C-shaped canal system: A case report

ABSTRACT:

C-shaped canals are anatomic variants in root canal morphology. This c-shaped configuration should be diagnosed earliest as it influences the management of such cases more efficiently. They pose challenges in shaping, cleaning and obturating protocols. We require a file system which can contact and shape all possible surfaces of the c-shaped canal. Some of these file systems are XP-endo shaper files(FKG),SAF (ReDent NOVA). For cleaning, advocated systems are XP- endo finisher files (FKG), SAF, ultrasonic files like irrisafe, sonic files (endo-activator),endo-vac system.3-D obturation should be done with downpack and backfill technique (warm vertical or continuous wave of compaction).

Key words: C-shaped configuration, Anatomic variant, 3-D obturation, XP-endo shaper files, XPendofinisher file.

Introduction:

Not always are extra canals a challenge, but some fewer canal cases also pose certain challenges. C –shaped canal is a special feature of (4.7%) of maxillary third molars,(3.5-4%) of mandibular third molars and (1%) of mandibular second molars [1-4]. Appearance of pulp chamber floor when viewed from above appears as shape of the letter "C". Some or all of the canal orifices are joined in the form of a groove or isthmus. The c-shaped canal may appear as a fused root with very fine canals. The orifice of C- shaped canal is "ribbon –shaped" in arc of 180°. This shape starts at mesio-lingual line angle of pulp chamber which curves buccally and ends at the distal aspect [5]. Roots of these teeth may be fused in buccal or lingual aspect. Roots usually have a conical or square configuration. The classification of c-shaped canal was given by Melton and later modified by Fan et al.

Prevalence of c-shaped canals is more in Asians than in whites[6]. Burmese population presented 22.4 percent prevalence, Indian population 7.5 percent [7,8,9].

Etiology-most likely, the failure of hertwig's epithelial root sheath to fuse on the buccal or lingual root surface[10]. This

Access this article online	
	Quick Response Code
Website: www.ujds.in	
DOI: https://doi.org/10.21276/10.21276/ujds.2020.6.2.12	

causes formation of conical or prism shaped root morphology with a thin inter radicular ribbon shaped isthmus connecting them.

Case Report - 1

A 40 yrs old female patient reported to the department of conservative dentistry and endodontics with the chief complaint of spontaneous pain in right lower back tooth since past 1 week. Subjective symptoms included increase in pain on chewing and tooth feels elevated and loose.



¹**SINGH R,** ²**R MANGAT P,** ³**AZHAR S,** ⁴**SANA** ^{1,2,3,4}Kalka Dental College, CCS University, Meerut

Address for Correspondence: Dr. Rajender Singh House No. 99, Sector 12, Pocket 3, Indraprastha Apartments, Plot No. 10, Dwarka New Delhi-11007 E-mail: r.singh.aeitaan@gmail.com

Received : 13 July 2020, Published : 31 August 2020

How to cite this article: Singh Raju, R., Mangat, P., Azhar, S., & Sana. (2020). C-Shaped canal system - A Case report. UNIVERSITY JOURNAL OF DENTAL SCIENCES, 6(2):83-5.

Clinical examination revealed large carious lesion on mesioocclusal region of crown. Tooth was tender on gentle percussion and grade II mobility was present. Periodontal probing around the tooth showed increased sulcular depth(3mm) along the buccal surface. Pre-operative radiograph revealed a mesio-occlusal radiolucency approaching the pulp space with a widened periodontal ligament space adjacent to the root apex. Also fused conical root with single canal was seen. A diagnosis of symptomatic apical periodontitis was made and routine non-surgical endodontic treatment was planned.

Patient was administered local anaesthesia (2% xylocaine with 1:200000 ephinephrine) and rubber dam was applied. Caries excavated and pre endodontic built up with GIC type II was done. Endodontic access was made using small round bur BR-49 (MANI), there was excessive hemorrhage due to large pulp chamber occluso-apically.As the pulpal tissues were extripated, gradually hemorrhage reduced and pulpal floor could be examined under operating microscope and a c-shaped canal with classification(-Fan's anatomic classification C 1 and pulp chamber floor classification type I)could be seen[11,12]. Start –X ultrasonic tip number 3 (Dentsply, maillefer) was used in dry mode to refine the pulpal floor after which a thorough irrigation of pulp chamber was done with chloroquick solution(Innovations Endo, India).

Coronal flaring of canal orifice was done using orifice opener Sx of protaper Universal file system (Dentsply Maillefer) and working length determined. As the 10 no file was super loose in the canal, proglider file (Dentsply Maillefer) was used to make glide path, it was used circumferentially along walls of c shaped canal after which xp-shaper file (FKG) was used all along the canal at 1000 rpm and 1Ncm torque. Apical shaping was done using light speed files till ISO size no 70.Irrigation was done between each file introduced using choloroquick solution (NaOCl 5.2% plus 18% HEBP). Unfortunately xp -endo shaper file got separated in the canal, cold normal saline was used to irrigate the canal causing the spirals of file to straighten a bit and subsequently a combination of ultrasonic k file (satelec) and braided technique using H files, the separated file was retrieved. A dedicated cleaning of cshaped canal was done using xp-endo finisher file and chloroquick solution, final cleaning was done using normal saline. The canal was dried using endo aspirator tip attached to suction and using paper points. Canal was coated with AH plus resin sealer using endo-activator sonic device. Obturation was done using non standardized guttapercha

master cone gauged at ISO size 70,additional accessory cone was used after lateral condensation and down pack device (Elements, Sybron endo) was used in a continuous wave of compaction mode to cut the guttapercha 4mm short of apex and compact the apical heated guttapercha followed by back filling the canal with thermoplasticised guttapercha.The coronal seal was made using dual cure composite resin (Para core, Coltene).

Case Report - 2

A 25 years old female patient reported with chief complaint of spontaneous dull pain in left lower back tooth with swelling and pus discharge from left side of cheek.



Objective symptoms-Extra oral swelling and sinus tract on left side cheek, swelling in buccal vestibular region related to tooth no 37.Tooth was tender on percussion. Mobility was grade II(Miller tooth mobility index).Palpable sub mandibular lymph node on left side, Localized periodontal pocket in relation to lingual aspect of root. Radiographic findings showed radiolucency involving pulp and peri apical radiolucency also present. A diagnosis of chronic apical periodontitis with extra oral sinus was made. Clinical examination of pulp chamber floor under operating microscope showed c shaped canal (Fan's anatomic classification C1 and pulp chamber floor classification Type I).A similar protocol as in case 1 was used for shaping, cleaning and obturation.

Discussion:

Diagnosing a c- shaped canal in an early stage is very critical for good prognosis of the endodontic treatment.

First clue of c-shaped canal after seeing a fused root in radiograph will be localized periodontal disease due to narrow groove or fold on buccal or lingual aspect of root [13, 14]. Second will be persistent hemorrhage on access opening due to large pulp chamber(and not due to any endodontic mishap like perforation)[15]. Third will be examining the pulpal floor anatomy under magnification and illumination and finally correlating it with classification of c-shaped canals(Melton's or Fan's classification).

In the presented two cases, shaping with xp- endo shaper file, cleaning with xp-endo finisher file using chloroquick solution and obturating with down pack (continuous wave of compaction technique) and back fill with thermoplasticised guttapercha has enabled to shape, clean and obturate the "ribbion shaped" anatomy of c- shaped canal effectively.

Conclusion :

Intricacies of c-shaped canals create challenges for negotiation, shaping, cleaning and obturation but due to advancements in diagnosis(operating microscopes),efficient shaping file systems, cleaning devices, irrigants and 3-D obturating systems these c- shaped canals should no longer be an enigma to the clinician.

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