

Typical C-Shaped Canals in Mandibular Second Molars

Dr. Sarita Singh

Reader

Dept. of Conservative Dentistry & Endodontics
Inderprastha Dental College, Ghaziabad (U.P)

Dr. Sharda Yadav

Senior Resident

RML Hospital
New Delhi

Dr. Anika Mittal

Professor & HOD

Dept. of Conservative Dentistry & Endodontics
Inderprastha Dental College, Ghaziabad (U.P)

Abstract

These case reports present a rare root canal system in a mandibular second molar with a single root and with a single C-shaped canal. C-shaped canals with varying configuration are commonly observed in single rooted mandibular second molars. The access cavities displayed a typical C-shaped orifice which is very rare. A clinician thus requires to have adequate knowledge about root morphology and its variation.

Key Words: Mandibular Second Molar, C-Shaped Canals, Single Canal.

Introduction

Successful root canal treatment depends on a number of factors such as proper diagnosis, knowledge of anatomy of root canal, thorough cleaning and shaping of the canal space and three dimensional obturation.

A sound knowledge of root form, configuration of pulp spaces and correct interpretation of radiographs is one of the first steps in rendering successful root canal treatment. This facilitates proper debridement and obturation.

Knowledge of dental anatomy is an essential tool for the success of endodontic treatment. A clinician is required to have an insight of the morphology of tooth related to its shape, form and structure before commencing treatment. Generally anatomical configuration of mandibular second molar is that of two roots, mesial and distal. Roots are closer together than the first mandibular molar. It can have variable internal anatomy and often have c-shaped canal configuration.² C-shaped canal system is commonly found in mandibular molars especially in Asian population.

Cimilli et al using spiral computed tomographic imaging concluded that the prevalence of C-shaped canals in single rooted second molars was 8%. Vertucci type I canals were most frequently seen in these C-shaped molars.³ A recent study conducted on Iranian population reported prevalence of 7.2% of C-shaped canals among second mandibular molars and these configuration were mostly seen among single rooted mandibular molars.⁴ A study by Yuan Gao et al described the presence of type I merging type of canals, where canals merged into one major canal before exiting at the apical foramen; partial dentin fusion areas may appear in the coronal and (or) middle portion of the canal.⁵ No mention of the presence of single canal with a round or oval orifice in a second mandibular molars could be found in literature. A study by Weine et al reported 1.3% of mandibular second molars had single canal configuration.⁶ The purpose of these case report is to report occurrence of single

canal in single rooted mandibular second molars that required endodontic therapy.

Case Report 1

A 32 years old man reported with the complaint of sharp pain right mandibular first & second molar (46 & 47). On examination, the teeth were carious and sensitive to percussion. On radiographic examination, pulpal involvement was seen in 47 having a single root canal (Fig.1). After completion of 46, access cavity of 47 was opened and pulp extirpated. Examination of the pulpal floor revealed a classical single C shaped orifice, without any separation. Working length was determined and cleaning and shaping completed by step back method with coronal preflaring using gates glidden drills. Irrigation with 3% sodium hypochlorite and 17% EDTA was done alternatively. Canal was obturated using thermoplastic obturation technique. Spaces left on sides were obturated using lateral condensation technique (Fig. 2).

Case Report 2

29 years old women reported with the complaint of severe pain left mandibular posterior teeth (36 & 37). On examination, 36 were already endodontically treated and had a crown while 37 had a temporary restoration. 37 were sensitive to percussion. On radiographic examination, 37 had pulpal involvement and single root canal while 36 had an inadequate obturation (Fig. 3). Patient wanted treatment of 37 only and after informing her of radiographic findings, treatment of 37 was initiated. On first day, access cavity of 37 was opened and pulp extirpated. Pulpal floor revealed a classical continuous C-shaped orifice. Working length was determined and cleaning and shaping completed by step back method with coronal preflaring using gates glidden drills. Irrigation with 3% sodium hypochlorite and 17% EDTA was done alternatively. Intracanal calcium hydroxide was placed and temporary was given. On next visit, canal was irrigated with 17 % EDTA liquid and dried with paper points. Canal was obturated using thermoplastic obturation technique. Spaces left on sides were obturated using lateral condensation technique. (Fig.4)

Case Report 3

A 37 year old women reported with the complaint of acute pain in left mandibular posterior tooth (37). There was history of extraction of 36 two weeks back and socket was seem to be properly healing. 37 had distal caries and was sensitive to percussion. On radiographic examination, 37 had pulpal involvement and single root with periapical radiolucency mimicking periapical abscess (Fig.5). One first day, access cavity of 37 was opened and pulp extirpated. Pulpal floor

revealed two root canal orifice, Melton Type II orifice configuration.

Coronal preflaring was done using gates glidden drills which converted two orifices in one. Working length was determined and cleaning and shaping completed by crown down method. Irrigation with 3% sodium hypochlorite and 17% EDTA was done alternatively. Intracanal calcium hydroxide was placed and temporary was given. On next visit, canal was irrigated with 17% EDTA liquid and dried with paper points. Canal was obturated using thermoplastic obturation technique. Spaces left on side were obturated using lateral condensation technique.(Fig.6)

Discussion

The C-shaped canal was first recognized by Cooke and Cox⁷. According to Cohen⁸, C shaped molar is so named for the cross sectional morphology of the root and the root canal. Further, the pulp chamber of C shaped molar, instead of having several discrete orifices had a ribbon shaped orifice with a 180 degree arcs arising at the mesial end of pulp chamber (mesiobuccal and/or mesiolingual canals),sweeping around the buccal, to end at the distal aspect.¹ Yang⁹ showed the presence of C-shaped canal in lower 2nd molar in 31.5%of chinese population and 13% of mixed Asian population. Melton¹⁰ in 1991 divided the C-shaped canals into three types.

Type I: Continuous C- shaped canal running from the pulp chamber to the apex defines a C-shaped outline without any separation.

Type II: The semicolon-shaped(;) orifice in which dentine separates a main C-shaped canal from one mesial distinct canal.

Type III: Simply have two or more distinct canals.

C-shaped canals could also vary in number and shape along the length of the root. The C-shaped molar often poses a challenge to the clinician owing to its complex root canal anatomy. Case report 1 and 2 can be assigned to Type I of Melton's classification. Melton also commented on the large amount of debris in instrumented canal space found in histological sections of these teeth, for which many authors agree on using ultrasonics and copious irrigation to facilitate their removal. Accordingly, irrigation with 3% sodium hypochlorite and 17% EDTA was used alternatively to remove the smear layer and to enhance the penetration of the thermoplasticized gutta percha. Walid¹¹ suggested obturating the main canals using lateral condensation technique and the central part of the canal with Obtura system using two pluggers. Kumar and Bhat¹² employed chemoplasticized gutta percha to obturate C-shaped canal, using rectified white turpentine as a solvent. These cases were obturated with



thermoplastic obturation techniques combined with lateral condensation techniques for proper adaptation to canal walls.

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Case Report 1

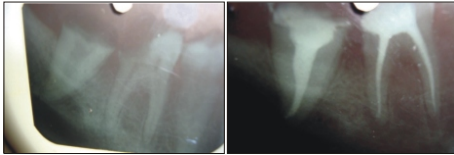


Fig. 1

Fig. 2

Case Report 2

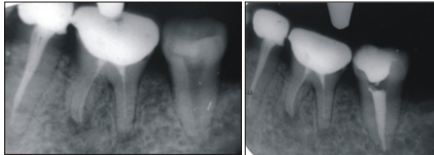


Fig. 3

Fig. 4

Case Report 3

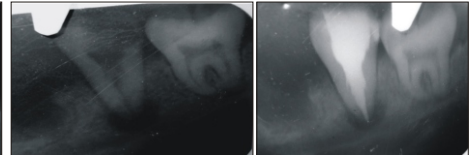


Fig. 5

Fig. 6

Address for Correspondence : Dr. Sarita Singh, Reader, Dept. of Conservative Dentistry & Endodontics, Inderprastha Dental College, Ghaziabad (U.P) drsarita_singh@yahoo.com

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Fig. 1



Fig. 2

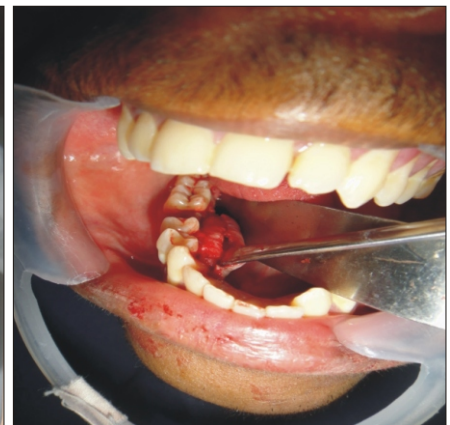


Fig. 3

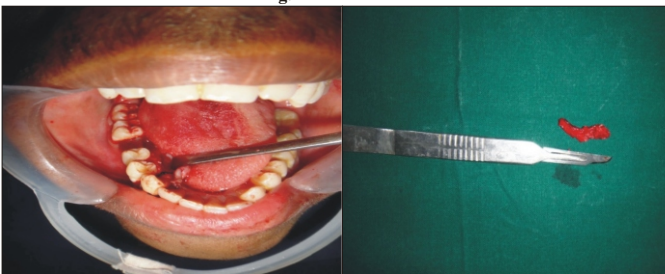


Fig. 4

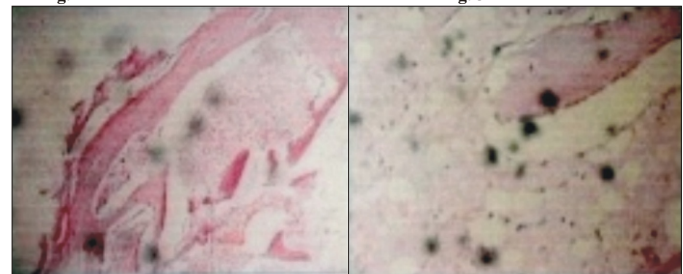


Fig. 5

rare, the goal of follow-up is to look for new osteomas or other signs indicative of Gardner's syndrome, as it is ruled out in our case. Malignant transformation of peripheral osteoma has not been reported in the literature.¹²

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Address for Correspondence : Dr. Dharnappa Poojary, Asso. Professor, Dept. of Oral & Maxillofacial Surgery, Manipal College of Dental Sciences, Mangalore-575001 Manipal University, Manipal, Karnataka, INDIA. dharnappa.poojary@manipal.edu



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