

Negotiating the Turns: An Endodontic Management of Curved Canals of Mandibular Third Molar– A Case Report

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Case Report

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Article History

Received: 02.04.2018

Accepted: 12.04.2018

Published: 30.04.2018

DOI:

10.21276/sjds.2018.5.4.2



Abstract: The aim of quality endodontic therapy has remained as it is since its establishment. Total removal of pulpal tissues with effective cleaning and shaping, followed by three dimensional obturation and coronal seal, will satisfy both mechanical and biological objectives [1]. As an endodontist, we need to appreciate each of these steps and know that our treatment's success is dictated by the weakest element of our procedure. An insight of canal anatomy, coronal flaring, pre-curving of all the hand files and use of gradually increasing in number of files facilitates easy negotiation of canal curvature and preserving the shape without any iatrogenic errors. Initiating the treatment without gaining the knowledge of anatomy of canal can lead to apical zips, perforations, canal blockages or instrument separation – which can leave the canal unprepared and lead to continued pathology compromising the outcome of treatment. A thorough assessment of preoperative radiographs coupled with careful approach yielded into a safe and a successful endodontic treatment of such teeth.

Keywords: endodontic therapy, removal, pulpal, endodontist, procedure.

INTRODUCTION

A straight root with a straight canal is rather an exception than a common finding. The curvature in the root is considered to be a developmental anomaly in which there is an abrupt change in axial inclination between the root and the crown [2]. Negotiating such curvatures mostly present a challenging situation in root canal treatment. The common causes of treatment failure in such cases of highly curved canal anatomies are due to procedural errors such as ledge formation, fractured instruments, blockage of the canal, zipping, or elbow creation [3].

A thorough assessment of the preoperative radiographs, careful and a meticulous approach can yield into a safe and a successful endodontic treatment of such teeth. The current case presents such interesting cases of endodontic management of 90° curve mandibular third molar.

CASE REPORT

A 23-year-old female patient reported to the outpatient Department of conservative dentistry and endodontics with the chief complaint of pain in relation to lower left back tooth region since one week.

Clinical examination revealed class I caries in relation to mandibular left third molar. The tooth was tender on Percussion. Medical history was noncontributory. Tooth was vital when pulp sensibility tests (electric pulp test and heat test) were carried out. The radiographic examination revealed the radiolucency involving both mesial and distal pulp horn, with periodontal ligament widening. Apart from these findings, radiographs also shows a gradual curvature starting from the middle one third till the apex

of mesial root and a sharp curvature at apical one-third of distal root [Figure1]. A diagnosis of chronic irreversible pulpitis with acute apical periodontitis was established and the endodontic treatment was planned followed by full coverage restoration of the smae.

With informed consent, local anesthesia was administered using 2% lignocaine and 1:200,000 Adrenaline and Endodontic therapy was initiated. Caries were removed and the endodontic access cavity was prepared using Endo access bur # 2 (Dentsply Maillefer). After access cavity preparation, isolation was done with rubber dam. All canal orifices are pre-flared with GG drills size 3. The pulp chamber was irrigated using 5% of sodium hypochlorite, 17% ethylene diamine tetraacetic acid and physiological saline. The initial instrumentation was done using pathfinder stainless steel file #10 (SybronEndo, Orange, CA, USA). Working length was determined by electronic apex locator and confirmed by radiograph [Figure 2]. Glide path was established up to the radiographic working length [4]. The canals were enlarged with subsequent instrumentation done by using

#15, #20 K-files (Mani, Inc, Japan). For verifying the patency of the root canals, no. 8 and 10 stainless steel

K-files (Mani, Inc., Japan) were used.

The apical third of the canals were prepared using short amplitude filing. Frequent irrigations and recapitulation were performed during biomechanical preparation of the root canals to avoid blockage by dentinal debris and to remove the necrotic remnants of the infected tissue. Final cleaning and shaping was carried out using Hyflex CM rotary files

(Coltene-Whaledent, Switzerland) up to 4% 20 size of the instrument.

On the same day, the canals were finally irrigated with saline and master cone selection was done in wet canals [figure 3]. After confirmation of master cone, canals were dried with appropriate size of paper points. Calcium hydroxide based sealer (Sybron Endo Sealapex root canal sealer) was applied with lentulospiral. Obturation was done with single cone system [figure 4]. Post endodontic restoration was done with GIC.[figure 5a, 5b]



Fig-1: preoperative; figure 2: working length determination; figure 3: master cone selection; figure 4: obturation; figure 5a,5b: post endodontic restoration

DISCUSSION

One of the most important considerations of endodontic treatment is the cleaning and shaping of the canals. The most ideal shape of the prepared canal is a continuous taper with the largest diameter at the coronal end and is narrowest at the apical constriction [5]. A good taper allows a greater degree of instrument and irrigant contact with the surfaces of the canal walls, thereby enhancing the effectiveness of cleaning [6].

However, the preparation of curved canals presents one of the greatest challenges in endodontics. Only the curvatures in mesio-distal plane can be seen on radiograph, though curvatures in the bucco-lingual plane are also may present in many teeth. Failure of cleaning the curved canals is mainly due to iatrogenic errors like fractured instruments, zip, ledges, canal blockage, and elbow creation [7]. Iatrogenic errors can be reduced by [9]

Precurving of file

(a)Precurved file traverses the curve better than a straight file. Precurving is done in two ways: 1) gradual curve for the entire length of the file. 2) a sharp curve of nearly 45° near the apical end of the instrument

(b)Use of smaller number files as they can follow canal curvature because of their flexibility, they should be used until larger files are able to negotiate the canal without force.

(c)Use of intermediate size of files

It allows smoother transition of the instrument sizes to cause smoother cutting in curved canals, e.g. cutting 1 mm of No. 15 file makes it No. 17 file as there is an increase of 0.02 mm of diameter per millimeter of length.

(d)Use of NiTi files

As they help in maintaining shape of the curve and avoid errors like ledge, elbow or zipping of the

canal. Decrease in length of actively cutting files is achieved by the following:

- Anti-curvature filing.
- Modifying cutting edges of the instrument by dulling the flute on outer surface of apical third and inner portion of middle third, which can be done by diamond file [5]?
- Use of crown-down technique. Tendency to create narrow canal shapes minimizing access of irrigants and creating potential to allow debris to be pushed apically. Attempts at overcoming the deficiencies of these instruments resulted in a number of preparation techniques that aimed to reduce iatrogenic defects and produce canals with a more flared shape [10].

Minimal taper

According to studies, the increased size/taper allowed for deeper penetration of irrigation, increased volume of irritant solution and improved flushing of debris. In curved canals, increase in the apical diameter and coronal taper will increase the risk of apical transportation and fracture of the curved root end [11]. With the advancement of technology like sonic and ultrasonic irrigation system, effective irrigation can be achieved even in less degree of taper and small adequate apical diameter [12].

CONCLUSION

A thorough knowledge of internal anatomy of the tooth, proper assessment of preoperative radiographs is crucial in managing curve canals. A careful minimal approach resulted in sufficient enlargement of the curved canals, reduces the risk of treatment failure. Selection of appropriate instruments and techniques and customized treatment planning will help to enhance the quality of the treatment. These endodontic errors cannot be totally prevented in clinical practice but can be greatly reduce by three “T”s technique, training and technology [13].

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