had a tooth ache, followed by a sharp pain upon thermal stimulus, with lingering pain, spontaneity and the referred pain frequency increasing during night. Percussion, palpation and thermal vitality test was negative. The treatment began after administering inferior alveolar nerve block anesthetic Septanest 1:100.000 (4% Articain hydrochloride with 1:100000 Epinephrine), (Septodont, Saint-Maur-des-Fosses Cedex, France) using Carpo syringe. The retro-alveolar radiography revealed an intact periapical tissue with radix entomolaris root canal variations. Tooth 38, lower left third molar, was with old amalgam filling and secondary caries.

The diagnosis of this tooth was symptomatic irreversible pulpitis (SIP).

Before the treatment, the patient was informed that his clinical information and radiographic images may be reported in the journal. So, the authors certify that they have obtained patient consent and the patient was informed that his name and initials will not be published.

Endodontic treatment was performed with a rubber dam.

After removing an old amalgam filling and caries, the access to the cavity was prepared and five root canal orifices were localized. Loupes with 3.0 magnification (Univet Loupes Spa, Rezzato, Italy) were used for canal localization. The root canals were explored with size 06, 08, and 10 K-files (Diadent, France). The patency was determined using k-file

size 06 and 08. Working length was set at 1 mm from the apical foramen with k-file size 10. The pulp tissue was removed, and the root canals were prepared with E-flex gold rotary files (Eighteeth, District, Changzhou City China) using crown down technique. During shaping and cleaning, the operators used 17% EDTA gel (Cerkamed, Stalowa Wola, Poland). After opening the pathway with hand files 06, 08 K-Files (Diadent, France) in these cases with curvature in middle third of mesial canal it is essential to continue with small k-file 06, 08 without applying apical pressure. When we notice the resistance at the tip of the file, we should not apply apical pressure. We go back cutting at the exit making a pull movement. We must repeat this process with k-file 06, 08 until reaching the working length and confirm it with apex locator. The operators used E-flex gold rotary file size 19/02 followed by size 20/04. The file should be inserted in the canal, connected to endomotor, but without rotation. After it reaches beyond the curvature, the rotation should be activated. Then, the shaping phase was finalized using E-flex gold rotary files size 25/04. The canals orifice was expanded with E-flex gold rotary file size 17/08 files and finished with E-flex gold rotary files size 25/04. Apical enlargement was performed with an E-flex gold rotary file size up to 25/04. During scouting, pre-flaring, glide-path and shaping the files must always be carefully observed to note if the flutes are intact or have been damaged due to stress. During the endodontic treatment, the operators used the endodontic hand piece E connect S (Eighteeth, District, Changzhou City, China) at a rotation 350 rpm, and torque 2.5 Ncm introducing the instrument passively into the root canal. The root canals were irrigated following Marcus Haapasalo protocol [12] and using Irriflex - flexible root canal irrigation needle (Produits Dentaires SA Vevey, Switzerland). During shaping and cleaning of each canal, the operators performed irrigation of 5.25 % sodium hypochlorite (Cerkamed, Stalowa Wola, Poland) and 17% EDTA (Cerkamed, Stalowa Wola, Poland) in each canal activated with ultrasonic device Ultra X. (Eighteet, District, Changzhou City, China). After shaping and cleaning, the operators continued with irrigation. The drying was performed with paper points. The root canal working length was verified with radiography followed by obturation of root canals with vertical gutta- percha condensation using Fast Pack and Fast Fill (Eighteeth, District, Changzhou City, China). Gutta-percha size was 25/04 (Diadent, France) in combination with Sealapex sealer (Kerr Corporation, Orange, CA, USA). Endodontic treatment was completed in one visit.

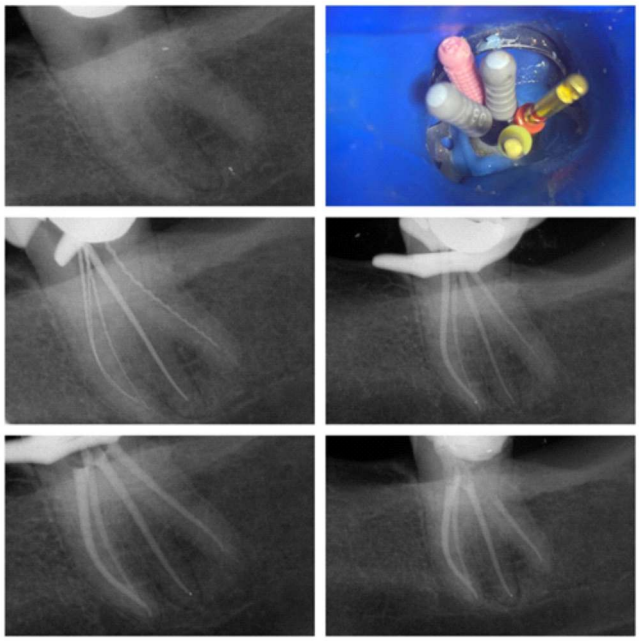

Figure 1. A. First diagnostic radiography; B. Working length determination under rubber dam; C. Verification of working length with rotary file; D. Verification of working length with gutta –percha; E. Radiographic image after obturation; F. Radiographic image after obturation without rubber dam.

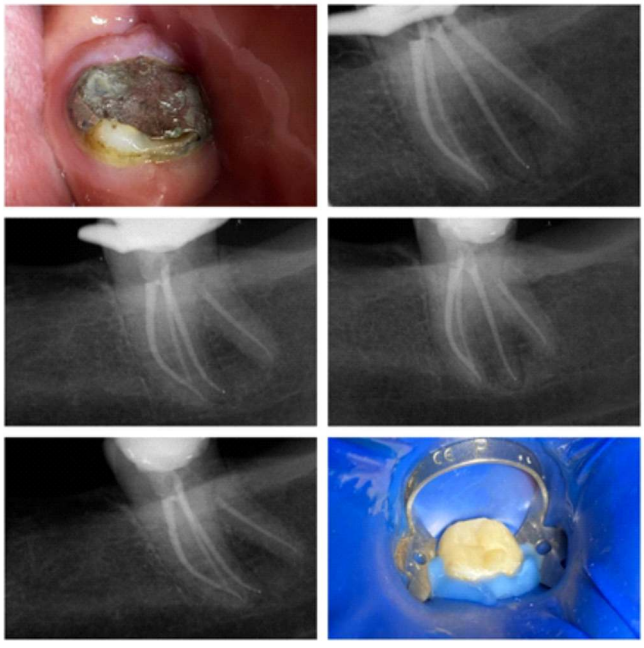

Figure 2. A. First diagnostic clinical photo from intra oral camera; B. Radiographic image after obturation; C. Radiographic image after obturation and fiber post under rubber dam; D. Radiographic image after obturation and fiber post image without rubber dam; E. Radiographic image after obturation and fiber post image without rubber dam from another view; F. Clinical photo with intra oral camera of composite filling.

Case Presentation

Case 2 (Figures 3,4,5):

A 23-year-old female patient came to the Private Dentistry Clinic "Dr. Berisha" in Pejë, Kosovo, describing that she had a tooth ache, followed by a painful response to biting and percussion. Percussion, palpation and thermal vitality test was positive. The treatment began after administering inferior alveolar nerve block anesthetic Septanest 1:100.000 (4% Articain hydrochloride with 1:100000 Epinephrine), (Septodont, Saint-Maur-des-Fosses Cedex, France) using Carpo syringe. The retro-alveolar radiography revealed a radiolucency of distal and mesial root of periapical tissue. Tooth 48, lower left third molar, was with old composite filling.

The diagnosis of this tooth was symptomatic apical periodontitis (SAP) with previously treated pulp.

Before the treatment, the patient was informed that her clinical information and radiographic images may be reported in the journal. So, the authors certify that they have obtained patient consent and the patient was informed that her name and initials will not be published.

Endodontic treatment was performed with a rubber dam.

After removing an old composite filling, a pulp residue was found in the cavity. After removing the pulp residue and the old root canal filling, the access to six root canal orifices were localized in the cavity. Loupes with 3.0 magnification (Univet Loupes Spa,Rezzato, Italy) were used for canal localization. The root canals were explored with size 10, 15 K-files (Diadent, France). Operator used eucalyptus oil (Cerkamed, Stalowa Wola, Poland) to disvolve the old gutta-percha. The patency was determined using k-file size 10 and 15. Working length was set at 1 mm from the apical foramen with k-file size 15. The residual pulp tissue was removed and old filling of the root canal and the root canals were prepared with E-flex gold rotary files (Eighteeth, District, Changzhou City China) using crown down technique. During shaping and cleaning, the operators used 17% EDTA gel (Cerkamed, Stalowa Wola, Poland). After opening the pathway with hand files 10, 15 K-Files (Diadent, France) in similar cases with curvature in apical third of distal canal, it is essential to continue with small k-file 10, 15 without applying apical pressure. When we notice the resistance at the tip of the file, we should not apply apical pressure. We go back cutting at the exit making a pull movement. We must repeat this process with k-file 15 until reaching the working length and confirmed with apex locator. The operators used E-flex gold rotary file size 19/02 followed by size 20/04. The file should be inserted in the canal, connected to endomotor, but without rotation. After it reaches beyond the curvature, the rotation should be activated. Then, the shaping phase was finalized using E-flex gold rotary files size 25/04. The canals orifice was expanded with E-flex gold rotary file size 17/08 files and finished with E-flex gold rotary files size 25/04. Apical enlargement was performed with an E-flex gold rotary file size up to 25/04. During scouting, pre-flaring, glide-path and shaping the files must always be carefully observed to note if the flutes are intact or have been damaged due to stress. During the endodontic treatment, the operators used the endodontic handpiece E connect S (Eighteeth, District, Changzhou City, China) at a rotation 350 rpm, and torque 2.5 Ncm introducing the instrument passively into the root canal. The root canals were irrigated following Marcus Haapasalo protocol 9 and using Irriflex - flexible root canal irrigation needle (Produits Dentaires SA Vevey, Switzerland). During shaping and cleaning of each canal, the operators performed irrigation of 5.25 % sodium hypochlorite (Cerkamed, Stalowa Wola, Poland) and 17% EDTA (Cerkamed, Stalowa Wola, Poland) in each canal activated with ultrasonic device Ultra X (Eighteet, District, Changzhou City, China). After shaping and cleaning, the operators continued with irrigation. The drying was performed with paper points. The root canal working length was verified with radiography followed by obturation of root canals with vertical gutta- percha condensation using Fast Pack and Fast Fill (Eighteeth, District, Changzhou City, China). Gutta-percha size was 25/04 (Diadent, France) in combination with Sealapex sealer (Kerr Corporation, Orange, CA, USA) were used. Endodontic retreatment was completed in one visit.

Figure 3. A. First diagnostic radiography; B. Working length determination under rubber dam with k-files; C. Verification of working length with gutta-percha; D. Radiographic image after obturation under rubber dam; E. Radiographic image from after obturation; F. Radiographic image from another view after obturation.

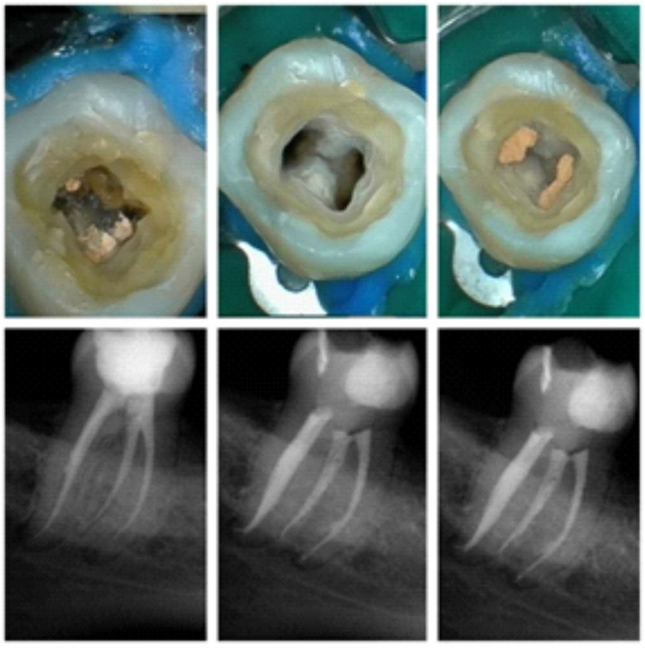

Figure 4. A. Photo from intraoral camera after removing the old composite shows us a pulp residue and old root canal filling; B. Photo from intraoral camera after cleaning and shaping; C. Photo from intraoral camera after obturation; D. First diagnostic radiography; E. Radiographic image after endodontic retreatment; F. Radiographic image from another angle after endodontic retreatment.

Figure 5. A. Photo from intraoral camera after removing the old composite shows us a pulp residue and old root canal filling; B. Photo from intraoral camera after cleaning and shaping; C. Photo from intraoral camera after obturation; D. D. Working length determination under rubber dam; E. Radiographic image after endodontic retreatment; F. Radiographic image from another angle after endodontic retreatment.

Discussion

The thorough knowledge of root canal anatomy is important for successful endodontic treatment. Variations in the root configurations can impose problems during endodontic treatments. The location of the canal orificiums may be difficult because of overhanging dentine. According to literature, the majority of radix entomolaris are curved. Possible variations in root canal anatomy need to be understood properly in order to prevent endodontic treatment failures. During the endodontic treatments, the use of magnification, such a dental loupes or microscope are useful in canal orifice identification. Radix entomolaris have from moderate to sharp curvature in buccolingual direction which causes technical difficulties during cleaning and shaping and has higher chances for instrument separation, furcal perforation, ledge formation, loss of working length, root canal transportation canal blockage. [13] A clinically

relevant method for cleaning, shaping and obturating a severe curvature root canal system has been presented utilizing a new generation of E-flex gold rotary file.

Conclusion

The clinical diagnosis of a radix entomolaris before root canal treatment is important to facilitate the endodontic procedure and to avoid missed canals. An endodontic treatment of lower third molar with radix entomolaris may be challenging. Radix entomolaris can be easily diagnosed by a careful evaluation of pre-operative radiographs when taken at different angulation. Thorough knowledge regarding the internal anatomy of root canal system and its most common variations of the teeth that are going to be treated, is essential to successfully finishing an endodontic treatment. The factors determining the success in negotiating the canals depends on the size and construction of the canal, degree of curvature, size and flexibility of file, along with the skills of operator.

Competing interests.

The author declare that they have no competing interests.

References

[1] Ingle JI, Bakland LK, Baumgartner JC. Endodontics. 6th ed. Hamilton, Ontario, Canada,

B.C: Decker; 2008.

[2] CarabellI G. Von Lunkaszprie GC, Georg Carabelli E. Systematisches Handbuch der Zahnheilkunde. Geoorg Olms Vertlag, 1844.

[3] Roeland De Moor, Christophe Derrose, Filip Calberson, The radix entomolaris in mandibular in mandibular first molars; an endodontic challenge. International endodontic journal, 2004, vol 37, no 11, p. 789-799.

[4] Almedin Berisha, Krenare Berisha Elezi, Hekuran Sahatçiu, Shkëqim Azizi , Miranda Stavileci. Endodontic management of mandibular premolars with root canal Vertucci type II and III Configuration. International journal of biomedicine 2023, vol 13, no 2, p. 346-349.

[5] Hannah, R., Kaandaswamy, D. Endodontic management of a mandibular second molar with radix entomolaris: A case report. Restor Dent Endod 39.2 (2014) p. 132-136.

[6] Vertucci FJ. Root canal anatomy of the human permanent teeth. Oral surg oral med oral pathol. 198458 (5); 589-99.

[7] Grossman' s Endodontic practice 13th Edition . B. Suresh Chandra, V. Gopikrishna. 2014.

[8] Ingle JI, Bakland LK, Baumgartner JC. Endodontics. 16 th edition. Hamilton, Ontario, Canada, B.C: Decker. 2008.

[9] Schilder H. Cleaning and shaping the root canal. Dent Clin North Am. 1974 Apr, 18 (2): 269-96.

[10] Arias A, Peters OA. Present status and future directions: Canal Shaping. INT Endod J. 222 May; 55 suppl 3 (SUPPL 3); 637-655. Doi: 10.1111/iej. 13698

[11] Hemanth S, Sujatha I, Vamshi Krishna V, Jayalakshmi K. Endodontic Management of

Mandibular Second Premolar Having Type-V Vertucci Canal Configuration – Case Series.

Saudi J Oral Dent Res.2017; 2 (3): 76-80. DOI: 10.21276/sjodr.2017.2.3.5.

[12] Schilder H. Cleaning and shaping the root canal. Dent Clin North Am. 1974; 18 (2): 269-

96. PMID: 4522570.

[13] Pai AV, Jain R, Colaco AS. Detection and endodontic management of radix entomolaris report of case series. Saudi Endod J 2014, 4 (2): 77. Doi: 10.4103/1658-5984.132723.