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Mesiodens Unveiled: Demystifying Dentigerous Cysts and Their Correlation"

Nandini B.[1], Barath Raj K.[2], Balamurali P. D.[3], Karthikshree V Prashad[4]

[1]Assistant Professor, Department of Oral and Maxillofacial Pathology and Microbiology, Subbaiah Institute of Dental Sciences, Shimoga, Karnataka, India
Email: *13nandini.np[at]gmail.com*
Contact no: 91 - 7012357831

[2]MDS, Post Graduate Student, Department of Oral and Maxillofacial Pathology and Microbiology, Mahatma Gandhi Postgraduate Institute of Dental Sciences, Puducherry, India
Corresponding Author Email: *kesavaraj1396[at]gmail.com*
Contact no: 91 - 8220895516

[3]MDS, Professor and Head, Department of Oral and Maxillofacial Pathology and Microbiology, Mahatma Gandhi Postgraduate Institute of Dental Sciences, Puducherry, India
Contact no: 91 - 9894019992
Email id - *balakederu[at]gmail.com*

[4]MDS, PROFESSOR, Department of Oral and Maxillofacial Pathology and Microbiology, Mahatma Gandhi Postgraduate Institute of Dental Sciences, Puducherry, India
Contact no: 91 - 9442396563
Email: *karthikshreevprashad[at]gmail.com*

Abstract: ***One of the most common cysts among the developmental cysts of odontogenic origin is the Dentigerous cyst. They are believed to form when the fluid accumulates between the crown of a tooth that has not yet erupted and the reduced enamel epithelium. In cases involving unerupted and fully developed permanent dentition, the diagnosis predominantly leans toward dentigerous cysts, accounting for 95%, with only 5% associated with supernumerary teeth. Specifically, mesiodens refers to a supernumerary tooth positioned between the maxillary central incisors. This article presents a case involving a dentigerous cyst in conjunction with an impacted mesiodens in a 29 - year - old male patient. Radiographically, the cyst manifested as an ovoid, well - defined unilocular radiolucency featuring a sclerotic border. The comprehensive case report outlines the successful management of the dentigerous cyst through surgical enucleation. Thorough scrutiny of the patient's history, coupled with clinical and radiographic assessments, proves crucial for accurate diagnosis, identification of etiological factors, and the administration of appropriate treatment.***

Keywords: Dentigerous cyst, Mesiodens, Maroteaux - Lamy syndrome, Unilocular radiolucency

1. Introduction

A dentigerous cyst is the one that is connected to the neck of the crown and attached to an unerupted tooth by follicular expansion[1]. In 1983, Paget coined the term "Dentigerous cyst, " which translates to "Tooth Bearing. " This cystic lesion of the jaws is the second most common, following the prevalent "Radicular cyst. " While these cysts typically encircle the crown, they can also accompany odontomas, deciduous teeth, and supernumerary teeth. The likelihood of a Dentigerous Cyst (DC) being associated with a supernumerary tooth is very rare, accounting for only 5–6% of all dentigerous cysts. Supernumerary teeth include mesiodens, paramolar, distomolar, lingual, or buccal supernumerary, conical/peg - shaped, tuberculate, and compound/complex odontoma. Among these, mesiodens are the most commonly occurring, thereby increasing its chances of being associated with the dentigerous cyst.

This cyst predominantly arises in individuals aged 10 to 30, with a higher prevalence in males, at a ratio of 1.6: [12]. Given that these cysts often remain asymptomatic, without pain or noticeable symptoms, their detection primarily relies on routine radiographs. Consequently, their diagnosis becomes feasible through a combination of surgical and radiographic assessments, specifically focusing on the cyst's attachment to the cementoenamel junction of the tooth[3]. They have the potential to expand, leading to the expansion of bone, erosion, pathological fractures, or secondary infections. The enlargement of a dentigerous cyst is linked to a subsequent rise in osmolarity of the cystic fluid which can be attributed to infiltration of the chronic inflammatory cells, epithelial cells that had desquamated into the cystic lumen. Signs such as any swelling, mobility, and/or displacement of tooth and sensitivity may manifest if the cyst surpasses a diameter of 2 cm. A radiograph of the dentigerous cyst typically reveals a well - defined unilocular radiolucency, often bordered by sclerosis, encompassing the crown of an unerupted tooth[4]. A conclusive diagnosis can only be made after the lesion has been removed with surgery and its histopathology has been examined. This case report explains the surgical enucleation of a dentigerous cyst along with the involved impacted mesiodens in a 29 - year - old male patient.

2. Case Report

A 19 - year - old male patient presented with a complaint of pain and swelling in the upper front tooth region persisting for the past 15 days. Initially asymptomatic, he noticed a sudden onset of swelling in the upper front tooth area, gradually

increasing in size. The associated pain was described as dull. The patient had a history of trauma in the same region two years ago, with no reported numbness or paresthesia. Upon extraoral examination, no abnormalities were observed.

Intraorally, a swelling was identified in the upper labial vestibular region corresponding to teeth 11 and 21, characterized by diffuse borders and no secondary surface changes. Palpation confirmed the initial visual findings, with the swelling measuring 0.5 x 0.5cm, exhibiting a soft to firm consistency, and tenderness upon palpation. Labial vestibular obliteration was noted in relation to teeth 11 and 21 (figure 1)

An intraoral periapical radiograph indicated a radio - opaque mass in the periapical region of tooth 11, suggestive of mesiodens. A well - defined pericoronal radiolucency surrounding the mesiodens measured 1.5 x 2.5cm with sclerotic borders. A maxillary occlusal view revealed a well - defined radiolucency around the mesiodens in the apical region of teeth 11 and 21, sized at 1.5 x 2.5cm with sclerotic margins (figure 2 & figure 3)

Thermal vitality testing showed a delayed response in tooth 11 and an immediate response in teeth 12, 21, and 22. Aspiration of the lesion yielded approximately 1.5 ml of black - colored fluid.

Following a comprehensive clinical and radiological examination, a tentative diagnosis of a dentigerous cyst was established. Additionally, potential considerations in the differential diagnoses encompassed a large inflammatory cyst, central giant - cell granuloma, adenomatoid odontogenic tumor, odontogenic keratocyst, and ameloblastic fibroma.

The preferred treatment option selected was the surgical enucleation of the cyst. The treatment procedure involved making an incision in the labial vestibule, removing the cyst lining, extracting a mesiodens, and performing a complete enucleation of the dentigerous cyst under local anaesthesia. The specimen, comprising a solitary soft tissue measuring 2.5x1.5x1 cm^3 and a hard tissue (tooth specimen - mesiodens), was forwarded to the histopathology lab for further investigation (figure 4). The histopathological examination disclosed a cystic specimen featuring odontogenic lining epithelium. In many regions, there was a predominantly flattened appearance, with proliferation towards the lumen, especially in areas exhibiting inflammation in the sub - epithelial zone. The connective tissue capsule displayed a fibrous nature. In correlation with the clinical and radiological features, the histopathology of the lesion indicates a "Dentigerous cyst with proliferation into the lumen in certain areas. " Additionally, the capsule exhibited satellite epithelium. No evidence of any dysplastic changes were noticed (figure 5 & 6). The culmination of clinical, radiographic, and histopathological features resulted in the conclusive diagnosis of a “Dentigerous cyst associated with a mesiodens”. The patient had routine follow - up care, and throughout the six - month follow - up, no reccurence was noticed.

3. Discussion

Upper lip swelling can stem from various conditions, encompassing infections, allergic diseases, neoplasms (particularly of salivary origin), granulomatous diseases, and various types of cyst[5]. Dentigerous cyst is the most prevalent odontogenic cyst of developmental origin, accounting for 60% of all developmental odontogenic cysts and 20% of all odontogenic cysts. The estimated frequency in the general population is 1.44 cysts for every 100 unerupted teeth[6]. Dentigerous cysts, which are typically associated with impacted teeth, can also infrequently be discovered in conjunction with supernumerary teeth, in the maxillary anterior incisor region; this is known as mesiodens[7]. Stafne et al initially documented the connection between dentigerous cysts and supernumerary maxillary teeth, revealing an incidence of 5.5% among 180 patients who had a total of 200 supernumerary teeth. Pitts was the first to delineate this association in 1924, primarily occurring in the vicinity of the upper central incisors[8]. There is a recorded incidence of dentigerous cyst with mesiodens up to 0.15 to 1.9%, with a predominance in men[3], which mirrors our present case. A rare consequence of mesiodens or associated cyst is root resorption of neighboring teeth[9]. Typically as in our case, dentigerous cysts develop in the second and third decades of life. Males are twice as likely as females to have dentigerous cysts, and the mandible is ten times more likely to develop cysts than the maxilla[10].

In the presented case, the upper jaw was encountered, and the cyst extended across the midline. Benn et al proposed two potential origins or histogeneses for dentigerous cysts[11]. Benn and Altini proposed three potential mechanisms for the histogenesis of Inflammatory Dentigerous Cysts (IDCs): First, intrafollicular developmental cysts form around the crowns of permanent teeth, becoming secondarily inflamed due to periapical inflammation spreading from nonvital deciduous predecessors. Second, radicular cysts at the apices of nonvital deciduous teeth fuse with the follicles of unerupted permanent successors. Third, any source of periapical inflammation, usually from nonvital deciduous teeth, can spread to affect the follicles of permanent successors that have not yet erupted successors[11].

Mesiodens, often considered a developmental anomaly, has been the subject of various theories. The phylogenetic reversion (atavism) theory, suggesting that mesiodens represent remnants of extinct ancestors with three central incisors, lacks substantial evidence. Alternatively, the dichotomy theory proposes that tooth buds split, resulting in two equal or unequal sections, one of which becomes the mesiodens. However, the most widely supported theory involves the hyperactivity of the dental lamina, where remnants or offshoots of the dental lamina develop into supernumerary tooth buds. Genetics also play a role, as mesiodens have been observed in twins, siblings, and successive family generations. This understanding contributes to the exploration of mesiodens etiology and its clinical management[12].

These dentigerous cysts may have radiographic features similar to unicystic ameloblastoma and unilocular keratocystic odontogenic tumors. Radiographically they

manifest as well - defined, unilocular radiolucent areas around unerupted teeth, often with a sclerotic border. Secondary infection may cause ragged margins. Associated supernumerary teeth have cone - shaped crowns and short roots, potentially causing resorption or displacement of adjacent teeth. Distinguishing from an enlarged dental follicle is crucial; suspicion arises when the follicular space exceeds 5 mm, considering the normal range is 3 - 4 mm[13]. Bilateral or multiple dentigerous cysts are commonly linked to Maroteaux - Lamy syndrome (mucopolysaccharidosis, type VI) and cleidocranial dysplasia[14].

The histopathologic characteristics of dentigerous cysts vary depending on their inflammatory status. In uninflamed dentigerous cysts, the lining consists of 2 - 4 layers of non - keratinized stratified squamous epithelium, forming a relatively flat interface with the loosely arranged fibrous connective tissue wall containing substantial glycosaminoglycan ground substance. The fibrous capsule may harbor small islands of inactive - appearing odontogenic epithelial rests.

In contrast, inflamed dentigerous cysts exhibit multilayered cystic epithelium with hyperplastic rete peg formation. The collagenized fibrous wall exhibits varying degrees of chronic inflammatory cell infiltration. There may be giant cells that accompany cholesterol clefts in the connective tissue around them. Amorphous eosinophilic curvilinear Rushton bodies, while nonspecific, may appear and are not exclusive to dentigerous cysts. Over 20% of instances include mucous cells, and 11% have contemporaneous cilia. Sebaceous cells may also be present, underscoring the odontogenic epithelial lining's pluripotent origin. Immunohistochemical studies indicate higher levels of IgG - containing plasma cells and a lower percentage of IgA - containing plasma cells in dentigerous cysts compared to other cysts, especially keratocysts.

Dentigerous cysts pose a significant risk of neoplastic epithelial proliferation. This includes the formation of the development of ameloblastoma, epidermoid carcinoma, and mucoepidermoid carcinoma can occur, originating from the lining epithelium or rests of odontogenic epithelium within the cyst wall. Notably, mucoepidermoid carcinoma, a malignancy resembling a salivary gland tumor, may arise from the cyst's lining epithelium, particularly when mucus - secreting cells are present. This risk is particularly associated with DC adjoining the impacted mandibular third molars[15.] Furthermore, Adenomatoid odontogenic tumors and complex odontomas can arise from the cyst wall.

Enucleating the dentigerous cyst along with the mesiodens is recommended when symptomatic complaints are present or if there is a significant displacement of permanent teeth, as observed in this case[16].

4. Conclusion

This unusual instance of a dentigerous cyst connected to a mesiodens emphasizes the value of prompt detection and treatment. The patient's symptoms were effectively managed by surgical enucleation, guaranteeing a complication - free six - month follow - up. When dealing with such rare situations, clinicians should exercise caution and stress the importance of early identification and treatment.

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Figure 1: Swelling in the upper labial vestibule

Figure 2: IOPAR i. r. t 11 and 21

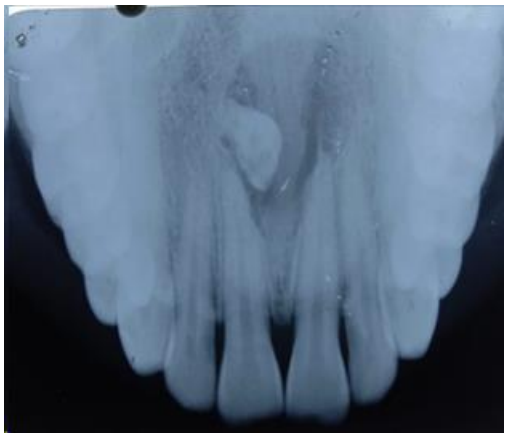

Figure 3: Maxillary occlusal radiograph showing mesiodens

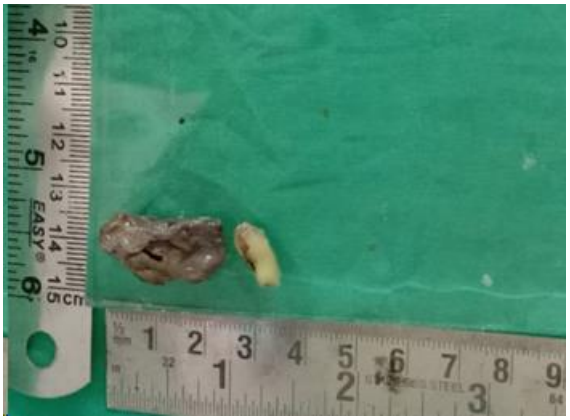

Figure 4: Gross specimen (Cystic lining with tooth)

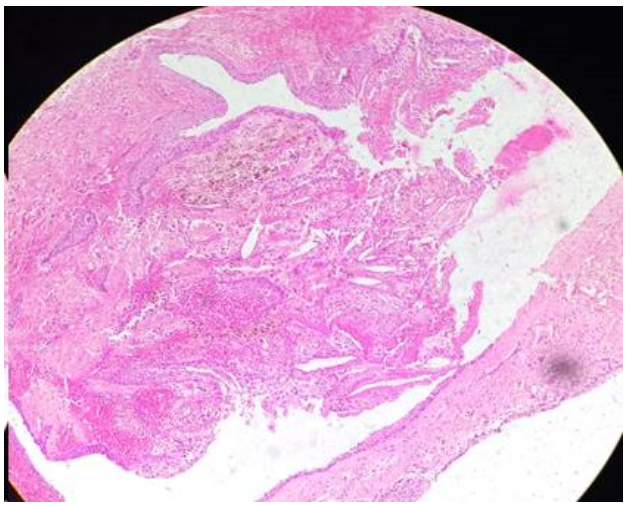

Figure 5: H & E showing thick fibrous capsule and proliferation into the lumen

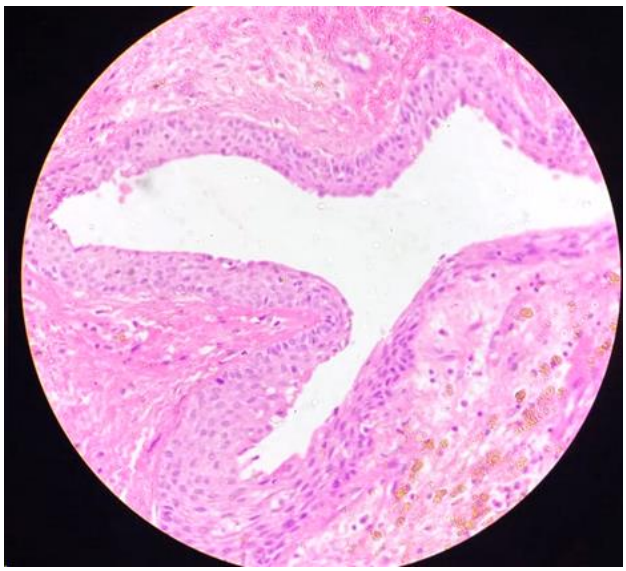

Figure 6: Odontogenic lining epithelium

LEGENDS for Pictures:
Figure 1 – Swelling in the upper labial vestibule
Figure 2 – IOPAR i. r. t 11 and 21
Figure 3 – Maxillary occlusal radiograph showing mesiodens
Figure 4 – Gross specimen (Cystic lining with tooth)
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Figure 6 - Odontogenic lining epithelium