CASE REPORT

Jurnal Radiologi Dentomaksilofasial Indonesia April 2026, Vol. 10, No. 1: 265-268
P-ISSN.2685-0249 | E-ISSN.2686-1321

http://jurnal.pdgi.or.id/index.php/jrdi/index

# Radiographic incidental finding of a complex odontoma associated with mandibular third molar agenesis: a rare case report

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## ABSTRACT

**Objectives:** This case report is aimed to report radiographic features of complex odontoma with mandibular third molar agenesis an incidental rare case.

**Case Report:** A 22-year-old female presented to the Dental Hospital Mulawarman University with a complaint of pain accompanied by tooth sensitivity in the maxillary molar. Extraoral clinical examination revealed no abnormal findings. Intraoral clinical examination showed a dental restoration on tooth 16. Radiographic findings revealed a radiopaque area suggestive of a restorative material, accompanied by a radiolucent lesion extending from the disto-occlusal region to the pulp chamber of tooth 16. Incidentally, an irregular, well-defined, corticated lesion was observed in the mandible region, associated with the absence of tooth 38. These findings were consistent with a complex odontoma occurring in conjunction with agenesis of the mandible third molar.

**Conclusion:** In this case, unilateral irregular round radiopaque well–defined corticated and the absence of third molar teeth in the mandible were found as the radiographic features that led to the suspect radiodiagnosis of a complex odontoma with agenesis of the third molar.

***Keywords:*** *Complex odontoma, third molar agenesis, mandible*
**Cite this article:** Alus LN, Agustin S. *Radiographic incidental finding of a complex odontoma associated with mandibular third molar agenesis: a rare case report.* Jurnal Radiologi Dentomaksilofasial Indonesia 2026;10(1):265-268. https://doi.org/10.32793/jrdi.v10i1.1515

## INTRODUCTION

Odontomas are the most frequently encountered odontogenic tumors (hamartomas), characterized by the formation of enamel and dentin in an abnormal pattern due to dysregulated tooth development. They are generally classified into two major subtypes: compound odontoma and complex odontoma. While compound odontomas resemble miniature normal teeth structurally, complex odontomas present as an amorphous mass of dental tissues without definitive tooth morphology.[1,2] Odontomas are typically asymptomatic and incidentally identified during radiographic examination, although larger lesions may be associated with delayed eruption, displacement of adjacent teeth, or cyst formation.[3]

Epidemiological studies indicate that the prevalence of odontoma ranges from approximately 0,26% to 0,30%, and these lesions occur more commonly in the maxilla compared to the mandible. Early detection and diagnosis of odontomas are clinically significant for appropriate treatment planning to prevent potential complications and ensure optimal outcomes.[4]

Agenesis, defined as the congenital absence of one or more teeth due to failure of initiation or differentiation of the dental lamina, represents the most common dental developmental anomaly in humans.[5] Among permanent teeth, the third molars exhibit the highest frequency of agenesis, with reported prevalence rates varying widely, often observed in 20 – 30% or more of individuals in diverse populations.[6] Studies have shown that agenesis of third molars may not be an isolated phenomenon but can reflect broader patterns of hypodontia affecting other dentition.[7]

The presence of a complex odontoma has important clinical implications, including disruption of normal eruption, tooth impaction, malocclusion, and possible root resorption of adjacent teeth. It may also contribute to cyst formation and functional disturbances, complicating dental management.[8] This is supported by Alim et al. (2025), who reported that complex odontoma can interfere with tooth eruption, lead to impaction, and require surgical removal.[9] Furthermore, complex odontomas can hinder orthodontic treatment by blocking tooth eruption, making surgical intervention necessary before orthodontic therapy. Muczkowska et al. (2025) also showed that a mandibular posterior odontoma caused molar impaction, requiring surgical removal followed by orthodontic treatment, as spontaneous eruption did not occur.[10] Similar cases have been reported in anterior regions, where complex odontomas

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Received on: January 2026
Revised on: April 2026
Accepted on: April 2026

delay the eruption of incisors and canines.[11–13] Although odontomas and third molar agenesis are relatively common individually, their coexistence is rare. This highlights the clinical importance of early detection and comprehensive radiographic evaluation to prevent delayed diagnosis and optimize treatment planning.[14]

Both complex odontoma formation and third molar agenesis are thought to arise from disruptions during early odontogenesis, involving aberrant dental lamina activity, altered epithelial-mesenchymal interactions, and genetic regulatory mechanisms governing tooth initiation.[15,16] Consequently, the presence of a complex odontoma in an area lacking a third molar tooth germ may indicate a common etiopathogenetic pathway related to dysregulated odontogenic signaling.[17] Reporting such rare incidental findings is essential to expand current knowledge and to improve understanding of the biological behavior and clinical implications of odontogenic tumors associated with developmental dental anomalies.

The purpose of this case report is to report the incidental finding of a complex odontoma with mandibular third molar agenesis. The findings of this study may provide new insights and contribute to the advancement of knowledge in dental radiology regarding the case of complex odontoma with agenesis of the third molar in the mandible.

## CASE REPORT

A 22-year-old female patient presented to the Dental Hospital of Mulawarman University with a chief complaint of pain accompanied by tooth sensitivity in the maxillary molar region. The patient had a history of dental scaling and restorative treatment performed by a dentist. Extraoral clinical examination revealed no abnormal findings. Intraoral clinical examination demonstrated that tooth 16 appeared to be restored with a dental filling material. Subsequently, a panoramic radiographic examination was conducted at Abdoel Wahab Sjahranie Hospital to evaluate the post–restorative condition.


**Figure 1.** Clinical photograph of the patient. (A) Frontal view, (B) Suspected location of a complex odontoma

Radiographic evaluation revealed that tooth 16 appeared radiopaque, resembling restorative material, accompanied by a radiolucent area extending from the disto-oclusal surface to the pulp chamber. Incidentally, a unilateral, well-defined, corticated radiopaque lesion with an irregular, round configuration was identified in the left mandibular region at the site of tooth 38, measuring approximately 5 mm (Figure 2). In addition, the tooth germ of 38 was absent in the region. Based on these findings, the radiographic diagnosis was suspected to be a complex odontoma with agenesis of the third molar in the left mandibular region.

**Figure 2.** Incidental finding of a complex odontoma with third molar agenesis in the mandible on the panoramic

## DISCUSSION

Based on the incidental case findings, the lesion appeared as an irregular, radiopaque, well-defined mass with a corticated border and a surrounding radiolucent halo, and no third molar (M3) tooth germ was observed. These features are characteristic of a complex odontoma with third molar agenesis. The incidental finding of a complex odontoma in the region of mandibular third molar agenesis represents an uncommon and clinically intriguing finding. Odontomas are generally associated with impacted, delayed, or displaced teeth, and their occurrence in areas where the corresponding tooth germ is congenitally absent is rarely documented.[18] This unusual presentation suggests that the coexistence of complex odontoma formation and third molar agenesis may not be coincidental but rather reflects a shared developmental disturbance during early odontogenesis.

The process underlying the coexistence of a complex odontoma and mandibular third molar agenesis can be based on disturbances occurring during the early stages of tooth development, particularly at the level of dental lamina formation and regulation. Tooth development begins with the initiation stage, in which the dental lamina invaginates from the oral epithelium into the underlying ectomesenchyme.[19] Normal tooth development requires tightly controlled epithelial–mesenchymal interactions mediated by several molecular signaling pathways, including β-catenin, bone morphogenetic protein (BMP), fibroblast growth factor (FGF), and sonic hedgehog (SHH).[20] Alterations in these pathways can result in either failure of tooth initiation, leading to agenesis, or abnormal proliferation and differentiation of odontogenic tissues, resulting in hamartomatous lesions such as odontomas. Recent molecular studies have identified mutations and polymorphisms in genes such as MSX1, PAX9, WNT10A dan AXIN2 as key contributors to non–syndromic hypodontia and disturbances in odontogenic signaling, supporting the concept of a common etiopathogenetic mechanism.[21]

Complex odontomas are characterized by a disorganized arrangement of enamel, dentin, cementum, and pulp tissue, forming an amorphous radiopaque mass without recognizable tooth morphology.[22] Radiographically, they typically appear as well–defined radiopaque lesions surrounded by a narrow radiolucent rim, corresponding to the connective tissue capsule. In the present case, the lesion was incidentally identified during panoramic radiographic examination, consistent with previous reports indicating that most odontomas are asymptomatic and detected unintentionally.[23]

Third molar agenesis is the most frequent form of dental agenesis and is often considered part of an evolutionary trend toward reduced dentition. Disruption of these signaling pathways due to genetic mutations, polymorphisms, or epigenetic influences can lead to premature arrest or regression of the dental lamina before a functional tooth germ is fully established.[24] As a result, tooth initiation fails, and the third molar does not develop. However, remnants of odontogenic epithelium or partially activated dental lamina cells may persist within the jawbone despite the absence of a complete tooth germ. These residual cells retain the potential for odontogenic differentiation.[25] However, contemporary studies suggest that third molar agenesis may also reflect broader developmental instability within the dentofacial complex.[26] Individuals with third molar agenesis have been shown to exhibit variations in craniofacial morphology and an increased likelihood of other dental anomalies. In this context, the presence of a complex odontoma in an area of third molar agenesis may represent an alternative expression of aberrant odontogenic signaling rather than two independent anomalies.

The simultaneous occurrence of third molar agenesis and complex odontoma formation can be interpreted as different phenotypic outcomes of a shared developmental disturbance.[27] While insufficient signaling results in failure of tooth initiation (agenesis), aberrant or excessive signaling in residual odontogenic tissues promotes abnormal tissue proliferation and differentiation, culminating in odontoma formation. This developmental model supports the concept that odontoma and agenesis are not independent events but rather interconnected manifestations of disrupted odontogenesis during early craniofacial development.[28]

The rarity of reported cases describing odontomas in regions of congenital tooth absence underscores the clinical relevance of this case. Most published case reports emphasize the association between odontomas and impacted teeth, particularly in the anterior maxilla for compound odontomas and the posterior mandible for complex odontomas.[9] However, documentation of complex odontomas occurring in sites lacking a corresponding tooth germ remains extremely limited. This scarcity of reports may be attributed to underdiagnosis, especially in asymptomatic patients who do not undergo radiographic evaluation. From a clinical and radiological standpoint, early identification of odontomas is essential to prevent potential complications, including bone expansion, root resorption of adjacent teeth, cystic transformation, or interference with orthodontic treatment planning.[29,30]

## CONCLUSION

In this case, a suspected complex odontoma with agenesis of the third molar in the mandible was incidentally found during panoramic radiographic examination. The radiographic findings, characterized by a unilateral, irregular, well-defined radiopaque lesion with a corticated margin and the absence of tooth germ teeth of 38, supported the radiodiagnosis. Further studies,


Jurnal Radiologi Dentomaksilofasial Indonesia 2026; 10 (1); 265-268 | DOI: https://doi.org/10.32793/jrdi.v10i1.1515

particularly those incorporating genetic and molecular analyses, are recommended to better elucidate the underlying mechanisms linking odontoma formation and tooth agenesis.

## ACKNOWLEDGMENTS

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## FOOTNOTES

All authors have no conflict of interest to declare for this article. Informed consent was obtained from the patient for being included in this case report.

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