

# Management of a Compound Odontoma in Association with a Retained Primary Tooth and Delayed Eruption of Permanent Maxillary Central Incisor in an 8-Year-Old Girl: A Case Report

Dr Geetha C P<sup>1</sup>, Dr Suchithra Muraleedhar Seetha<sup>2</sup>, Dr Gibi Syriac<sup>3</sup>

<sup>1</sup>Junior Resident, Department of Pediatric and Preventive Dentistry, Government Dental College, Kottayam, Kerala.

<sup>2</sup>Professor and Head of the Department, Department of Pediatric and Preventive Dentistry, Government Dental College, Kottayam, Kerala.

<sup>3</sup>Assistant Professor, Department of Pediatric and Preventive Dentistry, Government Dental College, Kottayam, Kerala.

Corresponding Author: Dr Geetha C P

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## ABSTRACT

Odontomas are the most common odontogenic tumors, frequently detected during radiographic evaluations in children with delayed tooth eruption or retained primary teeth. This case report presents a comprehensive clinical scenario of an 8-year-old girl who was initially referred for a toothache in the mandibular region. Incidentally, a retained maxillary primary incisor was discovered prompting further radiographic investigation. Imaging revealed a compound odontoma obstructing the eruption of the permanent maxillary right central incisor. The patient underwent surgical removal of the odontoma and extraction of the retained primary tooth. Orthodontic intervention and guided eruption using sectional fixed appliances, were employed to facilitate proper alignment of the impacted tooth. This report underscores the significance of early detection, accurate diagnosis, and collaborative treatment planning in managing complex odontogenic anomalies in children.

**Keywords:** odontoma, pediatric dentistry, retained primary tooth, delayed eruption, maxillary expansion, orthodontic eruption

## INTRODUCTION

Odontomas are benign odontogenic tumors that are better regarded as hamartomas rather than true neoplasms due to their limited growth potential and lack of malignant transformation. The term "odontome" was first coined by Paul Broca in 1867, who described it as a tumor formed by the overgrowth of dental tissues. (1) Histologically, odontomas consist of various dental components such as enamel, dentin, cementum, and pulp tissue. However, unlike true neoplasms which are characterized by unregulated cell proliferation and atypical histological features, odontomas represent a developmental anomaly resulting from the improper differentiation and morphogenesis of odontogenic tissues. Their formation is a result of the overproduction of normal dental tissue in an irregular or disorganized pattern, supporting their classification as developmental anomalies (hamartomas) rather than true neoplasms.(2)

Odontomas represent approximately 22% of all odontogenic tumors of the jaws, with compound odontomas accounting for about 10% of these cases. The reported prevalence of compound odontomas ranges from 9% to 37%, while complex odontomas have an incidence between 5% and 30%. These lesions are most frequently diagnosed during the second and third decades of life. Among the subtypes, compound odontomas are slightly more prevalent than complex ones, which are in turn more common than ameloblastic odontomas. Anatomically, compound odontomas are predominantly located in the anterior maxilla, particularly in the incisor-canine region, while complex odontomas are typically found in the posterior mandible, involving the premolar and molar areas. Notably, both types show a predilection for the right side of the jaw(1) The etiology of odontomes is multifactorial and remains not fully understood. A variety of factors have been proposed to contribute to their development, encompassing both genetic and environmental influences. Among the commonly implicated causes are local trauma, infections, and developmental anomalies of odontogenic tissues. Trauma, particularly to a developing tooth germ can disrupt the stages of odontogenesis, potentially resulting in hard tissue malformations. Infections, including prenatal infections or those affecting the maxilla in early infancy, may interfere with normal tooth germ development, sometimes leading to odontome formation. Additionally, local growth pressures due to spatial constraints have been considered significant, especially in cases where developing permanent teeth are impacted by the roots of their deciduous predecessors. Histological origins have also been explored, with mature ameloblasts, remnants of the dental lamina (cell rests of Serres), and extraneous odontogenic epithelial cells suggested as sources of odontogenic tumors. Genetic influences are notably significant; odontomes may arise from inherited mutations, postnatal

interference in gene regulation, or abnormal epithelial-mesenchymal interactions during tooth development. Researchers like Hitchin and Papagerakis have hypothesized that these genetic disruptions may affect normal signaling pathways, leading to the aberrant differentiation seen in odontomas. Furthermore, syndromic associations such as Gardner's syndrome underline a hereditary component. Overall, odontome formation likely results from a complex interplay of genetic predispositions and environmental insults that disrupt the normal morphogenesis and differentiation of dental tissues.

This case report highlights the incidental diagnosis and successful multidisciplinary management of a compound odontoma associated with a retained primary incisor and delayed eruption of the permanent maxillary central incisor in a young girl.

#### **CASE REPORT**

An 8-year-old girl was referred by her Pediatrician to the Department of Pediatric and Preventive Dentistry, Government Dental College, Kottayam, Kerala, India for evaluation of pain in relation to her right lower back tooth. The patient had no significant medical or family history. Extraoral examination was non-contributory, and her general health appeared satisfactory. Intraoral examination revealed deep caries in the mandibular right second primary molar (tooth 85), with signs and symptoms of pulpal involvement, including spontaneous pain and tenderness to percussion. Surprisingly, the maxillary right primary central incisor (tooth 51) was retained, while its permanent successor (tooth 11) was clinically missing (Figure1). No signs of acute or chronic infection were noted in the maxillary anterior region. 21 and 22 are erupted. Parent informed that upper left front milk teeth were exfoliated around 1.5 years back and the side front tooth around 7 months back. No history of trauma during the early childhood period was reported by the parent.



**[Figure 1: Intraoral image showing retained tooth 51 and unerupted tooth 11]**

To further investigate the status of the unerupted tooth, an intraoral periapical radiograph and an occlusal radiograph of the maxillary anterior region were taken. The radiographs revealed the presence of multiple small, radiopaque tooth-like

structures located inferior to the crown of the unerupted tooth 11 (Figure 2). The radiographic diagnosis suggested a compound odontoma obstructing the eruption pathway of the permanent maxillary right central incisor.



**Figure 2: IOPA showing compound odontoma interrupting the eruption of 11]**

Pulp therapy was initiated and completed on tooth 85. After discussing the diagnosis and treatment options with the parents, a treatment plan was formulated involving surgical enucleation of the odontoma and extraction of the retained tooth. It was decided to wait and watch for the spontaneous eruption of the unerupted permanent right maxillary central incisor, considering the age of the child, and as 21 was an immature tooth with incomplete root development. Orthodontic extrusion may be

carried out when the root becomes more mature.

Under local anesthesia and aseptic conditions, a mucoperiosteal flap was reflected, and the odontoma was surgically excised. The multiple denticles and encapsulating tissue were carefully removed. 20 denticles of varying sizes and shapes were there (Figure 3). The retained tooth 51 was extracted during the same procedure. Hemostasis was achieved, and the flap was repositioned and sutured with 3-0

Vicryl. (Figure 4). The patient was prescribed an antibiotic (Amoxicillin+Clavulanic Acid 375 mg) and

an analgesic combination of Ibuprofen and paracetamol 250 mg postoperatively.



[ Figure 3: image of denticles with cystic granulation tissue]



[Figure 4: Postoperative image showing sutured surgical site,

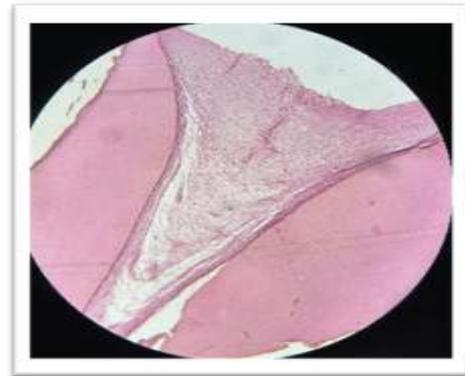


Figure 5: Photomicroscopic view]

The excised specimen was sent for histopathological analysis. Histological examination revealed a well-organized lesion composed of multiple tooth-like structures, consistent with a compound odontoma. The specimen predominantly exhibited tubular dentin, forming the bulk of the tissue, with a central area of pulp-like connective tissue. The dentin appeared acellular and eosinophilic under hematoxylin and eosin staining. The lesion lacked any cystic components, ghost cells, or proliferating odontogenic epithelium. The histoarchitecture, with organized dental tissues in a tooth-like arrangement, confirmed the diagnosis of compound

odontoma (Figure 5). Healing progressed uneventfully. After one-month 12 erupted into the oral cavity. The patient was monitored monthly for spontaneous eruption of tooth 11. However, no significant eruption was observed over the next six months, indicating the need for interceptive orthodontic treatment. Combined surgical and orthodontic approach allows for controlled movement of the impacted tooth in to correct position in the alveolar ridge. Fixed sectional orthodontic appliances were bonded to teeth 12 and 21 to apply gentle eruptive force on tooth 11. The progress was monitored monthly (Figure 6)



[ Figure 6: Sectional fixed orthodontics for eruption guidance]

Tooth 11 began to emerge after approximately two months of orthodontic traction. Within six months, the tooth had erupted into the arch, and occlusal adjustments were performed.



[ Figure 7: Immediate Post treatment)

A retainer was provided to maintain the arch form and prevent relapse. Periodic follow ups were conducted at 3 months intervals.



[Fig. 8 & 9. Intra oral photograph and IOPA radiograph at 1 year follow up visit showing 11 fully erupted and well aligned in the arch with a fully formed root apex.]

## **DISCUSSION**

Odontomas, though benign and non-aggressive, can cause significant interference in the normal eruption sequence, especially in mixed dentition. Their development is attributed to several etiological factors, including local trauma, inflammatory processes, hereditary anomalies, or syndromes such as Gardner's or Hermann's syndrome [(3),(4)]. Odontoma formation may involve activation of the WNT/ $\beta$ -catenin pathway in dental stem cells expressing SOX2. Ameloblastic Fibroodontoma /ameloblastic Fibro Dentinoma (AFO/AFD) lesions frequently exhibit BRAF V600E mutations, aligning them with true odontogenic tumors like ameloblastic fibromas rather than hamartomas.

In contrast, classic odontomas lack this mutation, supporting their non-neoplastic (hamartomatous) nature (5) According to the 2022 classification by the World Health Organization (WHO), odontomas are divided into two main types: compound and complex. The compound variant typically presents as multiple miniature tooth-like structures, known as denticles, and is most often located in the anterior maxillary region, particularly among children aged 6 to 10 years. In contrast, complex odontomas appear as a disorganized aggregation of dental hard tissues lacking any recognizable tooth form and are more commonly found in the posterior mandible, especially near the first and second molars. Clinically, odontomas are further classified into three categories: central (intraosseous), peripheral (extraosseous or soft tissue), and erupted odontomas. Among these, the central type is the most prevalent, typically affecting the anterior upper jaw and the posterior lower jaw. Peripheral odontomas, although histologically identical to their central counterparts, are confined to the soft tissue overlying the tooth-bearing regions of the jaws and are less commonly encountered in clinical practice.

Radiographically, compound odontomas appear as a collection of tooth-like structures surrounded by a radiolucent halo, which

corresponds to the follicular space (2). They are most commonly located in the anterior maxilla and may go unnoticed unless they delay tooth eruption or are incidentally discovered on routine radiographs (6). In this case, the odontoma was identified during the workup for an unrelated dental complaint, highlighting the importance of thorough intraoral and radiographic examinations in pediatric patients.

The differential diagnosis of compound odontoma includes several odontogenic and non-odontogenic lesions that may present with similar clinical, radiographic, or histological features. One of the primary considerations is a complex odontoma, which also consists of dental hard tissues but lacks the orderly tooth-like morphology seen in compound odontomas. Developing tooth germs, particularly in pediatric patients, can mimic the appearance of a compound odontoma; however, they typically demonstrate active odontogenic epithelium and a clear developmental stage. Ameloblastic fibro-odontoma is another important differential, characterized by a combination of proliferating odontogenic epithelium and a fibrous stroma, along with varying amounts of enamel and dentin-like material. Odontogenic hamartomas and supernumerary teeth may also be considered, especially when multiple rudimentary teeth are seen radiographically. Rarely, calcifying odontogenic cysts (Gorlin cysts) may be mistaken for compound odontomas if they contain ghost cells and calcifications, although the presence of cystic epithelium and ghost cells helps distinguish them histologically. Accurate diagnosis relies on correlating clinical findings with radiographic appearance and histopathological confirmation.

Surgical excision remains the treatment of choice for odontomas, especially when they obstruct the eruption of permanent teeth (7) Early intervention minimizes complications such as cyst formation, root resorption of adjacent teeth, or abnormal eruption patterns of the impacted succedaneous tooth/teeth. Extraction of the associated retained

deciduous tooth is usually performed concurrently.

In some cases, the spontaneous eruption of the unerupted permanent tooth occurs following the removal of the odontoma. However, when eruption is delayed or space is insufficient, orthodontic assistance becomes necessary. Maxillary expanders are widely used for arch development in the mixed dentition phase due to their simplicity and effectiveness(8). Fixed sectional appliances with push coil springs can then be employed to exert controlled forces, facilitating guided eruption.(9)

Interdisciplinary coordination between pediatric dentists, oral surgeons, and orthodontists is vital to the success of such complex cases. In the current case, the surgical-orthodontic approach ensured the timely eruption and alignment of the unerupted incisor without compromising the developing dentition.

## CONCLUSION

This case report demonstrates the importance of routine dental evaluation in children for early detection of asymptomatic anomalies such as odontomas. A compound odontoma in the anterior maxilla caused delayed eruption of the permanent central incisor and was managed successfully through surgical removal and interceptive orthodontics. Regular follow-up and preventive care remain essential for maintaining the outcomes achieved.

### Declaration by Authors

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