

Rare Concurrence of Talon's Cusp, Dens Invaginatus and Fusion in Maxillary Anterior Teeth: Images in Medicine

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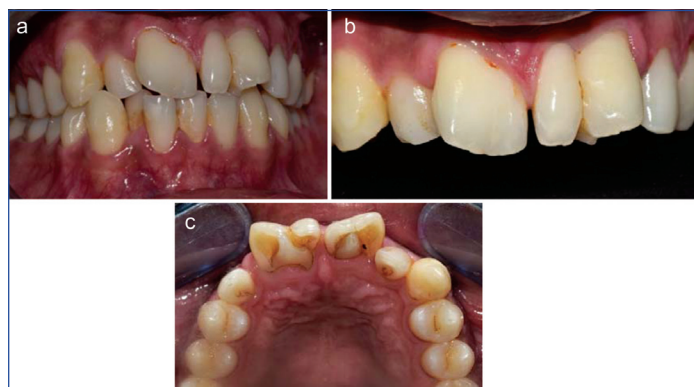
Developmental dental anomalies arise from disturbances during odontogenesis and may affect tooth morphology, structure, number, and eruption. The present case is unusual because it demonstrates the co-existence of fusion involving the maxillary central incisors with supernumerary elements, bilateral talon cusps, multiple dens invaginatus, and an impacted maxillary canine. Although each anomaly has been reported individually, their simultaneous occurrence in the same patient is exceptionally rare and reflects complex disturbances during morphodifferentiation of the enamel organ and dental papilla [1].

A 26-year-old male presented to the Department of Conservative Dentistry and Endodontics with the chief complaint of an unaesthetic appearance of his upper anterior teeth. The patient reported dissatisfaction with the shape of his upper front teeth but denied any history of pain, swelling, trauma, or previous dental treatment involving the affected teeth. His medical history was non-contributory, with no systemic illness, hereditary disorders, or history of familial consanguinity.

Extraoral examination revealed no facial asymmetry or associated abnormalities. Intraoral examination demonstrated unusual morphology of both maxillary central incisors. Tooth 11 exhibited mesiodistal widening with a faint developmental groove on the mesial third of the labial surface, mild palatal inclination, and a prominent talon cusp extending from the cingulum toward the incisal edge on the palatal surface. Tooth 21 also appeared enlarged mesiodistally with a distinct vertical developmental groove, labial depression, and incisal splitting. A well-developed talon cusp was present on its palatal aspect. The maxillary left canine (23) was clinically absent from the dental arch. No carious lesions or periodontal pathology were associated with the developmental grooves. The affected teeth were asymptomatic, with no tenderness on percussion or palpation, and responded positively to electric pulp and cold vitality testing, confirming pulpal vitality [Table/Fig-1].

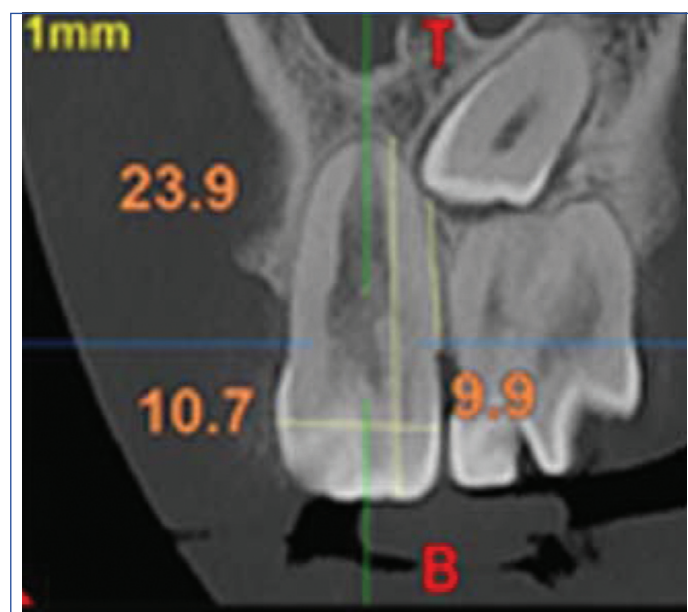
CBCT examination revealed widening of the crowns of both maxillary central incisors. Tooth 11 demonstrated a prominent talon cusp together with a single mesial dens invaginatus extending beyond the cemento-enamel junction into the root and terminating as a blind sac, consistent with Oehlers Type II dens invaginatus [2,3]. The root appeared broad mesiodistally with a constricted apical canal terminating in a single apical foramen. Tooth 21 exhibited similar crown enlargement with a well-developed talon cusp and two separate Type II dens invaginatus tracts extending into the root. The root morphology was irregular and broad with mild apical resorption. Sagittal CBCT sections demonstrated two distinct roots associated with both enlarged central incisors, while three-dimensional volume-rendered images clearly illustrated the complex relationship between the enlarged crowns, talon cusps, internal invaginations, and root morphology. CBCT also revealed an impacted maxillary left canine positioned superior to the root apex of tooth 22. A distinct follicular space surrounded the impacted canine, with no evidence of ankylosis or external root resorption of adjacent teeth [2].

Although enlarged anterior teeth may clinically resemble either fusion or gemination, differentiation between these anomalies is essential because treatment planning, prognosis, and epidemiological interpretation differ considerably. Fusion represents the union of two developing tooth germs, whereas gemination results from incomplete division of a single tooth germ [4,5]. In the present case, the enlarged crowns, developmental grooves, normal tooth count apart from the impacted left canine, and, most importantly, the presence of two distinct roots of 11 [Table/Fig-2] and 21 [Table/Fig-3a,b] in the CBCT images, strongly supported the diagnosis of bilateral fusion with supernumerary elements rather than germination [5,6].

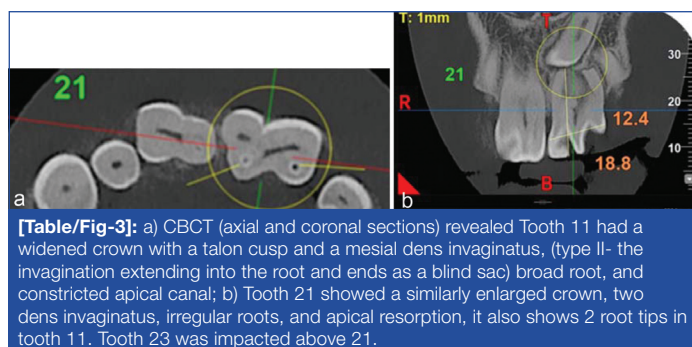


[Table/Fig-1]: a,b) 11 exhibiting mesiodistal widening with a faint groove and 21 exhibiting a prominent vertical groove, labial depression and incisal splitting; c) The presence of talon's cusp in 11 and 21 and absence of maxillary canine 23.

Because of the unusual morphology, cone-Beam Computed Tomography (CBCT) was performed for comprehensive evaluation.

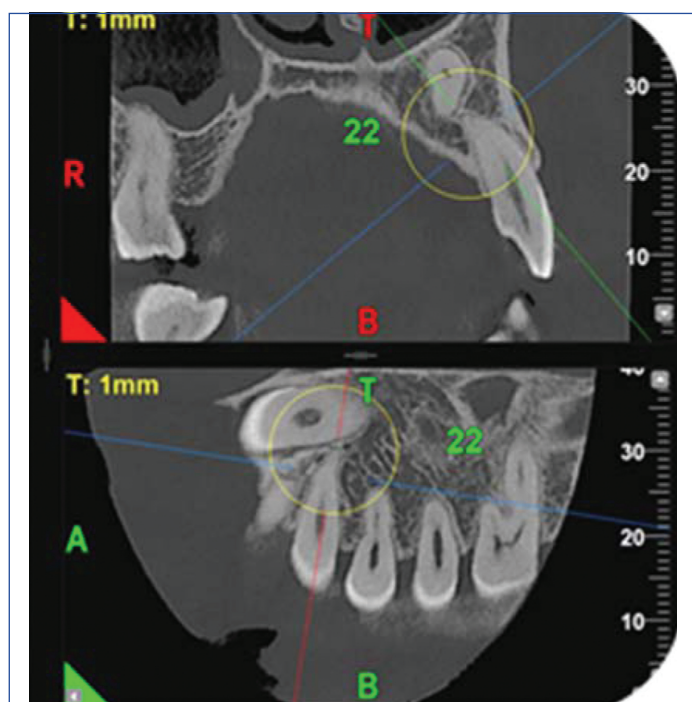


[Table/Fig-2]: CBCT images (sagittal sections) illustrating the 2 root tips seen in tooth number 21.



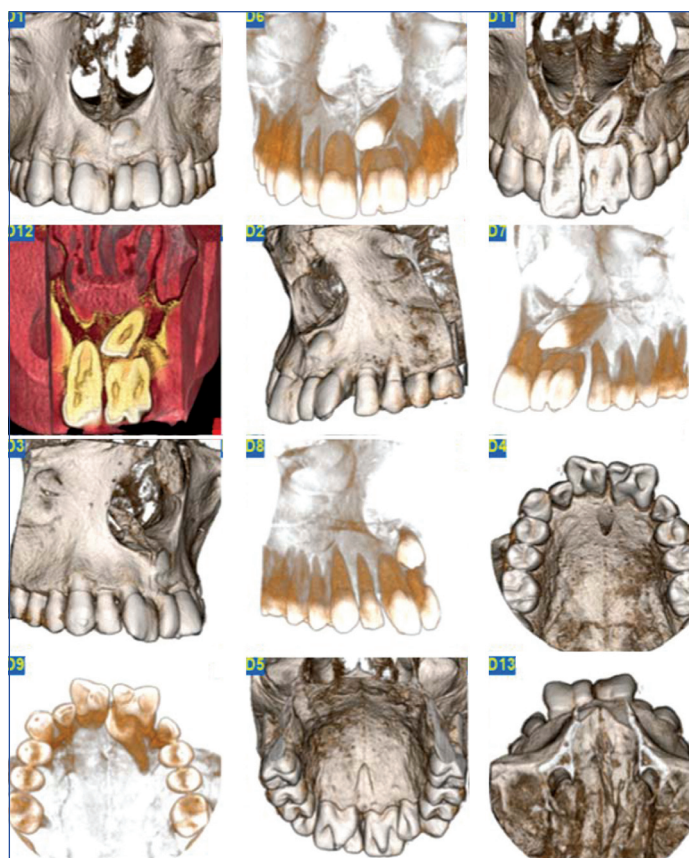
[Table/Fig-3]: a) CBCT (axial and coronal sections) revealed Tooth 11 had a widened crown with a talon cusp and a mesial dens invaginatus, (type II- the invagination extending into the root and ends as a blind sac) broad root, and constricted apical canal; b) Tooth 21 showed a similarly enlarged crown, two dens invaginatus, irregular roots, and apical resorption, it also shows 2 root tips in tooth 11. Tooth 23 was impacted above 21.

Based on the combined clinical and radiographic findings, a final diagnosis of bilateral fusion of the maxillary central incisors with supernumerary elements associated with bilateral talon cusps, one Type II dens invaginatus in tooth 11, two Type II dens invaginatus in tooth 21, and impaction of the maxillary left canine was established [Table/Fig-3-5]. The patient was informed regarding the developmental nature of the condition and the possible complications associated with deep developmental grooves and invaginated tracts, including plaque retention, dental caries, pulpal infection, and periodontal involvement. Various treatment options, including preventive sealing of developmental grooves, periodic vitality assessment, restorative correction of morphology, orthodontic management of the impacted canine, and long-term follow-up, were discussed. The patient had given consent for publication of his clinical pictures and CBCT reports. However, because the patient was asymptomatic and sought consultation primarily for information regarding the anomaly, he declined active treatment and opted for regular clinical and radiographic review.



[Table/Fig-4]: CBCT sagittal and coronal views showing the impacted maxillary left canine in close proximity to the fused maxillary central incisor complex. A distinct follicular space separates the canine crown from the root apex of 22. No evidence of root resorption or ankylosis is observed.

The co-existence of bilateral fusion with supernumerary elements, bilateral talon cusps, multiple Type II dens invaginatus, and an impacted maxillary canine represents an exceptionally rare developmental presentation. Previous reports have described the association of talon cusp with dens invaginatus or fusion individually; however, the simultaneous occurrence of multiple developmental defects affecting both the external and internal morphology of the same teeth remains extremely uncommon. Such a presentation substantially increases diagnostic complexity and necessitates careful clinical and radiographic evaluation.



[Table/Fig-5]: Cone-Beam Computed Tomography (CBCT) three-dimensional volume-rendered reconstructions demonstrating the complex developmental anomalies involving the maxillary anterior region.

Another noteworthy finding in the present case was the impaction of the maxillary left canine. The enlarged fused incisors may have contributed to localised space deficiency within the anterior maxillary arch, thereby altering the eruption pathway of tooth 23. This observation highlights that developmental anomalies may influence not only the morphology of individual teeth but also the eruption pattern and alignment of adjacent teeth.

CBCT played a pivotal role in establishing the diagnosis by providing accurate three-dimensional visualisation of the fusion, talon cusps, multiple dens invaginatus, root canal anatomy, and impacted canine [Table/Fig-5]. Unlike conventional radiographs, CBCT clearly demonstrated the presence of two distinct roots, confirming fusion rather than gemination, and accurately delineated the extent of the invaginations and their relationship with the pulp. This information is invaluable for diagnosis, treatment planning, and long-term management [7].

Although the affected teeth remained asymptomatic and vital, long-term follow-up is essential because developmental grooves and invaginated tracts predispose these teeth to future pulpal and periodontal complications. Early diagnosis, preventive measures, periodic vitality testing, and careful clinical and radiographic monitoring are therefore recommended to preserve tooth vitality and function. The rarity of the coexistence of bilateral fusion with supernumerary elements, bilateral talon cusps, multiple Type II dens invaginatus, and an impacted maxillary canine makes this case a valuable contribution to the literature. It further emphasises the importance of comprehensive clinical examination combined with CBCT evaluation for accurate diagnosis and individualised management of patients presenting with complex developmental dental anomalies.

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