



BAYONET SHAPED ROOT CANAL – AN ENDODONTIC CHALLENGE

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ABSTRACT

Root canal system has complex morphology which often poses a challenge to the endodontist. Canal shapes vary from being straight to dilacerated or even have an S shape, also known as bayonet shaped canal. Management of such canals is difficult as they have atleast 2 curves, apically being the most



vulnerable. Procedural errors such as strip perforations, ledges, canal blockage, zip and elbow creations are common causes of failure in such cases. This case report discusses the successful management of Bayonet shaped canal in mandibular second molar.

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INTRODUCTION

All root canals exhibit some kind of curvature varying from mild to moderate. A development anomaly that leads in a sharp angulation observed b/w the crown and the root of the tooth is known as Dilaceration, this term was coined by Tomes in 1849. Trauma to deciduous tooth, delevopment of tooth germ in an ectopic manner, presence of cyst/tumor/scar/infection, developmental anomaly of the tooth germ and other genetic factors are the etiologic reasons for dilaceration to occur. Some authors describe dilaceration as a 90 degree bend along the axis of the root wheareas others describe it as 20 degree or more deviation from the normal axis of tooth in apical area of root canal. Dilacerations can occur in any direction. If the root canal has double curve, it is called bayonet or S shaped dilaceration. Assessment of the pre operative periapical radiograph to study the curvatures and the anatomy of the root canal is extremely essential for a successful root canal treatment. S shaped canals have atleast 2 curves making it difficult for the instrument to reach the apical third.² Such extreme curvatures require the use of NiTi instruments which can effectively clean the root canal without breakage. This paper describes the successful endodontic management of bayonet shaped root canals in a mandibular 2nd molar.

CASE REPORT

A 37 year old woman reported with pain and tenderness in the lower left tooth to the Department of Conservative Dentistry and Endodontics in DY Patil University Navi Mumbai. Clinical examination revealed deep occlusal caries and pain on percussion. Preoperative periapical radiograph showed caries involving the pulp with extremely curved root with double curvature mimicking a bayonet or S shaped root canal with loss of lamina dura as shown in Figure 1. The case was diagnosed as Irreversible Pulpititis and Symptomatic Apical Periodontitis.

Figure 1





Figure 2

With informed consent, local anesthesia was administered using 2% lidocaine and 1:200000 adrenaline (Lox 2 %, Neon, and Thane, India) and root canal therapy was initiated under rubber dam isolation. Initially complete caries excavation was done with sterile round carbide bur (Mani, India) in high speed air rotar hand piece (Prefier Dent, India) with water spray. After caries excavation, pulp was exposed and complete deroofting of pulp chamber was done with Endo Z bur (Dentsply Malliefer Switzerland). After access opening 3 canal orifices were seen which were presenting Vertucci Type 1 configuration as shown in Figure 2. As the mesio-lingual canal was doubly curved, a double flare technique was used to enlarge this canal. To reduce the angle of the first curvature, the coronal third of the canal was enlarged with Protaper Gold SX which is an orifice opener at the speed of 300 rpm and torque of 1.2 N. The canal was scouted with sterile stainless steel K files no. 8 and 10 (Mani Inc, Japan). Working length was determined with an electronic apex locator (Root ZX J Morita) and was later confirmed with radiograph as shown in Figure 3. Working length of all canals was 18mm each. After determining the working length, sequential filing was done using stainless steel hand files of No. 10 and No. 15 (Mani Inc, Japan). Short amplitude filing was done to prepare the apical portion of the canals. Easypath files (Endostar Poldent Co. Ltd Warsaw) was used in an endomotor (Bombay Dental Surgicals) at a speed of 350 rpm and torque 1.4 N in light brushing strokes to expand the glide path prepared by hand files. Further cleaning and shaping was carried out with Azure files (Endostar) upto 25 (4% taper) at a speed of 350

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rpm and torque of 1.4 N. In between instrument change, 5ml of 2.5 % of sodium hypochlorite (Trifarma Pvt Ltd, Bhiwandi and Thane, India) was used as irrigating solution and patency filing was done sterile stainless steel file 8K file. Sterile calcium hydroxide (Prime Dental Product, Thane, India) was used as an intracanal medicament for a period of 15 days.

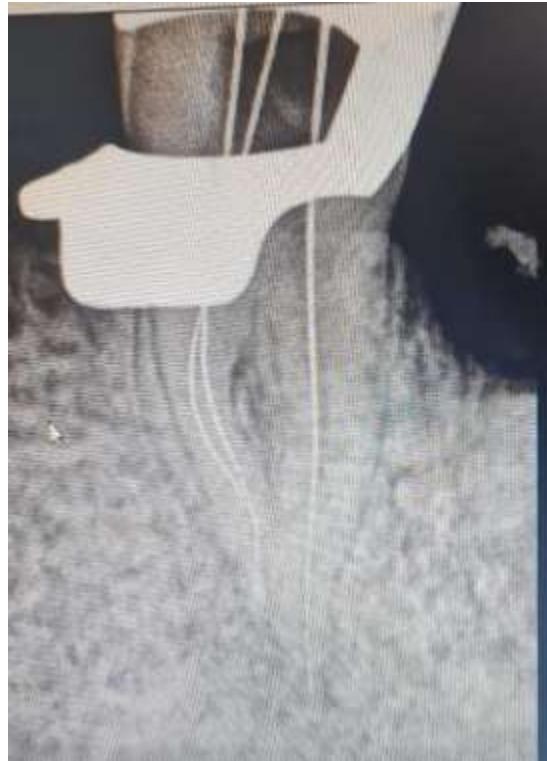


Figure 3



Figure 4



Figure 5

At the following appointment, CH was removed from canal by irrigating with normal saline. Selection of master cone was done with a taper 4 % was done for all 3 canals (Dentsply Sirona, Canada) as shown in Figure 4. Obturation was

done with GP (Gutta Percha) and AH plus sealer (Dentsply Malleifer, Tulsa OK) using lateral compaction as shown in Figure 5. Post obturation restoration was done with resin composite (3M Composite)



DISCUSSION

Thorough disinfection of the root canal system followed by a three dimensional obturation is necessary for a successful endodontic treatment. To achieve this goal, its necessary for the endodontist to have a good knowledge of the variations of the root canals and how to manage each kind of anomaly. In this case, S shaped canal had double curve leading to chances of strip perforation in the apical third. Preflaring thr coronal 1/3rd to reduce the angle of curvature was suggested by Guttman.³

The configuration of S-shaped root canals is not uncommon in maxillary and mandibular molars. About 30–35% of mesiobuccal canals of maxillary and mandibular frst molars show a double curvature and even 59% of mesiobuccal canals of second mandibular molars display an S-shaped cngfiguration⁴

- Reduce incidence of procedural errors by Decrease restoring forces by means of which straight file has to bend against the curved dentine surface
Length of file is decreased which is aggressively cutting at a given span
- Decreasing the force can be done by the following –
Precurving the file by either placing a gradual curve along the length of the file or by placing a sharp curve in the apical end of the file
Extravagant use of smaller number files as they can follow canal curvature, because of their flexibility. Make the smaller size file super loose in the canal before using larger files to negotiate the canal without force
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 mm of length.
Use of flexible files (NiTi files, Flex R files): As these files help in maintaining shape of the

curve and avoid procedural errors like ledge, elbow or zipping of the canal.

- Decreasing the length of actively cutting files is achieved by the following:

Anti-curvature filing

Modifying the 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 a diamond file.

Changing the canal preparation techniques, i.e. use of coronal pre flaring and crown down technique

In the present case series, bayonet shaped root canals were successfully managed by # 8k file in watch-winding motion to confirm the canal patency. After exploring the canal, crown-down sequence of instrumentation with NiTi files was followed, as early coronal flaring leads to greater tactile awareness of the apical constriction and reduce coronal binding of instruments. Azure (Endostar)TM NiTi rotary files were chosen for managing bayonet shaped root canals since, these files have been manufactured utilizing a unique process that controls the material's memory, making the files extremely flexible but without the shape memory of other NiTi files. This gives the file the ability to follow the anatomy of the canal very closely, thus reducing the risk of ledging, transportation or perforation

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CONCLUSION

Endodontic therapy is a very nuanced and challenging science and art. The diagnosis and management of double curvatures, or S-shaped canals, present an endodontic challenge. Careful examination of preoperative radiographs is clinically helpful.^{5,6,7} A frequent error that may occur during endodontic procedure in an S-shaped canal is the failure to maintain root canal curvature, resulting in ledge formation, apical transportation, zipping, instrument breakage, and the most common being strip perforation.⁸ To avoid these



mishaps, the basic principles of endodontic therapy must be followed, i.e., good preoperative radiograph, straight line access to apical foramen, precurving the endodontic hand instrument, file recapitulation, thorough irrigation, and use of flexible NiTi instruments.^{9,10}

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