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Failure of Eruption of the Permanent Central Incisor in a 9-Year-Old Child due to a Dentigerous Cyst: A Case Report

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Abstract: Dentigerous cysts are one type of odontogenic cyst originating from unerupted tooth follicles and are the second most common type of cyst after radicular cysts. These lesions are generally asymptomatic, but in children they can cause permanent tooth eruption disorders. This case report discusses the management of a dentigerous cyst associated with permanent central incisor impaction in a child. A 9-year-old boy came with his parent, complaining that his upper left front tooth had not grown in. Intraoral examination revealed persistence of deciduous tooth 62 and failure of permanent tooth 21 to erupt. Panoramic radiographic examination showed a well-defined radiolucent area surrounding the crown of impacted tooth 21. CBCT examination revealed a dentigerous cyst measuring approximately 11.9 mm x 9.6 mm. The treatment involved enucleation of the dentigerous cyst and observation for the eruption process of tooth 21. At six months postoperatively, tooth 21 had not erupted into the occlusal plane, necessitating further orthodontic intervention to facilitate eruption. The prognosis for tooth 21 remains favorable with continued follow-up and adjunctive orthodontic therapy. In conclusion, dentigerous cysts should be recognized as a potential cause of permanent-tooth eruption failure.
Keywords: dentigerous cyst; persistence; enucleation; permanent teeth

INTRODUCTION

A dentigerous cyst, also known as a follicular cyst, is a cyst that forms as a result of the separation of a follicle from the area surrounding an unerupted tooth crown.[1] A dentigerous cyst is an odontogenic cyst originating from an impacted tooth crown, an ectopic tooth, or a tooth that has failed to erupt. This cyst is a pathological cavity-like lesion lined by epithelium surrounding the tooth crown from the cemento-enamel junction (CEJ) and containing fluid. It forms due to fluid accumulation between the reduced enamel epithelium and the tooth crown.[2]

Dentigerous cysts contribute 24% of all cysts found in the jaw and are the second most common type of odontogenic cyst after radicular cysts. These cysts can be found in both children and adults, with the highest incidence occurring in the second or third decade of life.[3] About 70% of cases occur in the mandible and 30% in the maxilla. Based on gender, dentigerous cysts are more common in men than in women, with a ratio of 1.6:1. These cysts are twice as common in the lower jaw as in the upper jaw, and most often affect impacted or delayed-eruption teeth. They are generally associated with the lower third molars and are less common in the upper canines, lower premolars, and upper third molars.

Dentigerous cysts are initially asymptomatic and are typically detected during radiographic examinations conducted to determine the cause of failed tooth eruption. Radiographically, dentigerous cysts appear as radiolucent areas. These radiolucent areas usually have clear and well-defined borders, may be unilocular and multilocular, and has sclerotic border around the unerupted tooth crown.. Large dentigerous cysts give the impression of a multilocular process due to the persistence of radiolucent trabecular bone.[1,4]

Treatment for a dentigerous cyst involves enucleation of the cyst along with or without removal of the unerupted tooth. If eruption of the involved tooth is a possibility, the tooth may be left in place after partial removal of the cyst wall. The patient will require orthodontic treatment to facilitate the eruption of the tooth. Large dentigerous cysts can also be treated with marsupialization. This procedure reduces pressure on the cyst, which leads to a reduction in the size of the bone defect. The cyst can be removed at a later time via a limited or minimally invasive surgical procedure, without causing a large defect.[2,6,7]

This study presents a case of failure of eruption of the permanent central incisor in a young child caused by dentigerous cyst, highlighting the treatment interventions, while also reviewing existing literature and recent therapeutic advances. Understanding these aspects is essential for improving care and prognosis in patients with dentigerous cyst caused permanent central incisor can not erupted.

CASE REPORT

A 9-year-old boy and his parents visited the Soelastri Dental Hospital at Muhammadiyah University of Surakarta with a complaint that the boy's front teeth had not erupted. An intraoral examination revealed that tooth 21 had not erupted. The diagnosis was confirmed with the help of panoramic radiography and 3D-CBCT. The panoramic radiograph revealed a radiolucent area surrounding the crown of the impacted tooth 21, accompanied by the persistence of tooth 62 (Figure 1). Therefore, a 3D-CBCT scan was performed to assess the size and extent of the cyst in greater detail.

The 2D-CBCT radiographic findings on the coronal section showed an inferior-distal inclination of the crown of tooth 21 and a radiolucent lesion resembling a dentigerous cyst with a mesio-distal diameter of approximately 11.9 mm. The sagittal section showed inferior-labial inclination of the crown, persistence of the crown of tooth 62 on the inferior side of tooth 21, and a dentigerous cyst with a diameter from labial to palatal of approximately 9.6 mm. The axial section showed the persistence of the crown of tooth 62 on the distal side of tooth 21 and a dentigerous cyst with a diameter from labial to palatal of approximately 9.6 mm (Figure 2).

The CBCT-3D reconstruction showed the spatial relationship between the craniofacial structures and dentition, with a focus on the anterior maxillary region. The left maxillary central

incisor (tooth 21) appeared to be impacted. A radiolucent area resembling a cystic lesion was visible around the crown of tooth 21. Additionally, the tooth bud of tooth 22 was visible, indicating agenesis, and the persistence of the crown of deciduous tooth 62 was also observed.

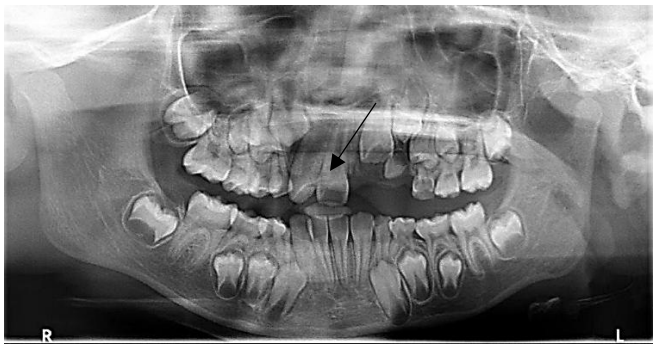

Figure 1. The patient's panoramic radiograph shows an impacted incisor in the left upper jaw, with a radiolucent area surrounding the crown of tooth 21.

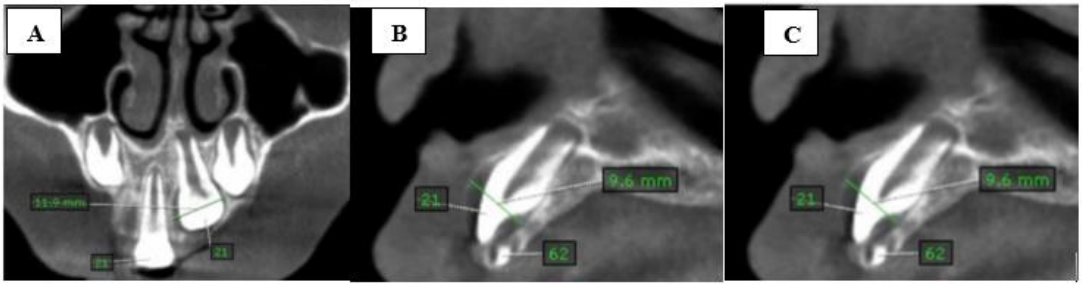

Figure 2. 3D-CBCT images of the patient's dentigerous cyst: A. Coronal view; B. Sagittal view; C. Axial view

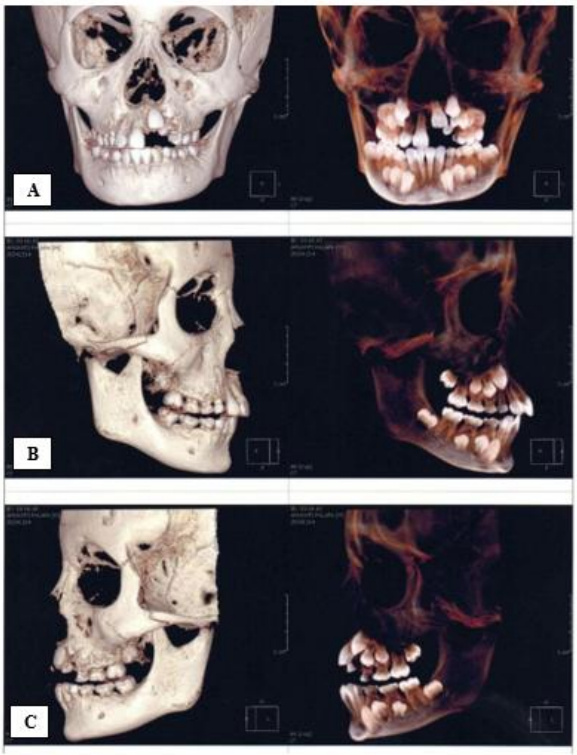

Figure 3. 3D-CBCT images reconstruction demonstrating the spatial condition surrounding the impacted maxillary left central incisor (tooth 21), agenesis of the maxillary left lateral incisor (tooth 22) and persistence of the crown of the primary maxillary left lateral incisor (tooth 62): A. Anterior of the maxilla and mandible; B. Buccal view of the right maxilla and mandible; C. Buccal view of the left maxilla and mandible

The treatment plan for this case consists of Dental Health Education (DHE), enucleation, histopathological examination of the cyst tissue, and post-operative follow-up to evaluate healing and determine further treatment. The procedure was performed after the patient's parent signed the informed consent form. Subsequently, vital signs were checked and laboratory tests were performed, including a complete blood count (CBC) with differential, random blood glucose (RBG), activated partial thromboplastin time (APTT), anti-HBsAg, and anti-HIV. The procedure was performed under general anesthesia because the patient was uncooperative. The procedure began with the creation of a mucoperiosteal flap to expose the cyst area by slightly opening the bone in the buccal and occlusal directions; the capsule was then removed, the former cyst area was cleaned, sharp bone edges were smoothed, and the site was irrigated with 0.9% saline solution, followed by suturing and the administration of intravenous (IV) medication.

Six months after surgery, the patient reported no symptoms and underwent follow-up with a 3D CBCT scan. The 3D CBCT results showed that tooth 21 had not erupted further onto the occlusal surface. The patient was scheduled for orthodontic treatment and windowing of tooth 21 to bring the tooth onto the occlusal surface.

DISCUSSION

Failure of permanent teeth to erupt in children is a common condition in mixed dentition, particularly involving permanent incisors. The upper incisors are directly related to the patient's aesthetic and phonetic functions. In this case, a 9-year-old male patient presented with a complaint of an unerupted left maxillary central incisor. One issue associated with unerupted maxillary permanent incisors is dental impaction. Several factors can cause impaction of the maxillary central incisors, including abnormal tooth bud position, lack of space for eruption, ankylosis, supernumerary teeth, trauma to the incisive teeth or alveolar bone, and odontomas, cysts, tumors, or neoplasms. Based on clinical and radiographic examinations, the etiology in this case is a dentigerous cyst surrounding the crown of impacted tooth 21.[1,2]

A dentigerous cyst, also known as a follicular cyst, is a cyst that forms as a result of the separation of a follicle from the area surrounding an unerupted tooth crown. A dentigerous cyst is an odontogenic cyst originating from an impacted tooth crown, an ectopic tooth, or a tooth that has failed to erupt.[3,4] This cyst is a pathological cavity-like lesion lined by epithelium surrounding the tooth crown from the cemento-enamel junction (CEJ) and containing fluid. It forms due to fluid accumulation between the reduced enamel epithelium and the tooth crown.[2,5,6]

Dentigerous cysts contribute 24% of all cysts found in the jaw and are the second most common type of odontogenic cyst after radicular cysts. These cysts can be found in both children and adults, with the highest incidence occurring in the second or third decade of life. About 70% of cases occur in the mandible and 30% in the maxilla. By gender, dentigerous cysts are more common in men than in women, with a ratio of 1.6:1. These cysts are twice as common in the lower jaw as in the upper jaw and most often affect impacted or delayed-eruption teeth. They are generally associated with the lower third molars and are less common in the upper canines, lower premolars, and upper third molars.[5,8] The patient in this case is a 9-year-old boy, slightly younger than the peak age range for incidence, and falls within the group with higher prevalence among male patients. This indicates that dentigerous cysts can also occur at a younger age, albeit less commonly, and therefore should still be considered in the differential diagnosis of unerupted teeth in children.

Dentigerous cysts are developmental in nature, but some may have an inflammatory pathogenesis. Dentigerous cysts typically arise from the enamel organ after the amelogenesis stage is complete, followed by fluid accumulation that causes the enamel to separate from the unerupted tooth. The fluid filling the interior of these cysts is hyperosmolar due to the presence of albumin, immunoglobulins, and squamous epithelial debris. This hyperosmolar fluid draws extracellular fluid into the cyst, causing the cyst to expand into the surrounding tissue. The epithelial lining of the cyst then secretes factors that activate collagenase and osteoclasts, leading to resorption of the surrounding bone and causing the cyst to enlarge. This enlarged cyst then

envelops the unerupted tooth crown and attaches to the cementoenamel junction.[3,9]

Dentigerous cysts can be divided into two types: inflammatory and non-inflammatory. Inflammatory cysts develop as a result of inflammation in a non-vital primary tooth, while non-inflammatory cysts develop due to the pressure exerted by the growing tooth's follicle. If the follicular space is larger than 2.5 mm, this indicates fluid accumulation, and if it is larger than 4 mm, it is considered a cystic lesion. In this case, the lesion was quite large (±11.9 mm × 9.6 mm) and the tooth was positioned with inferior-distal and inferior-labial inclinations, thereby obstructing eruption may be indicates to cystic lesion.[4,5,10]

Dentigerous cysts can grow to a large size, and large cysts may be associated with painless bone expansion in the affected area. Cysts are lesions that can spread and cause damage when located in the jaw. They can sometimes lead to pathological fractures of the mandible. The expansion of this lesion tends toward the direction of least resistance, such as buccal-lingual or palatal, except in the posterior region of the mandible, where the lesion may extend toward the ramus and lingual (due to the thickness of the external oblique ridge). Spread may occur mesially, distally, or coronally, depending on the position of the impacted tooth in the third molar region. Cyst growth can cause the impacted tooth and adjacent teeth to migrate position.[4,11]

On radiographs, a dentigerous cyst appears as a radiolucent area. The radiolucent area typically has clear and well-defined borders, is unilocular or multilocular, and is pericoronal with a sclerotic border around the unerupted tooth crown. The radiolucent area begins at the cervical margin. Infected cysts exhibit indistinct borders. Large dentigerous cysts give the impression of a multilocular process due to the persistence of radiolucent trabecular bone. The unerupted tooth is usually displaced, and the roots of adjacent teeth may undergo resorption.[12,13] Radiological examination in this case revealed a radiolucent area and the presence of an impacted tooth 21, with a mesio-distal diameter of approximately 11.9 mm. The radiolucent area appears to have clear and well-defined borders; it is unilocular and has a sclerotic border around the crown of the unerupted tooth.

The goal of treatment for dentigerous cysts is to eliminate the pathological abnormality and preserve the tooth through minimally invasive surgery. The choice of treatment depends on the size and location of the cyst, the patient's age, the affected tooth, the stage of root development, the position of the affected tooth within the jaw and its relationship to adjacent teeth, as well as the involvement of surrounding vital structures.[9,14]

One treatment option for a dentigerous cyst is enucleation of the cyst along with removal of the unerupted tooth. If eruption of the involved tooth is a possibility, the tooth may be left in place after partial removal of the cyst wall. The patient will require orthodontic treatment to facilitate the eruption of the tooth.[15]

The prognosis for most cysts is excellent; recurrence is rare following complete cyst removal. Several potential complications must be considered, particularly the possibility that the lining of the dentigerous cyst wall may transform into an ameloblastoma. However, the frequency of this neoplastic transformation is low. Intraosseous mucoepidermoid carcinomas may arise from mucous cells at the border zone of the dentigerous cyst.[1,8]

CONCLUSION

Failure of eruption of the permanent maxillary central incisor in children may be associated with a dentigerous cyst and requires careful diagnosis through clinical and radiographic examination, particularly panoramic radiography and 3D-CBCT imaging. In this case, delayed eruption of tooth 21 in a 9-year-old child was caused by a dentigerous cyst and successfully managed by cyst enucleation without extraction of the involved permanent tooth. After six months of surgery, the patient scheduled for windowing surgery of tooth 21 followed by orthodontic treatment was performed to bring the tooth onto the occlusal surface. The patient received an accurate diagnosis early on, followed by appropriate therapy and periodic follow-up to ensure optimal healing and the implementation of the follow-up care treatment plan.

Conflict of Interest

The authors affirm no conflict of interest in this study.

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