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Crown duplication-like morphology with apparent absence of root formation in a maxillary third molar: A rare developmental anomaly

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Abstract
Developmental anomalies affecting crown morphology and root formation are uncommon, particularly in maxillary third molars. We report a rare case of a 32-year-old male who presented with pain in the right maxillary posterior region. Clinical examination revealed a buccally displaced, partially erupted maxillary right third molar. Panoramic radiography demonstrated an impacted maxillary third molar with unusual crown morphology. Following extraction under local anaesthesia, gross examination revealed a malformed crown with a bifid, crown duplication-like appearance and complete absence of identifiable root structure. The remaining dentition was unremarkable, and the overall tooth count was normal. This case highlights a rare developmental anomaly involving a maxillary third molar and emphasizes the importance of careful clinical and radiographic evaluation of atypical dental morphology.

Keywords: Developmental dental anomaly, maxillary third molar, rootless tooth, arrested root development, bifid crown morphology, tooth malformation

Introduction

Developmental dental anomalies arise from disturbances occurring during odontogenesis and may affect the number, size, shape, structure, eruption pattern, or root development of teeth. Among these anomalies, abnormalities involving crown morphology and root formation are uncommon and often present diagnostic challenges [1]. Third molars exhibit the greatest developmental variability within the human dentition and frequently demonstrate alterations in crown form, root morphology, eruption pattern, and size. Nevertheless, the occurrence of severe crown malformation associated with the complete absence of root formation is exceptionally rare [2].

Anomalies resulting in enlarged, bifid, or duplicated crowns are commonly described as gemination, fusion, or "double teeth." Differentiation between these entities may be difficult because definitive diagnosis often requires assessment of internal tooth anatomy, root configuration, and pulp morphology. Consequently, descriptive terminology is preferred when advanced imaging or histopathological evaluation is unavailable [3].

Root development is regulated by Hertwig's epithelial root sheath (HERS), which directs root morphogenesis and radicular dentin formation. Disturbances affecting HERS may result in root hypoplasia, arrested root development, or complete absence of root formation. Most reported cases of rootless teeth have been associated with hereditary dentin disorders, developmental arrest, local disturbances, or idiopathic causes and generally involve multiple teeth rather than a solitary tooth [4]. The present report describes a rare developmental anomaly involving a maxillary third molar with a duplicated crown-like appearance and absence of identifiable root structure.

Case Report

A 32-year-old male presented with a chief complaint of pain in the right maxillary posterior region for five days, associated with difficulty in mastication. The patient's medical, dental, and family histories were unremarkable, with no evidence of syndromic features or a family history of dental developmental anomalies.

Extraoral examination did not reveal facial swelling, cervical lymphadenopathy, or restriction of mouth opening. Intraoral examination revealed a partially erupted maxillary right third molar, with only a single cusp tip visible and positioned buccally relative to the dental arch. Mild tenderness was elicited in the region. No evidence of swelling, sinus formation, or purulent discharge was observed.

Panoramic radiographic examination revealed a maxillary right third molar exhibiting enlarged and irregular crown morphology. No associated radiolucent or radiopaque lesion was observed, while the remaining dentition appeared unremarkable, and the overall tooth count was 32. (Figure 1)

Considering the patient's symptoms and the abnormal position of the tooth, surgical extraction was planned under local anaesthesia. Following reflection of a mucoperiosteal flap, the tooth was delivered in toto without complication. Gross examination of the extracted tooth revealed a markedly abnormal crown morphology. The crown was enlarged and exhibited a prominent accessory crown-like component separated from the main crown by a developmental groove, resulting in a bifid or crown duplication-like appearance. The occlusal anatomy was irregular and did not conform to the typical morphology of a maxillary third molar. Notably, no identifiable root structure was observed, and the tooth consisted almost entirely of crown tissue. (Figure 2)

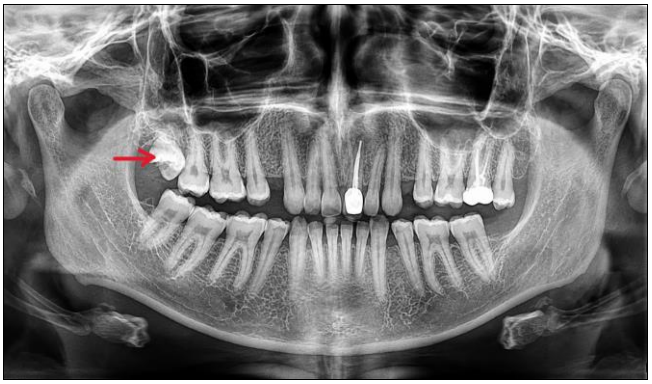

Fig 1: Panoramic radiograph showing an impacted maxillary right third molar with enlarged and irregular crown morphology and apparent absence of root formation

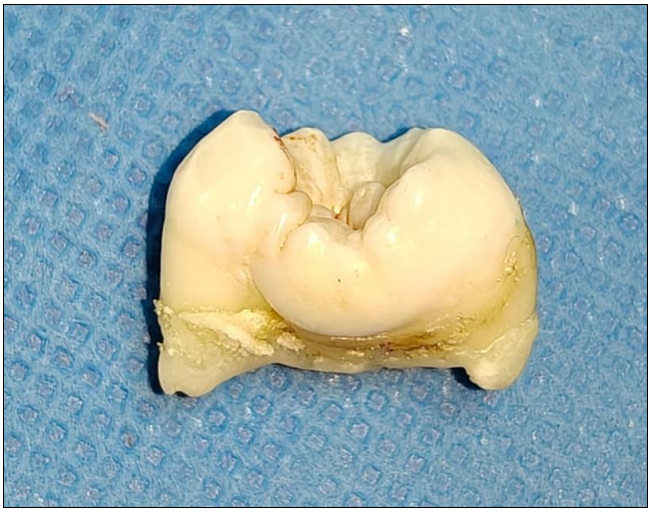

Fig 2: Extracted specimen demonstrating bifid crown morphology with a prominent accessory crown-like component and absence of identifiable root structure

Although odontoma was considered in the differential diagnosis, the radiographic appearance of a single impacted tooth and the gross morphology of the extracted specimen were more consistent with a developmental anomaly of the maxillary third molar than with a compound or complex odontoma. The specimen represented a continuous tooth-like structure with recognisable crown morphology rather than an irregular odontogenic calcified mass. Furthermore, the anomaly was located in the expected position of a maxillary third molar and exhibited recognisable tooth morphology rather than a separate odontogenic mass.

Based on the clinical and radiographic findings, the lesion was considered a rare developmental dental anomaly characterized by unusual crown morphology and apparent arrest of root development. The postoperative period was uneventful, and satisfactory healing was observed at the 1-week follow-up.

Discussion

Developmental anomalies affecting tooth morphology are uncommon and may result from disturbances occurring during the morphodifferentiation stage of odontogenesis. Among these anomalies, gemination and fusion represent developmental alterations characterized by enlargement, bifidity, or duplication of the crown morphology [5]. Although these anomalies have been reported in both primary and permanent dentitions, their occurrence in posterior teeth, particularly third molars, remains rare. Previous reports have emphasized that developmental anomalies involving molars account for only a small proportion of cases, with most reported examples occurring in anterior teeth [6].

Gemination is traditionally defined as an incomplete attempt of a single tooth germ to divide, resulting in a bifid crown that usually shares a common root and root canal system. Fusion, in contrast, results from union of two adjacent tooth germs and may present with separate or partially united pulp chambers and roots depending on the stage of development at which fusion occurs. Recent reports by Pellegrini *et al*., Oliva *et al*., and Brauer *et al*. have highlighted the rarity of third molar gemination and the diagnostic challenges in differentiating gemination from fusion [7-9].

The present case differs significantly from previously reported cases because all available reports describing molars with crown duplication or double-tooth morphology demonstrated at least partial root development, common roots, separate roots, or complex root canal systems. In contrast, the extracted specimen in the present case showed complete absence of identifiable root formation. Published reports describing a maxillary third molar exhibiting both crown duplication-like morphology and complete absence of root formation remain scarce.

Root development is initiated and regulated by Hertwig's epithelial root sheath (HERS), which guides root morphogenesis and induces differentiation of odontoblasts responsible for radicular dentin formation. Disturbances affecting HERS may result in root hypoplasia, arrested root development, or complete absence of root formation. Gunda *et al*. demonstrated that interruption of normal root development may result in arrested root formation, while Catalá *et al*. reported a rare rootless premolar attributed to developmental arrest during odontogenesis. [10, 11].

Most reports describing absent or severely shortened roots have involved hereditary dentin disorders such as dentin dysplasia, where multiple teeth demonstrate generalized root abnormalities. O'Carroll *et al*. emphasized that dentin dysplasia typically affects several teeth and often demonstrates characteristic radiographic findings involving the entire dentition [12]. In contrast, the present patient demonstrated normal morphology and root development of all remaining teeth, with the anomaly confined exclusively to a single maxillary third molar. This localized presentation argues against a generalized hereditary dentin defect and instead supports the possibility of a focal developmental disturbance affecting a single tooth germ.

Third molars are recognized as the most developmentally unstable teeth in the human dentition and frequently exhibit variations in size, shape, eruption pattern, and root morphology. Their prolonged developmental period and evolutionary tendency toward reduction in size have been proposed as factors contributing to increased susceptibility to developmental disturbances [13]. The present case further supports this concept by demonstrating an unusual combination of crown duplication-like morphology and complete arrest of root formation in a maxillary third molar.

A major strength of this report is the documentation of a developmental anomaly involving a maxillary third molar with unusual crown morphology and absence of identifiable root structure. The absence of advanced imaging and histopathological evaluation limited definitive characterization of the anomaly. Nevertheless, the unique

clinical and radiographic findings add to the limited literature on developmental disturbances affecting third molars and further broaden the spectrum of reported dental anomalies.

Conclusion

The present case describes a rare developmental anomaly of a maxillary third molar characterized by unusual crown morphology and complete absence of root formation. The isolated involvement of a single tooth and the absence of similar abnormalities elsewhere in the dentition suggest a localized disturbance during odontogenesis. Recognition and reporting of such uncommon presentations contribute to a better understanding of developmental anomalies affecting crown and root morphogenesis.

Patient Consent: Written informed consent was obtained from the patient for publication of the clinical information and accompanying images.

Conflict of Interest: The authors declare no conflict of interest.

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