**ABSTRACT**

Adequate cleaning, shaping and filling of root canal system are mandatory for successful root canal treatment. This paper reports the management of a 56 year-old male patient with c-shaped mandibular second molar with periapical infection by watermelon frost as intracanal medicament during root canal treatment and obturation. The prognosis of this case demonstrates the effect of watermelon frost in healing of periapical lesion and thorough disinfection of root canal system.

**Keywords:** Watermelon Frost; Mandibular Second Molar; C-shaped Canal; Periapical Lesion

**Introduction**

The main objective of root canal treatment is proper mechanical and chemical cleansing of the entire pulp space followed by complete obturation with an inert filling material. Root canal morphology is limitless in its variability and that clinicians must be aware that anatomic variations constitute an impressive challenge to endodontic success. Undetected extra roots or root canals are the major reason for failure of root canal treatment. Therefore it is recommended to identify the aberrant anatomy prior to and during root canal treatment. C-shaped root system is an anatomical variation of second molars. They can be seen with a fin or web connecting the root systems. Lateral canals, anastomoses and apical deltas are very common. Furthermore, the second molar roots have a tendency to be close together and may be fused single rooted (22%) and may have 3 roots also (2%). Watermelon frost, a traditional medicine for therapy, has been widely known by the Chinese community for ages.

Antibacterial study of watermelon frost by Christian A and Trimurni A showed that there is a potent antibacterial property of watermelon frost against Streptococcus mutans as one of the cariogenic bacteria. Dennis and Trimurni A in their research showed there is an anti-inflammatory effect against the pulpal PGE. This case report was aimed to report the use of watermelon frost as root canal medicament in non-surgical retreatment with periapical lesion of C-shaped mandibular second molar.

**Case Report**

A 56 year-old male patient reported with a chief complaint of discomfort and pain while chewing with his left mandibular second molar for past few weeks. History revealed a diffuse pain and discomfort with biting on the tooth. On clinical examination pain on percussion and negative response to thermal tests were present in relation to 37 with restoration. Pre-operative radiograph showed under restoration of 37(Figure 1). The tooth was planned for retreatment and Watermelon frost was considered as intracanal dressing. The procedure was explained to the patient and consent was obtained. An approval of using watermelon frost as root canal medicament has been obtained from university authorized board.

**Watermelon Frost:** A watermelon weighing 2.5 kg was sliced its top and part of the flesh was removed. Followed by this add 500 grams of glauber’s salt (sodium sulfate decahydrate) inside. Then place the watermelon in refrigerator (not in the freezer) for more less 7–10 days or till frost (white powder) was formed in outer part of watermelon. (Figure 2,3,4)

During the initial siting, rubber dam isolation with soft clamp made from high performance polymer was done. The deobturation file and gutta percha solvents were used to remove the obturated materials from the canals (Figure 5). Following the access cavity preparation, the pulpal floor was inspected for the canal opening. One semicolon type of canal orifice extending from distal canal to mesiobuccal canal and the other orifice of mesiolingual canal separately was noticed suggestive of type II of C-shape canal anatomy(Figure 6). Canal system identification was confirmed by intra-oral periapical radiograph (Figure 7). The negotiation of canals began with no.15 ISO file. On closer inspection with 4.5 times magnification prismatic loupes the pulp chamber floor was carefully examined. The working lengths of all root canals were estimated using an electronic apex locator and then confirmed radiographically with initial files (Figure 3). Distal, mesiobuccal and mesiolingual canal spaces were prepared normally and the isthmus area was initially cleaned using smaller K-files not more than ISO No 30 followed by ultrasonic files. 2.5% Sodium hypochlorite and 17% EDTA were used as irrigants alternatively. Cleaning and Shaping were completed using rotary Mtwo instruments with crown-down technique and canals were dried with sterile paper points. Pure white watermelon frost powder was mixed with distilled water till creamy like consistency was achieved. It was inserted into all canals using paper points to reach the working length and temporized with temporary cement for two weeks.

During second visit, the watermelon frost intracanal dressing was removed from the canals and canals were cleaned using root canal irrigants. Clinical examination confirmed the disappearance of clinical symptoms, which includes no tenderness and sensitivity on percussion and palpation. The master cone was selected and the root canals dried with absorbing paper points. Root canals were obturated using combination of cold lateral condensation technique and compaction technique of warm gutta percha with MTA based sealer (Fillapex, Angelus...
Watermelon frost as intracanal medicament

Figure 1. Pre-operative radiograph, Figure 2. Watermelon frost applied with glauber’s salt, Figure 3. Watermelon frost in the refrigerator, Figure 4. Watermelon frost harvested from fresh watermelon, Figure 5. After removal of previous root canal filling material, Figure 6. Completion of cleaning and shaping, Figure 7. Radiographic with files, Figure 8. Post-obturation radiograph, Figure 9. Follow-up period at one year.

Brazil). After obturation, glass ionomer cement was used to seal coronal portion (Figure 8). The tooth was then restored with composite resin onlay. Follow-up was done for one year. There was good prognosis with no clinical symptom and the radiograph showed complete periradicular healing (Figure 9).

Discussion

Many of the challenges appear during root canal treatment may be directly attributed to an inadequate understanding of the tooth morphology. Human molars show considerable anatomic variation and abnormalities with respect to number of roots and root canals. 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. This anatomical variation is mostly seen in mandibular second molars. 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. Failure of Hertwig’s epithelial root sheath to fuse on buccal or lingual root surface is the main cause for occurrence of C-shaped roots, which always contain a C-shaped canal. However, C-shaped root may form by coalescence because of deposition of cementum with time. Melton et al in 1991 proposed the following classification of C-shaped canals based on their cross-sectional shape. In this classification, there has been no clear description of the difference between category II and III. Fan et al in 2004 modified Melton’s method into following categories.

Category I: the shape is an uninterrupted “C” with no separation. (C1)
Category II: the canal shape resembles a semicolon resulting from a discontinuation of the “C” outline, but either angle α or β should be no less than 60°. (C2)
Category III: two or three separate canals are present and both angles α or β, are less than 60°. (C3)
Category IV: only one round or oval canal is found. (C4)
Category V: no canal lumen can be observed, usually seen near the apex. (C5)

These unique anatomical features are not easily recognized on a traditional two-dimensional periapical radiograph; thus, the operator may first become aware of the anatomy of this root-canal system only when encountering the unfamiliar shape of the pulp chamber and its floor. With the increased use of CBCT for endodontic treatment planning, the clinician may be able to better detect and diagnose C-shaped canals prior to endodontic treatment.

These C-shaped canals present a challenge to the clinician, both at the diagnostic and treatment level. The un-treated parts of the root canal system may serve as a potential habitat or passage for bacteria. Watermelon frost as a traditional medicine has been widely known by the Chinese community for ages. Clinical experiment has proven that watermelon frost affects inflammation treatment of oral cavity, tonsilitis, laryngitis, pharyngitis, dental pain caused by high fever, inflamed gums, scald, etc. This indicates that inflammation can be reduced or healed after being given watermelon frost as traditional medicine. Because watermelon frost is naturally gained from watermelon (Figure 9), it is biocompatible in oral tissues.

Dennis and Trimurni conducted an in-vitro study on the effect of watermelon frost on symptomatic and irreversibly inflamed dental pulp tissue. They reported that there was an anti PGE2 effect of watermelon frost was present which reduce pulp and periapical inflammation. This study results demonstrated that watermelon frost could be used to decrease the PGE2 level as a pain marker in inflamed pulp tissue. The antibacterial study of Christian and Trimurni confirmed the antibacterial effect of watermelon frost against Streptococcus mutans. In this clinical case, Watermelon frost used as intracanal dressing is proven effective in reducing dental pulp and periapical inflammation.

Conclusion

In conclusion, Watermelon frost can be used as root canal dressing in infected canals and it promotes favorable healing and repair in case with periapical disease. It is a new natural material, which leads to the acceptance of the natural material to become an alternative as root canal medicament.

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