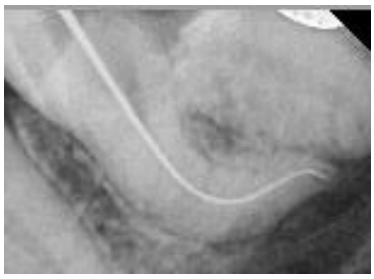
INTRODUCTION

The anatomy of third molars are unpredictable. However restorative, prosthetic, and orthodontic considerations often require endodontic treatment of third molars in order for them to be retained as functional components of the dental arch.

CASE REPORT

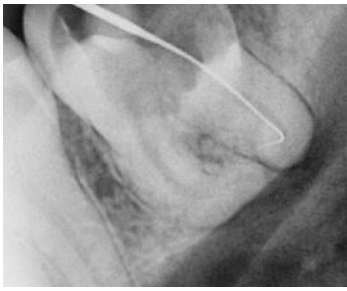
A 28-year-old apparently healthy male patient reported to the Department of Conservative Dentistry and Endodontics, Subharti Dental College, Meerut with a chief complaint of dull pain in the lower left back teeth. The medical history was non-contributory. Clinical examination revealed deep caries in relation to the mandibular left third molar (#38). The tooth was not tender to vertical percussion and there were no signs of periodontal inflammation. Sensibility tests showed abnormal response to cold and electric pulp testing. Preoperative radiographic investigation of the involved tooth showed evidence of deep (Occlusion) caries approximating pulp. Intra oral periapical radiograph (IOPA) revealed dilacerated mesial and distal root. A diagnosis of chronic irreversible pulpitis was made for #38 and endodontic treatment was planned.

Mesial canal with #15 K file



Distal canal with #8 K file

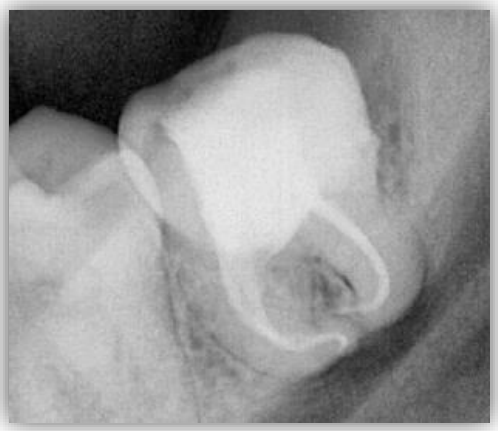
PRE OPERATIVE IOPA



After administration of local anaesthesia with 2% lignocaine containing 1:200,000 adrenaline (LOX*2%, Neon laboratories Ltd, Mumbai, India). Due to poor accessibility and reduced mouth opening rubber dam was not placed. Isolation was achieved with high suction and cotton rolls. All carious tissue was removed and access cavity with a straight line access was prepared using endodontic access bur (Dentsply Maillefer). Careful exploration of the pulp chamber floor with endodontic explorer (DG 16 probe, Dentsply) revealed three canal orifices, two mesial (Mesiobuccal and Mesiolingual) and one distal. The pulp chamber was flushed with 3% sodium hypochlorite to remove the debris. All orifices were enlarged with orifice opener (Coltene Hyflex EDM Orifice Opener 12%) The patency of the canals was checked with number 6 K-file (Mani, Inc.Japan) and working length was determined with Apex Locator (Canal-Pro CL2 Cordless Endo, COLTENE). An IOPA radiograph was taken at same length to verify the working length (Mesiobuccal canal = 21mm and Mesiolingual canal = 20.5mm and Distal = 21mm). A glide path was prepared very gently and slowly with #8, #10 and #15, 2% NiTi hand files (Dentsply Maillefer) and finally by #15 3% (Neolix, châtres-la-Forêt, France) and 17 4% (Neoendo, Orikam). Although 15 3% and 17 4% are rotary files but they were first used with hand and when full length was reached thereafter they were used with Endomotor (CanalPro CL2, Coltene). Cleaning and shaping of the canals was completed by using sequencing filing i.e #20 5% rotary HYFLEX EDM files till #25 One File (Hyflex, Coltene) under copious irrigation with 3% sodium hypochlorite solution and 17% EDTA solution to remove the smear layer. Irrigants were agitated with Endoactivator for proper disinfection.

The canals were then dried with absorbent points. Guttapercha cones were inserted in dried root canals and mastercone radiograph was taken to verify. Obturation was performed with guttapercha cones # 25 (Hyflex EDM Gutta Percha, Coltene) and sealer (Reko seal Single Dose, Coltene). Postoperative radiograph was taken to assess the quality of obturation. Orifice sealing was done with GIC (Ketac Cem Glass Ionomer Cement) followed by post endo restoration with Nanohybrid composite.

DISCUSSION



The posterior-most location of the third molar
makes it a clinical dilemma, compromises access of vision and instrumentation, and often presents with bizarre occlusal anatomy and internal patterns. The incidence of curved canals, fused roots, and C-shaped canals is generously reported in the literature. Gulabivala et al.[1] found 10.9% of single-rooted mandibular third molars having C-shaped variants. Hamasha et al.[2] reported the prevalence of dilacerations to be 3.8% and it was the highest in lower third molars, 19.2%. Similarly, the prevalence of curved canals has been found to be relatively higher in mandibular third molars, ranging from 3.3 to 30.92%, compared to maxillary molars that range from 1.33 to 8.46%. A tooth is considered dilacerated when there is a mesial or distal tilt of the root and the angle is equal or exceeds 90 in relation to the tooth or root axis. Another school of thought considers a dilaceration when its apical deviation is equal or exceeds 20 degree in relation to the normal tooth axis.[3]

Root canal curvatures may be apical, gradual, sickle-shaped, severe-moderate-straight curve, bayonet/S-shaped curve, and dilacerated curve.[4] Curved root canals present as a challenge in cleaning, shaping, and obturation of the root canal system.[5] These curves must always be valued and maintained strictly. The clinical strategy alters with the degree of dilacerations. Various attempts have been made for measuring the extent of curvatures. One of the most accepted one is given by Schneider. This method involves drawing a line parallel to the long axis of the canal in the coronal third of the root canal and another line drawn from the apical foramina to intersect the first line on a hard copy of the diagnostic radiographic printout. Schneider's angle is formed from the intersection of these lines. Accordingly, the degree of root canal curvature is categorized as straight: 5° or less, moderate: 10–20° and severe: 25–70° and another author Estrela C et al.[6] according to this method, radius of curvature which was categories as: small curvature (<4mm), moderate curvature (<8mm) and mild curvature (>8mm). Gunday et al.[7] introduced the term "canal access angle" (CAA), another parameter, which provides more information about the coronal geometry of canal

curvature. Abiding by Schneider's method, the aforementioned third molar exhibited severe dilacerations (Figure 1,2) and demanded a cautious preparation at each step. While preparing the curved canals, the following principles were closely followed:

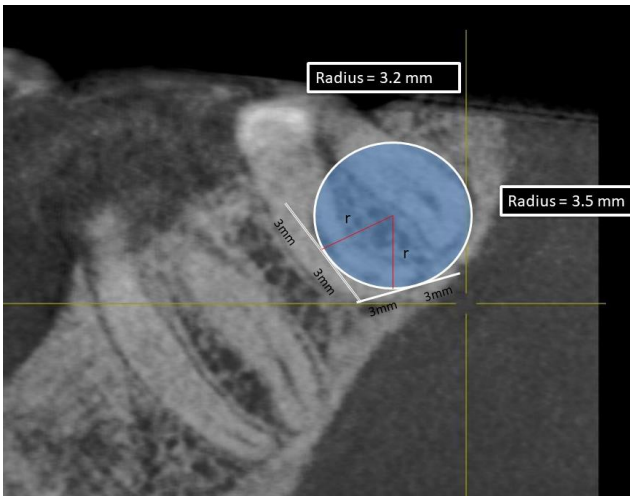
(1)To maintain the apical foramen in its original spatial location

(2)To gain a straight line access to the site of curvature

(3)To respect the anatomical danger zone in curved canals: the inner wall of the middle third and outer aspect of the apical third

(4)To use an instrument that closely adapts to the original shape of the canal, respecting its anatomy[7]

Figure 1. Measurement by Estrela's method using CBCT radiographic images. The root curvature radius based on 3 mathematical points can be determined in both apical and coronal directions. Curvature radius considering the two 6-mm semistraight lines are classified as small radius (r≤4 mm): severe curvature; intermediary radius (r>4 and r≤8 mm): moderate curvature; and large radius (r>8 mm): mild curvature

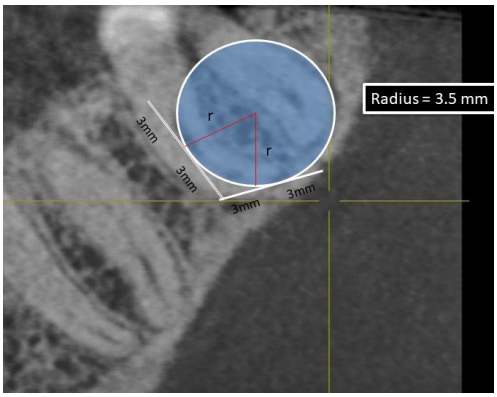


Radius less than 4mm (Severly Curved Canal)

Angle = 82 degree

Figure 2. Measurement of Schneider angle using radiograph. Angle more than 70 º (Severly Curved Canal)

$$\alpha =< 70°$$



CONCLUSION

Severely curved canals cannot be an indication for the extraction of a restoratively important third molar. Following the basic principles and taking advantage of new innovations (usage of intermediate precurved sequential filing and flexible rotary systems) in the field of

endodontics, even most severely curved canals can be negotiated and treated successfully as in the present case.

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(up to four authors for case report)