

# Cone Beam Computerized Tomography (CBCT) in Managing Endodontic Complications Associated with a Pulp Canal Calcification (PCC) – A Case Report

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**Abstract— Introduction:** Root canal treatment of calcified teeth presenting with endodontic complications is always a challenge to clinicians. The presentation, describes the use of CBCT in negotiating the root canal of a tooth presented with a peri-apical lesion. **Case History:** 26-year female presented with continuous pain in the upper left central incisor (tooth 21) which had PCC and a peri-apical lesion in the radiograph. Root canal treatment (RCT) was unsuccessfully attempted previously. As there was a risk of perforation and further compromise of tooth substance Guta Purcha (GP) was packed into the access cavity and sought the CBCT-guided negotiation of the canal. CBCT report which determined the relation to the root canal helped in negotiation with minimal preparation. The root canal was dressed for a brief period and the patient was free of symptoms thus the conventional treatment was carried out. **Conclusion:** CBCT determines and assists in the least invasive and easy negotiation of teeth with PCC with a predictable treatment outcome.

**Keywords—** Calcified root canals, CBCT, canal negotiation.

## I. INTRODUCTION

Following trauma and other reasons teeth get calcified, rarely there will be simultaneous necrosis of the tooth and subsequent complications. When the pulp chamber is fully calcified there is scarcely any guidance for the negotiation of the root canal. Even microscopic endodontics would not be useful. The case describes how CBCT has helped in the negotiation of the canal and in remedying the endodontic problem.

## II. CASE HISTORY

A 26-year-old female was referred to the Consultant Restorative clinic, at Colombo South Teaching hospital, Sri Lanka. She was having tenderness around the apex of tooth 21. She complained of previous orthodontic treatment for a few years done at a general practice level. She declared that discoloration has appeared towards the latter part of orthodontic treatment. About 6 months back she developed severe pain which settled after 2 days duration. Later she developed pain on biting with the same tooth. On examination, tooth 21 was tender on percussion whilst palpation of the apical area of the tooth demonstrated severe tenderness.

The patient was otherwise looking healthy with no facial asymmetry nor palpable lymph nodes or any facial swellings. 21 gave a negative response to the sensibility test. A peri-apical radiograph demonstrated PCC, breakdown of the peri-apical bone tissue and vague evidence of root resorption (Fig A).

The referring dental surgeon has attempted root canal treatment unsuccessfully. Root canal treatment was re-attempted at the consultant clinic. As the architecture was disturbed and the coronal 3<sup>rd</sup> of the root canal was calcified it was difficult to negotiate the root canal. The access cavity was further explored and examined under the microscope to

identify the orifice/ negotiation of the root canal. Canal negotiation was further tried with minimal preparation which was unsuccessful.

It was decided to obtain guidance from CBCT. GP (Gutta Percha, Dentsply Mumbai, India) was packed into the access cavity. The remaining part of the access cavity was covered with temporary Restorative Material. The patient was referred for CBCT. The CBCT report and the relation/ proximity to the root canal from the access cavity were obtained. It was noticed that the canal was in close proximity i.e. 1mm distal and 1mm in the palatal direction (Fig B & C). The access cavity was extended accordingly and the canal was negotiated. The working length was confirmed with the apex-locator confirmed with and a peri-apical radiograph.

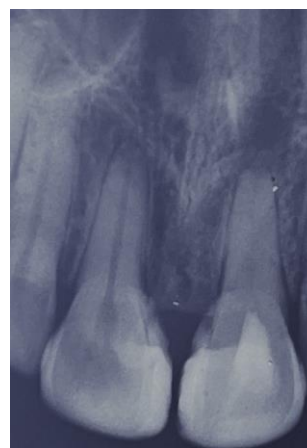


Figure A – Radiograph taken at the time of presentation

The root canal was prepared, cleaned and irrigated prior to being dressed with calcium Hydroxide with Iodoform (Calplus, USA). Following Calcium Hydroxide, another peri-apical radiograph was taken and it confirmed adequate filling

of the root canal and escape of the material probably through the resorptive channels (Fig D).

The patient was reviewed in 1 month and she was free of symptoms thus the conventional Root canal treatment was planned.



Figure B – CBCT – Sagittal section



Figure C – CBCT – Coronal section



Figure D – Peri-apical radiograph after placement of Calcium hydroxide

### III. DISCUSSION

The RCT of teeth with calcified canals is challenging. [1] Yet, it becomes mandatory when the patients are presenting with endodontic complications commonly peri-apical lesions.

Extensive calcification is usually associated with trauma and in reaction to operative procedures. The process of PCC is more complex than simple mineralization of the pulp, where a particular response of the cells results in abnormal and reparative tissue. [2], [3] Endodontic diseases such as irreversible pulpitis and apical periodontitis are effectively treated with root canal therapy. [4] Thus it is always obligatory to perform RCT in managing them. Surgical endodontics with retrograde restoration will be the alternative when conventional RCT is not possible.

CBCT assists in the diagnosis of periapical defects, detection of vertical root fractures, assessment of root resorption, visualization of perforations, identification of root canals, and treatment planning. [5] Studies confirm that CBCT is useful for analyzing the root canal system and peri-apical diseases, which accomplishes managing complicated RCT. [6] CBCT produces a three-dimensional (3 D) imaging of the dentition, by obtaining volumetric information from continuous cross-sectional scanning with spiral CT. In addition, CBCT provides morphologic details and variations of the root canal system, which are considered superior to routine radiographs.[7] In spite of its superiority, CBCT is not recommended above traditional radiographs during routine straightforward RCT. A routine pre-operative radiograph is mandatory prior to root canal treatment.

CBCT is useful in assessing the extent of PCC, thereby determining the proper sequence of the treatment. [8] CBCT helps in assessing the extent and depth of PCC and provides a guide to the precise location, depth, and angle to negotiate the patent part of the canals, which leads to optimal management.[9]

In the discussed case the challenge was to get to the patent part of the root canal. GP was packed into the access cavity to ease the detection and guidance to the patent part of the canal.

In addition to being accurate, CBCT analysis in calcified teeth assists dentists in operative design including the selection of the optimum approach. The possible complications associated with blind non-aided access cavity preparation of a tooth where the anatomical landmarks are obsolete are perforations and compromise of the precious tooth structure. CBCT images lead to successful negotiation avoiding unnecessary preparation and associated adverse problems. In a case series study of CBCT-aided RCT, adverse events such as perforation and deviation had been avoided in 16 root canals. [10]

Digital planning helps in 3-D visualization and predictable prognosis to decrease the risk of complications during root canal therapy. However, it is necessary for dentists to have good 3D conceptual visualization and better skills to expedite a successful outcome. In some studies, 3-D printed templates were used to guide the clinician in locating the canals with calcification. [11]

Better resolution and 3-D presentation of CBCT have proven an advantage in negotiating calcified root canals. [10] This study concluded that CBCT aided RCT to be a safe and clinically effective method for teeth with upper and middle thirds calcification. The use of CBCT transforms an empirical procedure into a quantitative procedure, increasing the predictability of a complicated RCT. However, the analysis of CBCT data in calcified teeth seems variable and depends on the dentist's clinical experience and expertise.[10]

#### *Ethical Considerations*

Informed written consent was obtained to review medical records and to publish de-identified information.

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