

ENDODONTIC MANAGEMENT OF C-SHAPED CANAL IN MANDIBULAR SECOND MOLAR: A CASE REPORT

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ABSTRACT:

A thorough knowledge of the root canal morphology is required for successful endodontic therapy. C-shaped canals are anatomic features that present the clinician with both diagnostic and operational challenges. C shape canal presents an extensive complex system and is mostly seen in mandibular second molars. Careful assessment of preoperative radiograph is a key step for its subsequent management, and this assessment might impact greatly on the treatment outcomes.

Key words: C-shaped canals, mandibular second molar, thermoplasticised gutta-percha, Smart Dentine Replacement.



INTRODUCTION

A thorough knowledge of the root canal anatomy and its variations is required for achieving success in root canal therapy, along with diagnosis, treatment planning and clinical expertise.^[1]

Mandibular second molars are commonly more variable in shape than other molar teeth. One of the most important anatomic variations is the "C" configuration of the canal system with a percentage ranging between 2.7% - 45.5%.^[2] The C-shaped canal, which was first documented in endodontic literature by Cooke and Cox in 1979, is so named for the cross-sectional morphology of the root and root canal.^[3] Instead of having several discrete orifices, the pulp chamber of the C-shaped canal is a single ribbon-shaped orifice with a 180° arc (or more), which, in mandibular molars, starts at the mesiolingual line angle and sweeps

around the buccal to the end at the distal aspect of the pulp chamber.^[4] C-shaped variation in canal anatomy has also been reported in maxillary first molars (0.12%), maxillary third molars (4.7%), mandibular third molars (3.5%-4%) and mandibular second premolars (1%).^[1]

Failure of the Hertwig's epithelial root sheath to fuse on the lingual or buccal root surface is the main cause of C-shaped roots, which always contain a C-shaped canal. The C-shaped root may also be formed by coalescence because of deposition of the cementum with time.^[5]

Once recognized, the C-shaped canal provides a challenge with respect to debridement and obturation, especially because it is unclear whether the C-shaped orifice found on the floor of the pulp chamber actually continues to the apical third of the root. Because of the great challenges in the diagnosis and

treatment of “C” configuration and critical need for its proper management “C” configuration is known to present a complex canal anatomy; its irregular areas house soft-tissue remnants or infected debris that may escape thorough cleaning or filling procedures, thus requiring supplementary effort to accomplish a successful root canal treatment.

This case report describe the successful endodontic management of C-shaped canal in mandibular second molar using thermoplasticized gutta-percha (Obturall) followed by coronal sealing by Smart Dentin Replacement and composite restoration.

CASE DETAIL

A 35 year old female reported to Department of Conservative Dentistry & Endodontics with chief complaint of decayed tooth in lower left back tooth region since 1 week. Patient gave no history of a pain. Medical history was noncontributory. Extra oral examination revealed no significant finding. During intra oral examination carious lesion w.r.t 37 involving the mesial and occlusal surfaces were present. Pulp vitality test indicated non vital tooth w.r.t 37. Radiographically, radiolucency was seen involving pulp with peripaical radiolucency w.r.t 37. The radiograph also showed a single conical root with outline of single root canal. Patient was diagnosed with periapical pathology along with single conical canal w.r.t 37 (Fig.1)

After access cavity preparation under rubber dam isolation (Fig.2), C-shaped

canal found and working length was determined using 15 K-file (Dentsply) (Fig.3). Cleaning and shaping of root canal was done (using K file MAF #50, and step back till #80 along with circumferential filling using H-file) with copious irrigation with 3% sodium hypochorite and final rinse with normal saline under proper isolation with rubber dam. After drying the canal with paper points followed by calcium hydroxide closed dressing for 1 week.

The patient was reported after 1 week and was asymptomatic. Appropriate master cone was selected (Fig.4). The canal was dried with paper point. Obturation was done using AH Plus sealer (Dentsply) and thermoplasticized obturation with Obturall (hybrid technique) (Spartan) after sectional obturation using master cone gutta-percha for apical 5mm followed by temporary restoration. Cavit G. After 3 days coronal sealing was done using Smart Dentine Replacement (Dentsply) followed by composite restoration (Brillant NG Coltene) (Fig.5)

DISCUSSION

The essence of successful endodontics revolves around knowledge, respect, and appreciation for root canal anatomy and careful, thoughtful, meticulously performed cleaning and shaping procedures.

A preoperative radiograph usually provides various clues in the identification of any variation in root canal morphology. However, there are differences in opinions on the value of a preoperative

radiograph in diagnosing a C-shaped case. Cooke & Cox were of the opinion that it is not possible to diagnose C-shaped canals on preoperative radiographs.^[3] Conversely, some investigators described four radiographic characteristics that can allow prediction of the existence of this anatomical condition: radicular fusion, radicular proximity, a large distal canal or a blurred image of a third canal in between.^[6,7] Radiographic interpretation is overall more effective when based on film combinations ('preoperative and working length radiographs' or 'preoperative and final radiographs' or 'all three radiographs') than on single radiographs.^[8] A preoperative radiograph and an additional radiograph from 20° mesial or distal projection may be the only noninvasive means clinically to provide clues about the canal morphology.

Hence, a C-shaped root in a mandibular second molar may present radiographically as a single-fused root or as two distinct roots with a communication. The radiograph may also reveal a large and deep pulp chamber, usually found in C-shaped molars.^[1]

Weine et al.^[9] advised placing K-files in the canals to determine canal configuration of the mandibular second molar. However, using a radiograph showing files set to the canal terminus to diagnose and to determine canal morphology may not give the results expected. In some instances it may be difficult to distinguish between C shaped canal or one with single or three canals joining apically. Thus, it was necessary to

confirm the diagnosis by exploring the access cavity with an endodontic explorer.

Because of the large volumetric capacity of the C-shaped canal system, housing transverse anastomoses and irregularities and continuous circumferential filing along the periphery of the C canal is irrigated with copious amounts of 5.25% NaOCl are often necessary to ensure maximum tissue removal and cessation of bleeding.^[8]

Studies have shown that following the cleaning and shaping, the remaining dentin thickness around the canals is usually 0.2 to 0.3 mm. The resultant forces of compaction during obturation can exceed the dentin canal resistance, which may result in root fracture and perforation of the root. In this regard, the thermoplasticized gutta-percha technique may prove to be more beneficial. But with thermoplasticized technique chances of apical extrusion is more. Hence in the present case sectional master cone used as apical barrier followed by obtura II thermoplasticized technique.^[1]

The excellent sealing properties of the material are crucial in preventing reinfection, specifically in endodontic access cavities. So in the present case SDR (Smart Dentine Replacement) used as coronal seal material because it's self-levelling consistency that ensures ideal adaptation to the cavity walls and flow into the ramifications of the cavity. SDR developed by Dentsply, is the first posterior composite for dentin replacement combining the handling properties of a flowable composite with

minimal shrinkage stress. Therefore a useful material for rapidly sealing the bulk of the access cavity in endodontics following which single shade composite is used to create and refine occlusal detail.

CONCLUSION

Knowledge of different possible alterations in the internal anatomy of teeth is important for successful endodontic therapy. The early recognition of these configurations facilitates

cleaning, shaping and obturation of the root-canal system.

Further long-term clinical studies are needed to substantiate the diagnosis of this variant in mandibular second molars using various diagnostic methods for a better understanding of this variant to facilitate cleaning, shaping and obturation of the root canal system.

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FIGURES:



Fig 1: Pre operative IOPAR w.r.t. 37



Fig 4: Master Cone IOPAR



Fig 2 : Access opening after rubber dam application

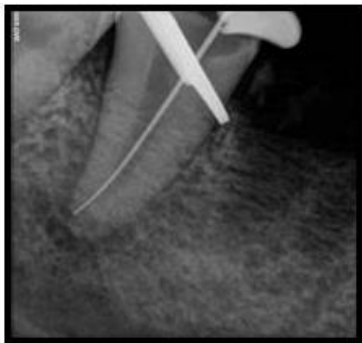
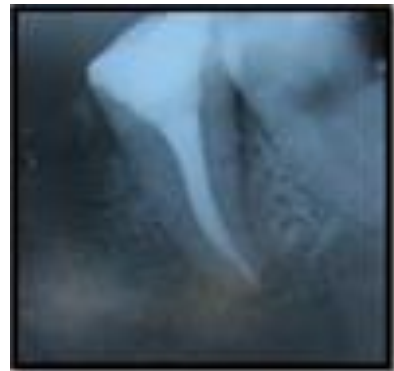


Fig 3: Working length IOPAR



Fig 5: Post operative after SDR (Smart Dentine Replacement) and Composite Restoration