Cone Beam Computed Tomography Tool for Assessment of Unilateral Fusion of Permanent and Supernumerary Tooth - A Case Report

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INTRODUCTION

This paper reports a fusion of the mandibular lateral incisor and a supernumerary tooth, case focuses on the diagnosis of the clinical and radiographic features. The clinical examination revealed the absence of interdental embrasure and unesthetic appearance of the right mandibular lateral incisor. The conventional radiograph did not reveal thorough information to decide on provisional and differential diagnosis as it provides a two-dimensional view, which is the main limitation of the conventional radiographic technique. The presence of fused tooth was confirmed by the newer technique CBCT which was very specific in reading the difference in morphology of the tooth, that was well appreciated.

PRESENTATION OF CASE

A female patient, 36-years of age reported to the Department of Conservative Dentistry and Endodontics, JSS dental college and hospital, Mysuru, India. The patient's chief complaint was a pain in the lower right back tooth. Clinical evaluation showed a healthy female with no other physical abnormalities. On clinical examination, carious lesions were evident and previously placed restorations presented in good condition and her chief complaint was addressed. Unusual size of the lateral incisor was noted which looked like a developmental anomaly. (Fig 1, 2 & 3).

Developmental dental defects are usually seen as a variation in colour, size, shape and number of teeth, various factors may influence these developmental defects. Local and systemic factors may also influence deciduous and permanent teeth which are affected during or after birth.[1]

The merging of two different tooth buds which can occur in any phase of dental development is commonly called fusion. This developmental disturbance may cause aesthetic impairment.[2] These anomalies are usually asymptomatic and fewer aesthetic corrections are required. However, some aesthetic and functional corrections are needed, which include caries, pits and fissures, periodontal pockets, malocclusion, and endodontic issues.[3–7]

Intraoral radiographs are considered to be an advantage for the preoperative diagnosis of position and nature of dental anomalies. However, due to their limitations such as insufficient precision, these methods are considered unreliable.[8,9]

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Figure 1. Frontal View of Fused Tooth

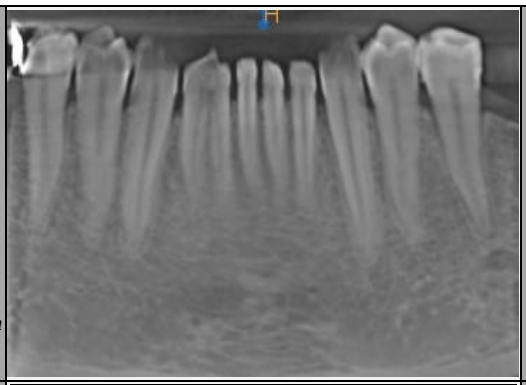

Figure 4. CBCT Image Showing Cross-Section of the Fused Tooth

Figure 2. Side View with Tooth in Occlusion

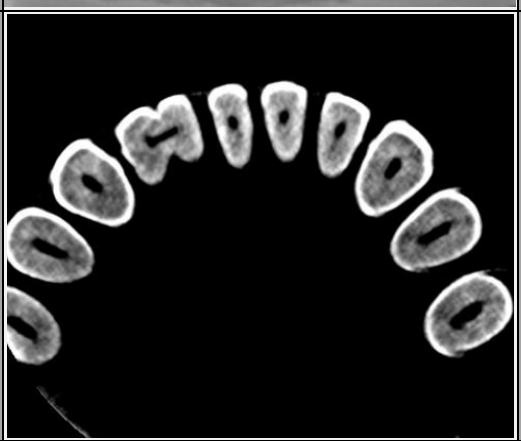

Fig 5: CBCT Image of Axial Sections Showing Fusion in the Coronal Third

Fig 3: Lingual View of the Fused Tooth

Figure 6. Axial Sections of the CBCT Show Separated Root with Two Separated Canal in the Middle Third

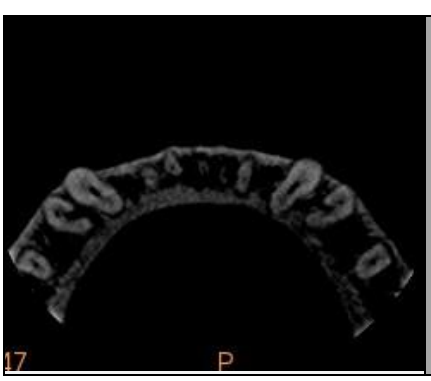

Figure 7. Axial Sections of the CBCT Show Separated Root with Two Separated Canals in the Apical Third

Three-dimensional images can be obtained by cone-beam computed tomography (CBCT), which is a new imaging technique used for better interpretation of the case.[10] Introduction of CBCT, improves the role of diagnosis and treatment plan.[10] The high-quality images, less time for the scan, volumetric analysis and comparatively less radiation than medical CT, have all helped in good imaging modality in dentistry.[11]

DISCUSSION

On clinical examination, carious lesions were evident and previously placed restorations presented in good condition and the patient's chief complaint was addressed. Unusual size of the lateral incisor was noted which looked like a developmental anomaly. A family history of hereditary propensity to supernumerary or congenitally missing teeth was not found. The intraoral examination revealed healthy soft tissues in the presence of poor oral hygiene practices.

Differential diagnosis cannot be offered always based on the clinical findings, so the periapical radiographic examination was advised. However, intraoral radiograph did not reveal much details to assess the case, because it was a two-dimensional image that presented with overlapping areas which were inconclusive. Hence a CBCT was advised. The three-dimensional image showed the merging of the teeth at the dentinal aspect, suggestive of the dental fusion of the mandibular right lateral incisor with a supernumerary tooth. (Fig 4, 5, 6 & 7)

DISCUSSION

Fusion can be defined as a conjunction of two separate tooth germs and identified radiographically as two separate pulp chambers and root canals.[12] The prevalence of the defect is approximately 0.1 % in the permanent dentition. The aetiology of fusion is still not clear, due to the effect of pressure or mechanical physical force which produces close contact between two erupting teeth that was reported as a possible cause. Genetic inclination was also reported as a contributing factor.[13,14,15] The different hypothesis says the use of thalidomide or pregnant women suffering from viral infection.[16] Fusion has been associated with inherited anomalies like cleft lip and congenital disorder like X - linked conditions. Few dental and non-dental malformations such as hyperdontia, hypodontia, peg-shaped incisors, Dens invaginatus, paronychia, syndactyly, series of conical teeth, megadontia and double permanent teeth have been reported with fusion.[17] Fusion may lead to a reduced number of teeth or may occur between a normal and supernumerary tooth.[18] Occasionally two independent pulp chambers and root canals are seen. However, the union of a normal tooth bud to a supernumerary tooth germ is referred as fusion,[19] which results in unesthetic appearance by crowding and irregularly formed tooth causing occlusal disturbances, respectively. The deeper fissures contribute to caries formation which leads to early pulpal exposure and compromises the periodontal health.[20]

These types of anomalies may be unilateral or bilateral (0 % to 0.6 %) and may influence both primary and permanent dentition, but case reports show that primary teeth are the most commonly affected. Cases have been reported with an equal incidence of fusion in both males and females.[21] Fusion of the teeth causes aesthetic problems and malocclusions, as fused teeth are wider than the adjacent teeth, aesthetics may be a concern. Fusion can result in diastema, more space in the dental arch. These problems require both cosmetic and orthodontic consideration.[22] The clinical management of fusion depends on teeth that are involved, the degree of fusion, and the morphologic defect.[23] Several reports have suggested that to intercept future malocclusion, further treatment, including extraction, partial removal, or separation of double teeth, should be considered.[22] If the fused tooth is caries-free, it may require no treatment, preventive measures should be considered. If the tooth is carious, then restoration has to be planned for both aesthetics and proper function. If caries is pulpally involved, root canal treatment should be rendered similarly to a multirooted tooth. While treating, the complex root canal system should be carefully evaluated. Interdisciplinary approach from orthodontic and prosthodontics speciality should be considered to ensure proper function, occlusion and good esthetics.[21]

Diagnostic findings are necessary to overcome mistakes and provide proper decision and accurate planning.[24] CBCT is a technology ideally suited for imaging the head and neck region, including hard and soft tissues. It gives more relevant information than intraoral radiograph.[24] In this case, the use of CBCT was appropriate and helped the analysis of the tooth morphology of the fused teeth. However, by reading a number of teeth the differentiation between twinning and fusion is non-conclusive because the developmental anomaly usually occurs between a permanent tooth and a supernumerary tooth as in the present case report.[25]The use of CBCT provides a better analysis of the teeth and helps in the choice of the appropriate treatment.[3] Therefore, proper diagnosis afforded by three-dimensional (3D) computed tomography scans allow proper visualization of the anatomy and its complexities and ensure formulation of a treatment plan with predictable and successful outcomes.[25] Hence the dentist should have a thorough knowledge of the dental anatomy as well the recent updates regarding diagnostics tools.

CONCLUSIONS

Dental anomalies are the most challenging in the dental practice where 3D imaging not only supports the differential diagnosis and the identification of changes in tooth development but also allows the visualization of their extent and limits. Hence the dentist should have a detailed knowledge of the dental anatomy as well the recent updates regarding diagnostics tools.

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