

## Multidisciplinary management of a Fused Maxillary lateral incisor using Cone Beam CT as a diagnostic aid: a Case Report

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**Abstract:** Successful clinical management of teeth with odontogenic anomalies is quite challenging. Fusion can be defined as a union of two separate tooth buds at some stage in their development. This case report describes a multidisciplinary approach involving endodontic and restorative considerations for a successful, functional and esthetic rehabilitation of fused tooth using cone beam computed tomography (CBCT) as a diagnostic tool.

**Keywords:** Fusion, Cone Beam Computed Tomography, odontogenic anomalies

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### I. Introduction

To ensure the long-term prognosis of a tooth undergoing root canal treatment, it is imperative that the morphology of the root canals and their numerous variations are assessed before initiating root canal treatment. Maxillary lateral incisors have a variety of different shapes, resulting in diagnostic and treatment challenges. And, one such variation is fusion (1).

Pindborg defined fusion as the union between dentin and /or enamel of two or more separate tooth germs and gemination as the division of a single tooth germ resulting in a bifid crown, and single root. Literature gives evidence that the prevalence rate of fusion ranges from 0.5% -2.5% (2).

A careful clinical and radiographic examination is beneficial for optimal treatment planning. Conventional intraoral periapical radiographs are an important diagnostic tool in endodontics but sometimes are not sufficient to aid in understanding the complicated morphology of root canal system, as in the case of fused teeth(3). These problems can be overcome by utilizing small or limited volume cone beam computed tomography imaging techniques, which produce accurate 3-D images of the teeth and surrounding dentoalveolar structures (4).

The present article describes the successful endodontic and esthetic management of a fused maxillary lateral incisor with two roots and three canals using CBCT as a diagnostic aid.

### II. Case report

A 20 year old male patient reported to the Department of Conservative Dentistry & Endodontics with pain in left maxillary anterior region since 1 week.

On clinical examination, the tooth appeared wider mesiodistally with a composite veneer, which was placed 10 months back for esthetic reasons. On palatal view, a fused lateral incisor with a supernumerary tooth was evident. There was history of sensitivity immediately after placement of restoration on taking hot or cold food. There was no history of trauma or any hereditary conditions.

Presently, the tooth was not sensitive to percussion or palpation. The tooth responded to an electric pulp tester and showed early response to cold test. On radiographic examination, a complex structure of the pulp was observed but the exact anatomy of the tooth could not be clearly identified. So, a 3D imaging using Cone Beam Computed Tomography (CBCT) was planned. Images from the 3D reconstruction revealed that the left maxillary lateral incisor had single large pulp chamber with two separate root canals (a type IV distal canal according to Weine's classification and mesial canal). From the above findings a diagnosis of irreversible pulpitis with the fused maxillary left lateral incisor and supernumerary tooth was made.

### III. Management

Access cavity preparation was done under rubber dam and two separate canals were located, one on the mesial aspect and other on distal aspect. Initially, a size 10K file was used to establish glide path. Coronal flaring of the tooth was done using Gates glidden drills no. 1 to 4 (Mani Inc) and working length established using 15 K files. Cleaning and shaping was completed by using step back technique (apical enlargement done up to ISO no.50). Throughout the treatment, canals were copiously irrigated with sodium hypochlorite (2.5%)

followed by saline. Canals were dried using paper points, calcium hydroxide was placed into the root canals and access cavity temporized with IRM. The patient was recalled after 1 week for obturation.

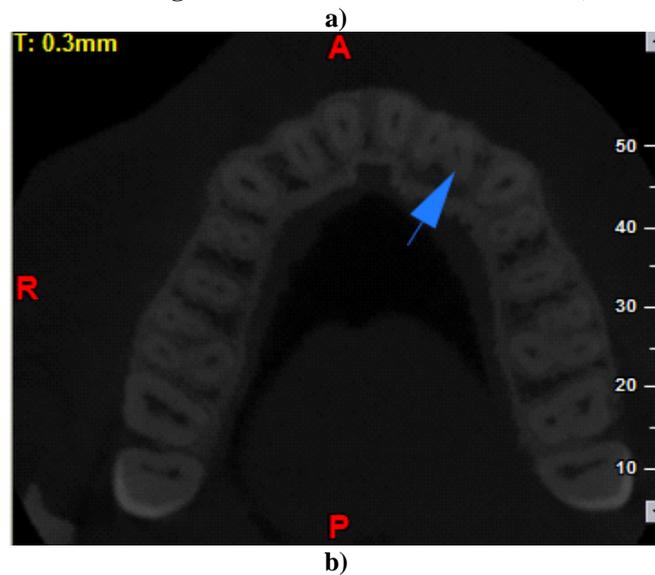
Prior to obturation, the canals were ultrasonically irrigated with 17% aqueous EDTA (Prodent) to remove the smear layer. Canals were obturated using thermoplastic obturation technique and AH plus sealer. Access cavity was sealed with resin composite.

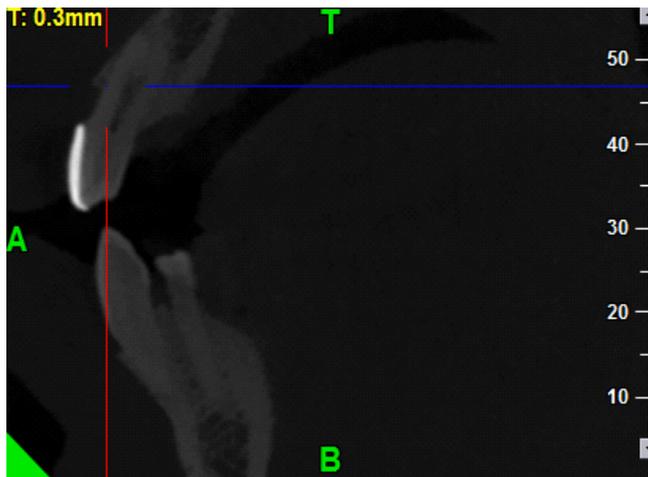
A modified crown preparation was attempted by placing a groove to partially divide the single large fused tooth to place two crowns for esthetic rehabilitation. On both the maxillary central incisors, old composite fillings were removed and ceramic veneers were placed.

**Fig I. Pre-operative photograph**



**Fig. II and III shows CBCT images of distal canal with two canals. a) Axial and b) MPR view**





**Fig IV. Post-operative radiograph**



**Fig.V Photograph after crown preparation.**



**Fig.VI Post-operative photograph**



#### **IV. Discussion**

The treatment of fused teeth can be complex and contain various treatment protocols that might include a multidisciplinary approach as a result of the abnormal crown shape, size and root formation, and esthetic problems in addition to endodontic considerations (3). For this reason, a modified treatment plan right from diagnosis to esthetic management was undertaken in the present case.

Cone beam computed tomography overcomes most of the limitations of intra-oral radiography and is a desirable addition to the endodontist's armamentarium (4). The increased diagnostic data should result in more accurate diagnosis and monitoring and therefore improved decision making for the management of complex endodontic problems. Also, CBCT is advantageous in that it has low effective dose in the same order of magnitude as conventional radiographs. Blattner et al, evaluated the efficacy of CBCT as a modality to accurately identify the presence of second mesiobuccal canals in maxillary first and second molars. The CBCT images accurately identified the presence or absence of the MB2 canal in 78.95% of samples. Statistical analysis showed that there was no significant difference in the clinical sectioning (5).

For complex root canal morphologies, the conventional cleaning and shaping with hand instruments alone are not sufficient to remove the microflora. Passive ultrasonic activation of irrigants provides adequate disinfection and removes the smear layer allowing the hot gutta-percha to flow into accessory and lateral canals. Also, the thermoplasticized gutta-percha technique enables a more 3 dimensional seal in complicated root canal anatomy than the conventional techniques(7).

One of the most important tasks in esthetic dentistry is creating harmonious proportions between the widths of maxillary anterior teeth when restoring or replacing them. And the "golden proportion" is a main guideline in this field (6). Levin pointed out that "the width of the maxillary lateral incisor is in the golden proportion to the width of the central incisor and also the width of the maxillary canine to the lateral incisor when viewing from the front." This guided in the successful establishment of esthetics in the present case report.

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