

Non Surgical Endodontic Management of Mandibular First Molar with Anatomical Complexities

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ABSTRACT

Background: Most teeth show curvature of the root canal. The curvature increases also difficulty of treatment. The narrow roots or narrow canal space can also complicate the treatment further. S- shaped/bayonet canals present with double curvatures in the root and negotiating the more apical curve becomes very difficult. The chances for strip perforations are very high in such cases. However, recent developments in endodontic procedure have contributed greatly in simplifying endodontic therapy. If used judiciously and with proper case assessment, many teeth once discarded as untreatable may be saved. This article presents the successful endodontic treatment of a mandibular left molar tooth with thin roots and S-shaped curvature of both mesial and distal roots.

Keywords: Bayonet/S-shaped curve, Hyflex CM Mandibular first molar.

INTRODUCTION

The complexity of the dental root canal anatomy is well established in literature. A successful endodontic therapy requires a thorough cleaning and shaping of the root canal followed with a fluid tight seal^{1,2,3}. One of the frequent reasons for failure in root canal treatment is insufficient preparation due to the presence of root curvatures. Procedural errors such as ledge formation, apical transportation and blockages have been observed after preparation of curved canal.^{3,4}

Higher degree of curvatures increases the risk for procedural errors. Classifications for canal curve shapes are important for selection of samples for research and for practice. Forms of the root canals could be classified as: I-straight canal, C-curvature in whole length of the root, J-curvature of the apical third and S-more than one curvature. It

may also be classified as primary secondary and tertiary curvatures.⁴

S shaped canals/bayonet canals are very challenging as they have two curves and the chances for strip perforation is very high. Their occurrence in maxillary premolars is quite high.⁴ Its occurrence in mandibular molars are relatively rare. This case report discusses the successful management of a mandibular first molar with S shaped mesial and distal roots.

CASE REPORT

An 11 year old female patient was referred for endodontic consultation and management of tooth number 36, to the Department of Conservative Dentistry and Endodontics. The patient had a history of swelling and pain in relation to the tooth two weeks back which was controlled

Received: Jan. 11, 2015; Accepted: Apr. 2, 2016

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by antibiotics. However, the swelling persisted. Clinical examination of 36 revealed a large carious lesion involving the occlusal and buccal surface with clinical pulp exposure. A firm buccal swelling with no sinus was present in relation to the tooth. Mobility was within physiological limits. Periodontal probing confirmed no loss of periodontal attachment. Radiographic examination revealed, a large radiolucency involving the furcal area, bayonet or S- shaped curvatures of both the mesial and distal roots which also appeared to be narrow ribbon like in nature apically {Fig 1} A

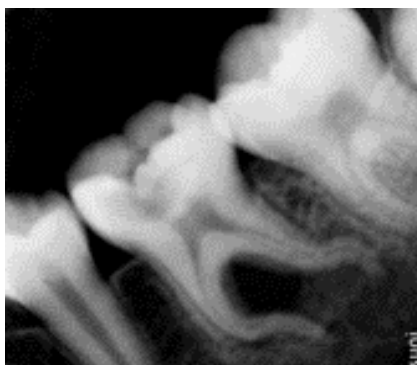


Fig 1: Preoperative radiograph of 36.

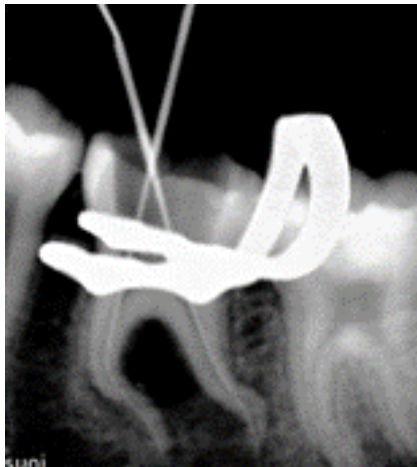


Fig 2: Ascertaining the glide path.

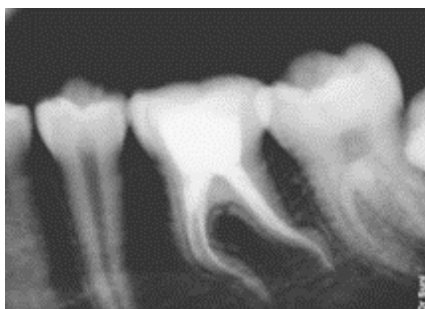


Fig 3: Immediate postoperative radiograph of 36.



Fig 4: 3 months postoperative radiograph of 36.

diagnosis of asymptomatic apical periodontitis was made. Considering the multiple complexities extraction was suggested. However, the patient and her parents were unwilling for extraction or for a surgical intervention. Therefore, a two visit non surgical endodontic approach was planned.

First visit

The tooth was anesthetized by administering an inferior alveolar nerve block using 2% lignocaine with 1: 100000 adrenaline. Caries was excavated and the access prepared using Endo-access bur #3 and Endo - Z bur (Dentsply,USA).The pulp chamber was copiously irrigated using 2.5 % sodium hypochlorite and saline. Four canal orifices were located, two in the mesial and two in the distal. Coronal flaring was done using Protaper Sx hand file (Dentsply,USA) up to the point of resistance. Glide path was ascertained with the help of 2% stainless steel K file #06 (Mani inc, Japan) up to an approximate working length which was 1mm short of the pre- operative radiographic tooth length[Fig 2]. Mesio lingual canal was negotiable only to the first curvature. The canals were then sequentially enlarged with 2% tapered #08 and #10 stainless steel K files using filing motion of short amplitude. The working length was re- assessed with an apex locator (Root ZX, J Morita,Japan). The tip of the 2% tapered #10 K- file was cut by 1mm to obtain the next intermediate file size of #12.This was then used to enlarge the apical third. Hereafter, 2% tapered NiTi hand files were used to enlarge to working length in the sequence of #15 and #20. 6% tapered 20 Hyflex CM(Coltene,Switzerland) rotary files were then used to shape the canal in a crown down technique up to working length.

Recapitulation was done after each step using #10 or 15K- file and copious irrigation with passive activation using hand files was done to ensure proper disinfection and prevent canal clogging. EDTA gel(Glyde,Dentsply,USA) was used during instrumentation for lubrication and smear layer removal. The canals were given a final rinse with saline and then dried using 6% 20 paper points .Calcium hydroxide and iodoform intra canal medicament (Metapex,USA) was placed and the access temporarily sealed with Cavit(ESPE,Germany).

Second visit

After one month, the patient was asymptomatic. The swelling on the buccal surface had subsided and the canals were free of discharge. After irrigation with EDTA and saline, the canals were dried. Master cones were selected using 6% 20 gutta pecha cones and canals were obturated using single cone technique and MTA- based sealer(MTA-plus,Prevest,India).Post endodontic restoration was given with composite[Fig 3]. At 3 months review the patient was found to be asymptomatic and gradual reduction in the interradicular radiolucency was observed [Fig 4].

DISCUSSION

Morphological variations in the root canal have been well documented in dental literature.**Ahmed HA,Abu-bakr NH,Yahia NA, Ibrahim YE**¹ reported 59% mandibular first molar had four roots canal whilst 10% of mandibular second molar had c shaped roots /canals. molars in a Sudanese population. **De Pablo OV, Estevez R, Sanchez MP,Heilborn C, Cohenca N**²stated that the no of roots on the mandibular first molar is related to ethnicity.the root canal morphology present the clinician with a complex anatomy requiring more diagnostic approach ,acesss to successfully disinfect and seal the root canal system .**Peters OA**³ reported that it is important to envisage the specific purposes of root canal shaping extending beyond antimicrobial efficacy. ³The proper disinfection of the canal and achieving a fluid tight seal becomes challenging and technically demanding. ⁴ Most teeth show some curvatures in the canal in addition to curvatures in different planes throughout the length of the tooth .Curved canal may present the following features

1. Gradual curvatures of the mesial canals in the apical third
2. Acute curvature in the apical third
3. Curvature throughout the canal
4. Sickle shaped
5. Dilacerated root canal
6. S-shaped/bayonet root canal⁵

A 20 degree curvature in a narrow root canal is considered difficult or even impossible to negotiate with endodontic instruments. Success in negotiating narrow curved canals depends on the degree of curvature,size and constriction of the root canal, size and flexibility of the instrument blade, and skill of the operator⁶

Traditional stainless steel 2% endodontic files have a tendency to straighten in the canal. Therefore, it becomes difficult to control removal of dentin along the length of the file. Iatrogenic errors like ledging, zipping, canal perforation, instrument separation and apical transportation can occur during instrumentation. The risk becomes greater in case of complicated canal morphology. Higher incidence of instrument failure has been reported in molars particularly the mesial roots of mandibular molars⁷

Errors can be reduced by decreasing the restoring force by means of which the straight file has to bend against the curved dentin surface, and decreasing the length of the file which is aggressively cutting at a given span. The restoring force may be reduced by precurving the files, use of smaller size files initially as they negotiate curves better before the next larger files is used without force, use of intermediate file sizes to obtain a smoother transition between file sizes, utilizing more flexible files like NiTi files. Decreasing the length of actively cutting files is possible by anti curvature filing, modifying the filing instrument by dulling the outer flutes that lie in the apical third and the inner flutes in the middle third of the root, use of coronal pre-flaring and crown down technique for instrumentation⁸

Most of the case reports documented so far has focused mainly on bayonet canals in maxillary or mandibular premolars. This case report highlights the presence of such s-shaped canals in mandibular molar which is relatively rare.

In the present case, the bayonet canals were cleaned and shaped by combining the various techniques suggested. MTA root canal sealer was used as it is found to have several advantages which would promote the healing of the bony lesion, by being biocompatible, bioactive, antimicrobial, non mutagenic and non neurotoxic, provide effective seal against dentin and promote biologic repair and regeneration of the periodontal ligament, not sensitive to moisture or blood, and It is radiopaque and non shrinking⁹

CONCLUSION

Successful root canal therapy despite the wide variations seen in root canal, is possible with the advances in endodontics. However, a systematic method in acquiring the history followed with a thorough clinical and radiographic assessment is necessary to attain the goal. A case difficulty assessment as given by the American Association of Endodontists may be used to assess the difficulty levels of each case which would make case selection more efficient and consistent and also help in documentation¹⁰ A thorough knowledge in tooth morphology, current instrumentation techniques and endodontic advances will help in ensuring a superior quality of treatment.

CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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