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Case Report

Endodontic management of a severely dilacerated mandibular third molar: A case report

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ABSTRACT

Introduction: It is crucial to have a thorough grasp of the anatomical changes in the roots and root canals of third molar teeth, as well as the endodontic consequences of these variations, before beginning any endodontic therapy. The key to the success of endodontic therapy is the cleaning and shape of the root canal. While treating curved canals, a few procedural mistakes might occur, such as ledge development, obstructions, and apical transportations and perforations. It was advised utilizing precurve files or flexible NiTi files to minimize procedural errors. Third molars face a variety of anatomical differences, such as merged canals, C-shaped canals, curved roots, and bayonet roots. Curved canals have become more common and been discovered to be comparatively higher in mandibular third molars (3.3 to 30.92%) as opposed to maxillary third molars (1.33 to 8.46%).

Aim: The following article presents a case report of the endodontic treatment of a mandibular third molar with severely curved canals and highlights the various disciplines and modifications employed for its management.

Conclusion: It is essential to give thorough attention to the radiographic assessment, access cavity preparation, and exploration in order to successfully navigate curved canals.

1. Introduction

Dentists often find endodontic treatments on third molars to be challenging due to their position at the posterior of the mouth, unusual internal anatomy, complex chewing surface, and irregular eruption patterns. While, extracting third molars is commonly recommended, there are some cases where keeping these teeth is necessary. In specific clinical scenarios, third molars can be used as support for dental prosthetics like removable partial dentures or fixed bridges, especially when second molars are missing. In essence, the focus of endodontic procedures is on maintaining all functional parts of the dental arch. Third molars exhibit a variety of anatomical differences including curved roots, bayonet roots, fused canals, and C-shaped canals. The occurrence of curved canals is more common in mandibular third molars, ranging from 3.3% to 30.92%, compared to maxillary molars which range from 1.33% to 8.46%. Dealing with curved root canals can be challenging for cleaning, shaping, and filling the root canal system, particularly as the curvature increases.[1] Restorative, prosthetic, and orthodontic factors frequently necessitate

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endodontic therapy for third molars to remain functional within the dental arch.[2] Having a tooth with a completely straight root and canal is not the norm but rather an uncommon occurrence, as the majority of teeth exhibit some degree of curvature in their canals. Furthermore, most canals feature various bends throughout their length. Back in 1848, Tomes referred to these curvatures as "dilacerations," which denote an angular deviation or sharp bend in either the root or crown of a tooth, or a deviation from the linear alignment between a tooth's crown and root.[3] The primary focus of modern dental practice is to minimize intervention while preserving all functional components of the dental arch, including the third molars.[4] Dilacerations commonly occur due to a sudden physical injury to the primary baby tooth, causing a distortion in the development of the permanent tooth underneath. This disruption moves the calcified portion of the permanent tooth germ, creating an angle with the non-calcified portion of the tooth germ.

Several syndromes linked to tooth dilaceration include Smith Magenis syndrome, Ehlers-Danlos syndrome, Axenfeld-Rieger syndrome, and congenital ichthyosis.[5] Morphologically, mandibular molars are intricate in structure. The most notable difference within this category is found in the mandibular third molar, which typically possesses three roots. While variations like this are not commonly seen in mandibular second molars, they have occasionally been documented in mandibular third molars.[6] Root canal treatment involves a series of procedures aimed at preserving or improving the condition of the tissues surrounding the root (European Society of Endodontology, 2006). To eliminate bacteria and their substances, it is essential to clean the root canal according to defined mechanical objectives. Properly instrumenting the root canal system is acknowledged as a key step that can influence the outcomes of the treatment.[7] During the initial stage, known as shaping, hand stainless-steel files along with rotating Ni-Ti files are utilized. The introduction of Ni-Ti files into clinical practice marked a significant breakthrough in the field of endodontics. This innovation enabled the development of new endodontic tools, both manual and rotating, with superior qualities compared to traditional stainless steel instruments. As a result, more consistent and efficient outcomes were achieved. The Ni-Ti alloys employed in dentistry possess a precise atomic composition of 55% Nickel and 45% Titanium.[8] Clinicians may find it challenging to clean and shape curved root canals and properly fill the root canal system.[9] In this article, a case report is discussed detailing the endodontic treatment of a mandibular third molar with significantly curved canals. The text also underscores the diverse disciplines and adjustments utilized for its successful management.[10]

2. Case Report

A 34-year-old patient came to the Department of Conservative Dentistry and Endodontics with the chief complaint of pain in relation to lower left back tooth region and with a non-contributory medical and dental history. The pain was spontaneous, increased on lying down and present for last 3 days. Patient also complained of episodes of sensitivity to hot foods in the involved tooth. On clinical examination, patient's oral hygiene was found to be moderate. Deep carious lesion was observed. #48 The tooth was tender on percussion. #48 There was no evidence of swelling or sinus tract. Electric pulp test and heat test with a Gutta-percha stick gave a lingering response.

Radiolucency in association with tooth #48. [Figure 1]

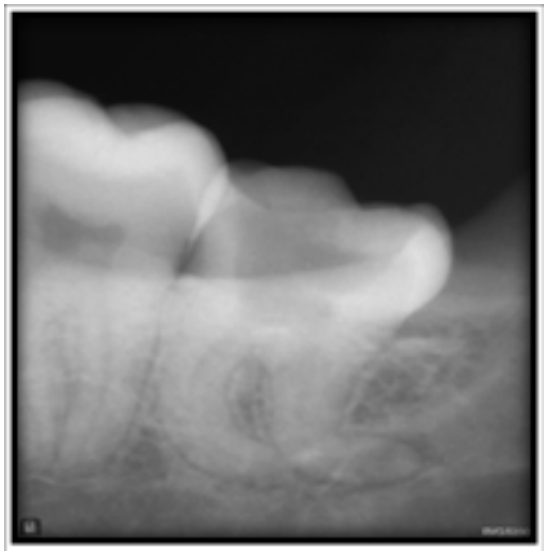

Figure 1: Pre-operative

Upon complete clinical and radiographical examination, diagnosis of acute irreversible pulpitis was made. It was decided to carry out endodontic treatment in mandibular third molar #48. Access was gained to pulp chamber after administration of local anesthesia (2% lidocaine with 1:80,000 adrenaline). Three orifices were located in third molar #48. Mesiobuccal, mesiolingual and distal canals were identified. Straight paths were established. Access cavity was refined with endo access bur (Dentsply, Switzerland) and working length was determined using an electronic apex locator (Root ZX, J.Morita) and was confirmed by radiography. [Figure 2]

Canals were cleaned and shaped using hand K files and ProTaper Gold rotary files (Dentsply, Switzerland) with 17% EDTA and were subsequentially irrigated using 5% sodium hypochlorite. Patency was achieved in all the canals and was maintained with a 10#k-file (Mani, Japan). All the canals had separate portals of exit.Canals were dried using paper points and obturation was done with gutta percha

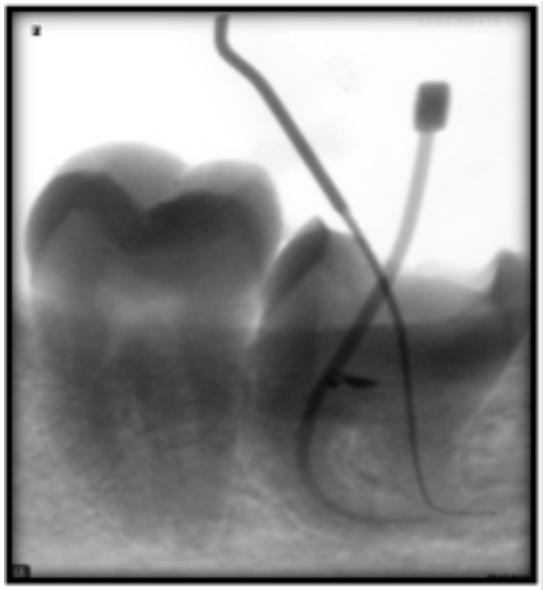

Figure 2: Working length

points with the use of single cone technique using Maarc rootfyx bioceramic root canal sealer (Maarc Dental India). Radiograph is employed to evaluate the fit and placement of gutta-percha mastercone. [Figure 3]. Access cavity was filled with composite resin (Orikam Neofill).

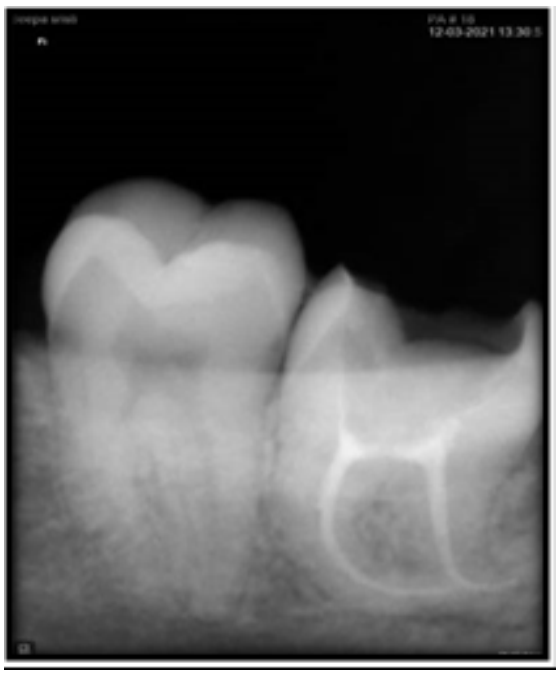

Figure 3: Obturation

3. Discussion

Typically, third molars are often recommended for extraction rather than receiving endodontic treatment based on common agreement. However, there are specific scenarios where it may be more beneficial to retain these molars. This includes situations like when the second molars are missing or require extraction due to substantial decay, or when the third molars are potential candidates for transplantations or orthodontic purposes. In such cases, the third molar could be a good support for a fixed dental prosthesis to replace the missing second molar. Additionally, the patient had a good mouth opening and minimal gag reflex, making it feasible to proceed with endodontic treatment for the third molar.[1] The literature generously reports the occurrence of curved canals, fused roots, and C-shaped canals. According to Gulabivala et al.,[2] 10.9% of single-rooted mandibular third molars exhibit C-shaped variants. Hamasha et al.[3] discovered that the prevalence of dilacerations is 3.8%, with lower third molars having the highest rate at 19.2%. Similarly, the presence of curved canals is more common in mandibular third molars, ranging from 3.3% to 30.92%, compared to maxillary molars ranging from 1.33% to 8.46%. A tooth is classified as dilacerated if its root shows a mesial or distal tilt of 90° or more in relation to the tooth or root axis. Alternatively, some define dilaceration as an apical deviation of 20 degrees or more from the normal tooth axis. [(2)] Yet, the complexities involved in preparing curved canals make it a significant challenge in the field of endodontics. While X-rays can only depict curvatures in the mesio-distal plane, the presence of curvatures in the bucco-lingual plane is apparent in numerous teeth. The root cause of unsuccessful root canal treatments in curved canals primarily stems from procedural mishaps such as ledges, broken instruments, blockages, and the creation of zips and elbows.[3] Achieving proper obturation in C-shaped canals may necessitate unique techniques. Effective chemo-mechanical preparation of these canals is essential for root canal cements to penetrate the isthmus area adequately during lateral compaction. Nevertheless, utilizing thermoplasticized gutta-percha is recommended as the optimal choice for this procedure.[4] Dilaceration of a tooth can occur for various reasons, with traumatic injury to the primary tooth being a primary factor. Other causes include ectopic tooth germ development, infections, scarring or tumours, developmental anomalies, and genetic factors. When a tooth is affected in two different ways, it is known as bayonet dilaceration.[5] The endodontist needs to possess a thorough understanding of root canal morphology, as teeth undergoing endodontic treatment may exhibit various types of root curvatures and anatomical differences. Failure to locate the root canal system could decrease the likelihood of successful treatment outcomes.[6] The natural curvature of root canals itself poses a challenge in allowing proper irrigation flow

during traditional methods. The effectiveness of irrigation is compromised when the canal shape is not optimal for proper shaping or when the irrigant cannot reach close to the working length (Nguy & Sedgley, 2006). For cases where traditional needles struggle, finer and more flexible options like 31-32 G needles could reach the apical third, but they require significantly more force (three to six times) compared to a 30 G needle to achieve the same flow rate (Boutsioukis et al., 2007). Alternative methods like apical negative pressure irrigation and laser-activated irrigation are limited by the narrow and curved nature of canals (Brunson et al., 2010; Gregorio et al., 2013; Groot et al., 2009). In extremely curved canals, sonic or ultrasonic methods are unlikely to provide any significant clinical benefits.[7] With complex anatomies in endodontic cases, modern rotating Ni-Ti files can assist the clinician in thoroughly shaping the root canal up to the working length while also reducing the risk of fractures.[8] It is crucial to determine the degree of canal curvature before starting root canal treatment in order to understand the level of complexity involved. Understanding the curvature of the root canal aids in accurately planning the root canal preparation and navigating the challenges posed by the anatomy and limitations of root canal instruments. This knowledge allows for the preservation of the natural curvature during root canal preparation and helps prevent any deformation of the instruments. Thus, diagnosing root dilaceration before beginning endodontic treatment is vital to ensure proper canal preparation.[9] Numerous efforts have been made to quantify the degree of bends in root canals. The most widely recognized technique is proposed by Schneider. This approach involves sketching a line parallel to the canal's long axis in the top portion of the root canal and another line connecting the apical foramina to intersect the initial line on a physical printout of the diagnostic radiograph. The angle defined by Schneider is identified from the intersection of these lines. Correspondingly, the level of root canal curvature is classified as follows: straight (5° or less), moderate (10–20°), and severe (25–70°). Gunday et al. coined the term "canal access angle" (CAA), a parameter that offers a deeper insight into the coronal structure of canal curvature. Following Schneider's approach, the mentioned third molar displayed significant dilacerations, necessitating careful planning at every stage of the preparation process.[10]

4. Conclusion

Managing a curved mandibular third molar can be quite challenging due to the anatomical variations present. However, with precise adherence to fundamental guidelines, this task can be effectively accomplished. Taking advantage of advanced endodontic techniques, such as utilizing intermediate pre-curved files in combination with flexible rotary systems, can facilitate the treatment of such challenging cases, as highlighted in this case study.

5. Source of Support

None.

6. Conflict of Interest

None.

References

1. Ahmed HMA. Management of third molar teeth from an endodontic perspective. *Eur J General Dent*. 2012;1(3):148–60.
2. Ambili C, Prasad BSK. Trouble curve: Endodontic management of severely curved root canal system - A case report. *RGUHS J Dent Sci*. 2021;13(1):86–90.
3. Ansari I, Maria R. Managing curved canals. *Contemp Clin Dent*. 2012;3(2):237–41.
4. Arora S, Gill GS, Setia P, Abdulla AM, Sivadas G, Vedam V, et al. Endodontic management of a severely dilacerated mandibular third molar: Case report and clinical considerations. *Case Rep Dent*. 2018;p. 7594147. doi:10.1155/2018/7594147.
5. Chaniotis A, Ordinola-Zapata R. Present status and future directions: Management of curved and calcified root canals. *Int Endod J*. 2022;55(S3):656–84.
6. Iandolo A, Amato A, Martina S, Latif DA, Pantaleo G. Management of severe curvatures in root canal treatment with the new generation of rotating files using a safe and predictable protocol. *Open Dent J*. 2020;14(1):421–5.
7. Nautiyal S. Mandibular Third Molar -An Endodontic Enigma: A Case Report. *Int J Sci Res*. 2023;12(8):1185–8.
8. Raut AW, Mantri V, Kala S, Lakhera4 H. Management of severely dilacerated mandibular third molar. *J Clin Diagn Res*. 2017;11(8):5–6.
9. Sinha D, Sinha A. An endodontic management of mandibular third molar with five root canals. *Saudi Endod J*. 2014;4(1):36–9.
10. Parakh S, Shiraguppi V. A case report management of severely curved canals in mandibular third molar: a case report. *J Interdiscip Dent*. 2019;8(2):13–5.

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