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RESEARCH ARTICLE

Management Of C- Shaped Canal – A Case Report.

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Abstract

The root canal morphology always poses a challenge to the clinician especially the C shaped canal. Proper identification, correct negotiation, suitable cleaning and shaping technique, adequate utility of diagnostic aids are the key factors to successfully restore this aberrant canal configuration. Along with this the clinician should also be aware of the existence of such variations that challenges his expertise. This case report deals with the management of an unusual case of C-shaped canal in mandibular molar with two buccally fused roots. Computed tomography (CT) was employed to confirm the existence of this unusual anatomy. Rotary endodontic instruments were utilized to ensure complete cleaning of the canal system. Use of diagnostic aids like CT, CBCT, improved magnification with dental operating microscope, and the use of novel file systems ensure success. Keywords: C-Shaped canals, root canal configuration, mandibular second molar.

A thorough knowledge of tooth morphology, careful interpretation of angled radiographs, proper access preparation and a detailed exploration of the interior of the tooth are essential prerequisites for a successful treatment outcome¹. C shaped canals are an uncommon variation, which can pose a challenge to even the experienced clinician during root canal negotiation. The name comes from the appearance of the pulp chamber floor when viewed from above. Some or all of the canal orifices are joined in the form of a groove or isthmus with a shape of the letter C. It presents with variation in both number as well as location of the root canals. The C shaped canal is special feature of some lower second molars. Approximately 1% of lower second molars have C-shaped canals. It is rather commonly found in the mandibular second molars, it may also occur in mandibular premolars, maxillary molars and mandibular third molars. It is very important to identify the canal configuration early so as to aid the clinician in proper negotiation, preparation and thus prevent irreparable damage to the tooth structure.

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Case Report:-

A 28-year-old female patient reported to the Department of Conservative Dentistry and Endodontics, with a chief complaint of pain in the lower right back tooth region. The tooth was tender on percussion and the patient complained of increase of pain during night. A detailed history was taken; her medical history did not reveal any significant findings.

Clinical examination revealed deep disto-occlusal dental caries extending in to the pulp, associated with the fracture of the distolingual cusp. The vitality of the tooth was checked and it was non-responsive to all the tests. The patient was diagnosed with irreversible pulpitis with 47.

The intra-oral periapical radiograph was done which revealed carious lesion extending into the pulp with moderate peri-radicular changes. The radiograph also showed a horizontally impacted third molar. (Fig 1)



Figure 1

The patient was put under medication for the acute symptoms to subside, later she was explained about the treatment protocol, the need for surgical extraction of the impacted molar before the fabrication of crown for the second molar and was subsequently taken up for root canal therapy with 47. Local anesthetic was injected, rubber dam applied and an access cavity was made to gain access to the root canal system. After the pulp extirpation and initial maneuvers of the hand files the unusual anatomy of the root canal was noticed.



Figure 2

A single orifice, ribbon shaped; with an 180° arc located in the middle portion of the floor of the pulp chamber with the shape characteristic of the C shaped canal was noticed. The canal configuration was more evident when viewed under surgical operating microscope with its typical features. (Fig 2).

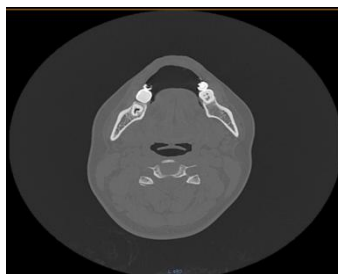
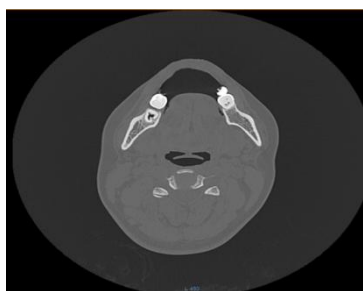


Figure 3

A CT scan was performed to confirm the presence of C shaped canal configuration (Fig 3).

Working length was determined using apex locator (Root ZX, J. Morita CO, Tustin, CA) and with digital radiographs. (Fig 4)

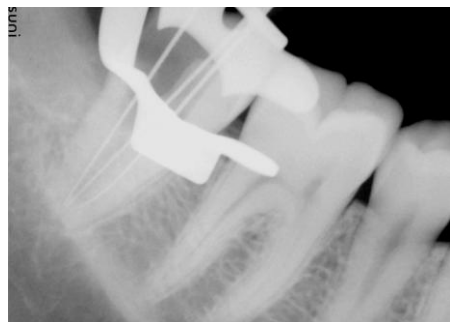
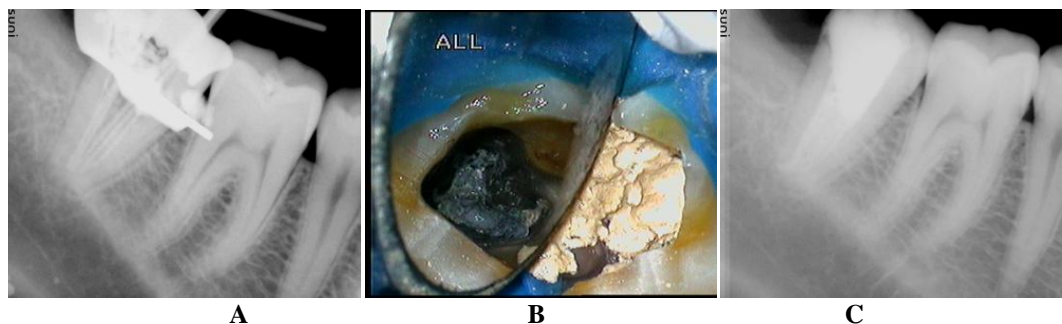


Figure 4

The glide path was initially obtained with hand file number 15 and number 20 followed by rotary glide path was established using number 20 with 4% taper (Mtwo endodontic instruments; VDW, Munich, Germany). The coronal part of the root canal orifice was enlarged with a Gates Glidden drill in order to facilitate subsequent instrumentation. Cleaning and shaping was completed using rotary files (Mtwo endodontic instruments; VDW, Munich, Germany) and the canal was enlarged to size 30 with a taper of 6%. Calcium hydroxide (RC-Cal, India), an intracanal medicament was used and the patient was recalled after 1 week.

In the next appointment, master cone was inserted and verified to the working length and radiograph was taken and the canal was obturated with selected master gutta-percha cone along with accessory cones with AH-Plus endodontic sealer with both lateral and vertical compaction. (Dentsply Maillefer Company, USA). (Fig 5 A, B, C)



Figures- 5

A temporary restoration was placed. The patient was recalled after 1 week for a post endodontic restoration.

Discussion:-

Fan et al.² analyzed the C-shaped canal system using micro-computed tomography (CT) and modified the classification of the C-shaped canal system.

1. They considered that this type of canal system had to exhibit all of the following three features: (i) Fused roots, (ii) a longitudinal groove on the lingual or buccal surface of the root, and (iii) at least one cross-section of the canal belonging to the C1, C2, or C3 configuration. They found that although the C3-type orifice may look like two or three separate orifices, an isthmus linking them is often discernible. Clinical recognition of C-shaped canals is based on the definite observable criteria (i.e., the anatomy of the floor of the pulp chamber and the persistence of hemorrhage or pain when separate canal orifices were found). When a deep groove is present on lingual or buccal surfaces of the root, a C-shaped canal is to be expected. The basic feature of C-shaped canals is the presence of a fin or web connecting the individual canals. The convergence of root canal instruments at the apex or being centered and exiting the furcation were used as the criteria for identifying C-shaped canals. In this case, initial evaluation of the radiograph suggested the presence of two roots with a wide centrally located canal space, suggesting that there may be a C-shaped configuration of the canal. After access preparation, only one orifice was negotiated, which showed presence of a single root canal.

The use of ultrasonics along with conventional therapy would be more effective. An increased volume of irrigant

and deeper penetration with small instruments using sonics or ultrasonics may allow for more cleansibility in fan-shaped areas of the C-shaped canal.

It should be emphasized that, in C-shaped mandibular molars, the mesiolingual canal is separate and distinct from the apex, although it may be significantly shorter than the mesiobuccal and distal canals. These canals are easily over instrumented in C-shaped molars with a single apex. Care should be exercised to avoid over-instrumentation and root canal perforation. Thermoplasticized gutta-percha technique is the recommended technique for canal irregularities⁸.

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