

A Calcified Curveball in Pediatric Jaws: Case Report of Dentigerous Cyst with Dystrophic Calcification and Scoping Review Across all ages

Nagendran J¹, Aafirin U², Raghu Dhanapal³, Effie Edsor⁴, Kavitha⁵

ABSTRACT

Background: Dentigerous cysts are the second most common type of odontogenic cyst, accounting for approximately 20–24% of all jaw cysts. They are commonly associated with impacted teeth and are usually asymptomatic; however, larger or symptomatic lesions may cause delayed tooth eruption, displacement of adjacent teeth, and facial asymmetry. Calcification within dentigerous cysts is uncommon, particularly in pediatric patients, and requires careful diagnosis and management.

Case Presentation: A 13-year-old male patient presented with delayed eruption of the right maxillary central incisor. Clinical and radiographic examination revealed an unerupted permanent maxillary right central incisor (11) associated with a well-circumscribed radiolucent lesion containing multiple radiopaque foci. Based on the clinical and radiographic findings, a provisional diagnosis of a dentigerous cyst with calcifications was made. The patient had no history of trauma, infection, or systemic illness that could explain the delayed eruption.

Management and Prognosis: Surgical enucleation of the cystic lesion and exposure of the impacted tooth (11) were performed under local anesthesia. Histopathological examination revealed a cyst lined by stratified squamous epithelium with dystrophic calcifications within the fibrous capsule, confirming the diagnosis. Orthodontic traction was subsequently initiated to facilitate eruption of the impacted tooth. The prognosis was favorable, with no evidence of recurrence during follow-up.

Conclusion: This case highlights the importance of early diagnosis and timely intervention in patients presenting with delayed eruption of permanent teeth. Successful management requires a multidisciplinary approach involving pediatric dentistry, oral surgery, and orthodontics to achieve optimal functional and esthetic outcomes. The rarity of extensive dystrophic calcification within a dentigerous cyst in a pediatric patient makes this case particularly noteworthy.

Keywords: Dentigerous cyst, Pediatric dentistry, Calcification, Unerupted tooth, Surgical enucleation

INTRODUCTION

Dentigerous cysts accounting for approximately 20% of all jaw cysts are the second most common type of odontogenic cysts¹. These developmental cysts are associated with the crown of an unerupted or developing tooth, enclosing it and attaching at the cemento-enamel junction². Generally asymptomatic, dentigerous cysts can become clinically significant when they are infected & enlarge, causing disfigurement, displacement of teeth, or delayed eruption. In pediatric patients, such cysts are particularly concerning as they can disrupt the natural eruption sequence and alignment, leading to functional and aesthetic challenges.

On radiography, it appears as a distinct unilocular radiolucent region. At the moment, it makes up roughly 23% of all odontogenic cysts². It is up to 45% associated with lower third molars and usually affects men in their third decade of life. Cysts develop as a result of the decreased enamel epithelium expanding due to fluid accumulation between the tooth's crown and the dental follicle's epithelial components. It usually has a thin, non-keratinized stratified epithelium lining its connective cystic wall, based on the histological examination².

Dentigerous cysts in maxillary anterior region are relatively rare but can cause significant disruption, including delayed eruption, root resorption of adjacent teeth, or dis-

Department and Institution Affiliation: ^{1,2}Department of paediatric and preventive dentistry, R.V.S Dental College and Hospital, Sullur, Coimbatore 641402 India; ^{3,5}Department of Oral Pathology & Microbiology, R.V.S Dental College and Hospital, Sullur, Coimbatore 641402 India; ⁴Department of Oral & Maxillofacial Surgery, R.V.S Dental College and Hospital, Sullur, Coimbatore 641402, India.

Corresponding Author: Dr. Nagendran J, Head of the Department, Department of Paediatric and Preventive Dentistry, R.V.S Dental College and Hospital, Sullur, Coimbatore 641402 INDIA. Email: nagaped@gmail.com

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placement into surrounding structures³. Early identification through clinical and radiographic evaluation is crucial for timely intervention and preservation of the developing dentition⁴.

CASE PRESENTATION

A 13-year-old male visited the Department of Pediatrics and preventive dentistry OPD (RVS Dental College and Hos-

pital) with a chief complaint of a missing tooth in the upper front region for the past 5 years. Clinical examination revealed the presence of permanent dentition, with the exception of the maxillary right central incisor (11). No clinical crown of 11 was visible intraorally. Palpation of the labial mucosa in relation to 11 indicated the presence of an unerupted tooth beneath the mucosa. Signs of inflammation, including gingival overgrowth covering the erupting tooth, were observed.

The patient was built moderately and nourished, with no history of systemic diseases. Retrospective questioning revealed no history of extraction or trauma to the affected region. Family history was non-contributory, with no similar complaints in immediate or extended family members. Informed consent for publishing patient data was obtained from the patient's parents.

Based on the clinical findings, a provisional diagnosis of a partially edentulous maxillary anterior region secondary to delayed eruption of the permanent maxillary right central incisor (11) was made. An intraoral periapical radiograph (IOPA) was advised to determine the presence, position, and orientation of the unerupted tooth. Radiographic examination revealed a vertically impacted permanent maxillary right central incisor (11) within the alveolar bone. A well-defined unilocular radiolucent lesion was noted surrounding the crown of the impacted tooth, extending beyond the cemento-enamel junction. Multiple irregular radiopaque foci were observed within the radiolucent area, suggestive of dystrophic calcifications. No significant root resorption of adjacent teeth or cortical bone perforation was evident on the available radiograph. The radiographic appearance was suggestive of a dentigerous cyst associated with

Extraoral and Intraoral Photographs:



Fig. 1: Occlusal View-Maxilla



Fig. 2: Occlusal View-Mandible



Fig. 3: Right Lateral view



Fig. 4: Frontal View



Fig. 5 : Left lateral view



Fig. 6: Extra-oral View

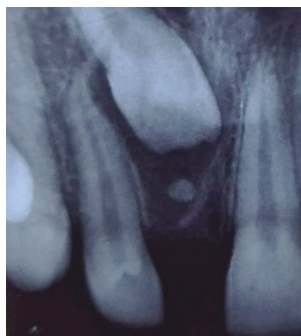


Fig. 7: Pre Operative



Fig. 8: Post Operative

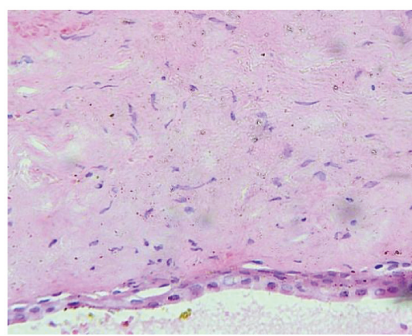


Fig. 6: Histopathological section showing thin cystic epithelial lining (40×)

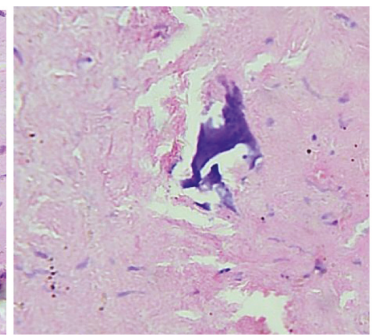


Fig. 7: Dystrophic calcifications within the fibrous capsule (40×)

calcification.

Based on the clinical and radiographic findings, the differential diagnosis included a calcifying odontogenic cyst (Gorlin cyst), adenomatoid odontogenic tumor (AOT), calcifying epithelial odontogenic tumor (Pindborg tumor), and a dentigerous cyst with dystrophic calcification. The association of the lesion with the crown of an impacted tooth favored a dentigerous cyst; however, the presence of internal calcifications necessitated histopathological confirmation. Cone-beam computed tomography (CBCT) was considered to obtain a three-dimensional assessment of the lesion, evaluate its exact extent, relationship to adjacent anatomical structures, and characterize the calcified components more accurately. However, CBCT imaging could not be performed as the patient and parents were unwilling to undergo additional radiographic investigations. Therefore, treatment planning was based on the available conventional radiographic findings and clinical assessment.

RADIOGRAPH:

A distinct unilocular radiolucency is seen in relation to unerupted permanent maxillary incisor, with the radiolucent region enclosing the crown and joining at the cemento-enamel junction. Internal radiopaque foci in the lesion are indicative of focal calcification. There is no sign of a perforation, but there is mild displacement of neighbouring teeth and thinning of the cortical plate. A dentigerous cyst displaying calcific changes is consistent with the radiographic features.

Treatment Plan and Management

The case was managed through a multidisciplinary approach involving pediatric dentistry and orthodontics. The treatment plan included: Surgical exposure of the unerupted maxillary central incisor (11). Removal of the inflamed gingival tissue covering the tooth. Orthodontic traction to guide the tooth into proper alignment within the dental arch. Periodontal care to manage inflammation and promote healing. The surgical exposure and gingival tissue removal were performed under local anaesthesia. The tissue was removed completely and sent to biopsy.

Surgical interventions:

Local anaesthesia is given in relation to 11. A triangular mucoperiosteal flap was raised. A number 8 round tungsten carbide bur was used for the osteotomy, which was irrigated with saline solution. The lesion was fully enucleated, and hard tissue and a turbid liquid came out of the inside. Silk suture -5 numbers were placed. The lesion was fixed in a 10% formaldehyde solution and sent for histopathologic investigation.

HISTOPATHOLOGICAL FINDINGS

The Hematoxylin and Eosin Stained tissue revealed a cystic lining epithelium associated fibrous capsule. The epithelial layer of the cystic lining is 2-4 cells thick. A thin layer stratified squamous and a few cuboidal cell in certain foci, was a part of the cystic lining epithelium. Calcified masses are also evident in capsular tissue, with irregular borders and star shaped suggestive of dystrophic calcification. The lesion was diagnosed as dentigerous cyst with foci of calcification.

SCOPING REVIEW

Objective

To review and synthesize the current literature on dentigerous cysts associated with calcifications.

Methods :

Review Design :

A scoping review was conducted to identify and summarize published evidence regarding dentigerous cysts associated with calcifications. The review was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews (PRISMA-ScR) guidelines.

Information Sources and Search Strategy A comprehensive literature search was conducted in three electronic databases: PubMed, Google Scholar, and Clinical Key. Studies published between May 2015 and June 2025 were considered for inclusion.

The search strategy was developed using the following keywords and Boolean operators:

((“Dentigerous cyst” AND calcification) OR (“Follicular cyst” AND calcification) OR (“Dentigerous cyst” AND radioopacity) OR (“Follicular cyst” AND radioopacity))

The following filters were applied where available:

Publication period: May 2015 to June 2025

Language: English

Source type: Journal articles, clinical overviews, and image-based reports

Discipline: Dentistry, Oral and Maxillofacial Pathology, and Oral Radiology

Database-wise Search Results PubMed: 6 studies

Google Scholar: 3 studies

ClinicalKey: 2 studies

Total records identified: 11 studies

Eligibility Criteria

Inclusion Criteria

- Case reports and case series.
- Studies published in English.
- Studies published between May 2015 and June 2025.
- Studies reporting dentigerous cysts with radiographic or histopathological evidence of calcification.
- Patients of any age diagnosed with a dentigerous cyst associated with calcifications.

Exclusion Criteria

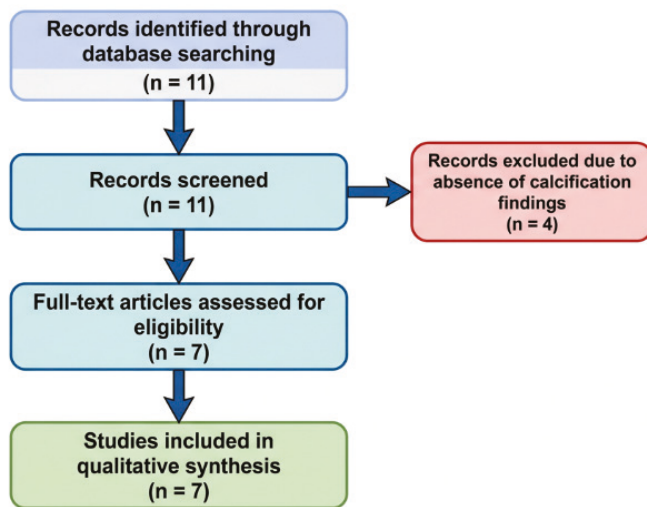
- Non-peer-reviewed publications, including editorials, opinion articles, and narrative reviews.
- Studies with incomplete clinical, radiographic, or histopathological data.
- Case reports and case series lacking detailed radiographic or histological descriptions of calcifications.
- Duplicate publications.

Study Selection Process

All records identified through database searching were screened based on title and abstract. Potentially relevant studies underwent full-text review. Studies fulfilling the predefined inclusion criteria were included in the final qualitative synthesis.



PRISMA-ScR Flow Diagram



RESULTS

Seven studies describing dentigerous cysts associated with calcifications fulfilled the inclusion criteria and were included in the final qualitative synthesis.

Among the included studies, four involved pediatric patients, one involved an adult patient, one included both pediatric and adult patients, and one study did not clearly specify the patient's age. All reported cases occurred in male patients, with most cases presenting during the second and third decades of life.

All lesions were associated with permanent dentition and predominantly involved the mandible. Radiographically, the lesions typically appeared as well-defined unilocular radiolucencies containing radiopaque foci or mixed radiolucent-radiopaque areas. Some cases demonstrated cortical expansion and displacement of adjacent structures.

Histopathological examination revealed calcifications within the cyst lining, fibrous capsule, or associated odontogenic tissue. The calcified material was reported as dystrophic calcifications, cemento-osseous deposits, or odontogenic calcified structures.

Three studies described hybrid lesions in which dentigerous cysts were associated with calcifying epithelial odontogenic tumor (CEOT)-like areas, ghost cells, and amyloid-like material. Additional microscopic findings included odontogenic epithelial nests, chronic inflammatory connective tissue, and cystic epithelial linings exhibiting focal calcifications.

The most common treatment modality was surgical enucleation, while marsupialization was performed in selected cases. All reported cases showed favorable outcomes, with no significant complications or recurrence during the follow-up period.

Summary of Findings

Seven studies met the inclusion criteria. Four cases involved pediatric patients. All reported cases occurred in male patients. Mandibular involvement was observed in all cases. Calcifications were associated exclusively with permanent dentition. Radiographic findings ranged from radiolucent lesions with

radiopaque foci to mixed radiolucent-radiopaque lesions. Dystrophic and cemento-osseous calcifications were the most frequently reported histopathological findings. Three cases demonstrated hybrid lesions with CEOT-like features, ghost cells, and amyloid-like material. Enucleation was the most common treatment approach, followed by marsupialization in selected cases. All cases demonstrated favorable clinical outcomes.

DISCUSSION

Dentigerous cysts are the second most common odontogenic cysts, accounting for approximately 20–24% of all jaw cysts. They develop around the crowns of unerupted teeth as a result of fluid accumulation between the reduced enamel epithelium and the tooth crown. Although they most commonly involve mandibular third molars and maxillary canines, their occurrence in association with maxillary central incisors is relatively uncommon. In pediatric patients, delayed eruption of a permanent tooth is often the first clinical sign that prompts further investigation.^{1,2,13}

Calcification within a dentigerous cyst is an uncommon finding and remains poorly understood. The exact pathogenesis of these calcifications has not been established. Previous authors have suggested that dystrophic calcification may occur secondary to degeneration within the cyst wall, whereas others have proposed that mesenchymal cells of the dental follicle may differentiate into cementoblasts or osteoblasts capable of producing a calcified matrix. Lin et al. reported calcified deposits in approximately 13.3% of dentigerous cysts, indicating that although microscopic calcifications may not be rare, radiographically detectable calcifications are uncommon.^{4,10,14}

The present scoping review identified 11 potentially relevant studies from three databases, of which seven met the inclusion criteria. The reviewed cases involved patients aged 13–34 years and demonstrated a marked male predominance. Most reported lesions involved the mandible and were associated with permanent dentition. Radiographically, the lesions typically presented as well-defined radiolucencies containing radiopaque foci or mixed radiolucent-radiopaque areas. Histopathological examination most commonly demonstrated dystrophic or cemento-osseous calcifications within the cyst lining or fibrous capsule. Three reports described hybrid lesions associated with calcifying epithelial odontogenic tumor (CEOT)-like areas, ghost cells, and amyloid-like material.^{5–11}

Compared with previously reported cases, the present case demonstrates several noteworthy features. First, the lesion occurred in a pediatric patient and was associated with an unerupted maxillary central incisor, a less common site for dentigerous cyst development. Second, radiographic examination revealed distinct calcified foci within the lesion, raising the differential diagnosis of calcifying odontogenic cyst, adenomatoid odontogenic tumor, and calcifying epithelial odontogenic tumor. Third, histopathological examination confirmed dystrophic calcifications within the fibrous capsule without evidence of an associated odontogenic neoplasm, supporting the diagnosis of a dentigerous cyst with dystrophic calcification.^{4,6,8,9,11}

The histopathological appearance of the calcifications in the present case was particularly distinctive. The calcified deposits were located within the fibrous capsule and exhibited irregular,

star-shaped outlines with variable peripheral staining intensity and areas of retraction from the surrounding connective tissue. These findings are consistent with dystrophic calcification occurring within chronically altered connective tissue. Similar patterns have been reported in other odontogenic cysts and calcifying odontogenic lesions.^{5,10,14}

Management of dentigerous cysts with calcifications is similar to that of conventional dentigerous cysts and depends on lesion size, location, and the status of the associated tooth. Surgical enucleation remains the treatment of choice for most lesions, whereas marsupialization may be considered for larger cysts. In the present case, enucleation of the cyst followed by surgical exposure and orthodontic traction of the impacted maxillary central incisor allowed preservation of the permanent tooth and facilitated eruption. This highlights the importance of interdisciplinary management involving pediatric dentists, oral surgeons, and orthodontists.^{12,13}

The clinical significance of this case lies in the rarity of extensive dystrophic calcification within a pediatric dentigerous cyst and its association with delayed eruption of a permanent maxillary central incisor. Early radiographic assessment of delayed tooth eruption is essential to identify underlying pathology, establish an accurate diagnosis, and initiate timely treatment. Recognition of calcifications within a dentigerous cyst is particularly important because they may mimic other odontogenic lesions with more aggressive biological behavior.^{3,4,8,13}

In conclusion, dentigerous cysts with dystrophic calcifications are rare, particularly in children. The present case contributes to the limited literature on this entity and emphasizes the importance of careful radiographic evaluation, histopathological confirmation, and multidisciplinary management to achieve favorable functional and esthetic outcomes. Further studies are required to clarify the pathogenesis and biological significance of calcification in dentigerous cysts.^{4,8,14,15}

CONCLUSION

This report emphasizes the importance of early diagnosis and customized management strategies in 5 cases of delayed eruption of permanent teeth. A multidisciplinary approach ensures the resolution of functional and aesthetic concerns, ultimately enhancing the patient's quality of life. Our case is

unique from the reported literature by means of paediatric age group, mass of calcification on radiographic and histopathological confirmation of the same.

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