Non-FunctionalObturator-Assisted Marsupialization for Dentigerous cyst in a child: A Conservative treatment approach.

Abstract

Dentigerous cysts (DCs) represent the most common developmental odontogenic cysts and are typically associated with the crown of an unerupted or impacted tooth. These cysts are often asymptomatic but may present with jaw swelling, pain, facial asymmetry, tooth displacement, root resorption of adjacent teeth, and, in severe cases, infection. Radiographically, they appear as welldefined unilocular radiolucencies with sclerotic borders surrounding the crown of the involved tooth. Although enucleation with extraction of the associated tooth has been the conventional treatment, management strategies in pediatric patients should prioritize preservation of developing permanent teeth. Marsupialization has emerged as a conservative treatment modality that facilitates decompression of the lesion and allows spontaneous eruption of the involved tooth. This article reports a case of a large dentigerous cyst in a 9 year-old child managed successfully through marsupialization using a precisely fabricated non functional acrylic obturator. Clinical and radiographic follow-up over a 12-month period demonstrated complete resolution of the lesion with uneventful healing and eruption of the associated permanent tooth. This case highlights the effectiveness of non functional obturator-assisted marsupialization as a conservative and toothpreserving approach in the management of pediatric dentigerous cysts.

KEYWORDS

Dentigerous cyst, marsupialisation, non-functional acrylic obturator

INTRODUCTION

Jaw lesions in children encompass a broad spectrum of conditions, ranging from developmental abnormalities to inflammatory pathologies. Odontogenic cysts (OCs) are pathological cavities of the jaws, accounting for approximately 90% of jaw cysts, characterized by an epithelial lining derived from odontogenic tissues and containing fluid or semifluid material. According to the World Health Organization, odontogenic cysts are broadly categorized into inflammatory and developmental types, with radicular cysts being the most prevalent inflammatory odontogenic cysts and dentigerous cysts (DCs) representing the most common developmental odontogenic cysts.[1]

Dentigerous cysts (DCs) are developmental odontogenic cysts associated with the crown of an unerupted or developing tooth. They represent the second most common odontogenic cyst after radicular cysts, constituting nearly 20% of all epithelial-lined cysts of the jaws.[2] Dentigerous cysts account for approximately 14–20% of mandibular cysts and 15.2–33.7% of all odontogenic cysts. The frequency of dentigerous cyst development has been estimated at 1.44 cases per 100 unerupted teeth. These cysts demonstrate a higher prevalence in males than females and are reported to occur more frequently in Caucasians compared to individuals with darker skin.[3]. The highest incidence of dentigerous cysts (DCs) occurs during the second and third decades of life, with a lower frequency observed in children below 10 years of age. The majority of cases are associated with impacted or unerupted teeth, most commonly involving mandibular third molars, followed by maxillary canines and mandibular premolars. Maxillary third molars may also be affected, with occasional involvement of maxillary central incisors.[2,4,5] .Dentigerous cysts represent the most frequently occurring cysts in children[1].

The inflamed DCis characterized by the presence of hyperplastic epithelium. Most dentigerous cysts are considered developmental in origin and typically exhibit a cystic wall derived from remnants of the reduced enamel epithelium surrounding the crown of an unerupted or impacted tooth. They are thought to develop due to the accumulation of fluid between the reduced enamel epithelium and the crown of an unerupted tooth.[2] Radiographically, they appear as a well-defined unilocular radiolucency with sclerotic borders surrounding the crown of an unerupted tooth. The radiographic presentation of dentigerous cysts may vary according to the relationship between the cyst and the associated tooth crown. The most common presentation, the *central variety*, is characterized by the cyst enveloping the crown of the unerupted tooth, with the crown projecting into the cystic lumen while the root(s) remain external to the lesion. In the *lateral variety*, the cyst expands along the lateral aspect of the root surface, partially surrounding the crown, as commonly observed in partially erupted mesioangular impacted mandibular third molars. The *circumferential variety* radiographically appears as a cyst enclosing the crown and extending vertically along the root surface, thereby creating the impression that a portion of the root lies within the cystic lumen.[6,7] Larger dentigerous cysts may occasionally exhibit a multilocular appearance, mimicking the radiographic features of other odontogenic pathologies.[8] In cases of inflammatory dentigerous cysts, the radiolucent lesion is most frequently observed in association with an overlying necrotic primary tooth.[9]

A thorough assessment incorporating clinical, radiographic, and histopathological findings is essential before planning surgical intervention. An accurate diagnosis of dentigerous cysts necessitates the combined assessment of radiographic features and histopathological examination through incisional biopsy to exclude other pathologies that may warrant more aggressive management. Prompt diagnosis and appropriate management are crucial, as

untreated dentigerous cysts may result in complications such as jaw deformity, loss of permanent teeth, and, in rare instances, progression to odontogenic tumours or carcinomas.[2,5]

The standard therapeutic approach involves enucleation of the cyst with concomitant removal of the associated tooth, thereby permitting regeneration of normal bone. However, in selected cases this modality may be unnecessarily aggressive. Consequently, conservative treatment options such as decompression or marsupialization have been advocated, particularly due to their potential to preserve the involved tooth and facilitate its eruption.[10]The choice of treatment should be individualized and based on a comprehensive evaluation of factors including the size and location of the cyst, the patient's age, the status of the dentition, and the extent of involvement of adjacent vital anatomical structures.[3]

The present article reports a case of a dentigerous cyst in a pediatric patient presenting with a swelling in the lower left quadrant and discusses its surgical management, with particular emphasis on evaluating the role of a non - functional acrylic obturator in the postoperative period.

CASE REPORT

A 9- year old female child accompanied by the parents reported to the Department of Pediatric and Preventive Dentistry of Educare Institute of Dental Sciences, Malappuram, Kerala with achief complaint of swelling in the lower left back tooth region since 2 weeks (fig.1). On inspection, mild facial asymmetry was presentwith diffuse facial swelling in the lower left mandibular region.A bony hard swelling was felt on the lower left side of the face extending to the lower border of the mandible with mild discomfort on palpation (fig.2). Intra oral examination revealed bony hard swelling extending from mesial aspect of 36 to distal

aspect of 73, extending gingival margin to vestibule with non-inflamed overlying mucosa. Dentition was mixed with mobile 73,74 and 75. Patient has discomfort while touching the lower part of the face.

The radiographic findings (OPG and IOPA) (fig.3) revealed a well-defined radiolucent lesion, with sclerotic borders, encircling the crown of developing mandibular left secondpremolar.Unerupted 33 and 34 shows mesial displacement. Following the clinical and radiographic examination, a provisional diagnosis of the dentigerous cyst was made.

Considering the age of the patient and to preserve the uneruptedpremolars, marsupialization of the cystic lesion was planned. Surgical intervention was carried out under local anaesthesia after routine blood investigation (fig.4). The primary mandibular left canine, first and second molars were extracted before the exposure of the cyst cavity. The cyst cavity was identified and the content of the cyst was removed and sent for histopathologic evaluation (fig.5) where the diagnosis of dentigerous cyst was confirmed. Antiseptic iodoform pack was placed in the cystic cavity. The surgical procedure was completed with no complications and analgesics and antibiotics were prescribed. Post-operative instructions were given to the patient and recalled after 7 days.

The cystic cavity filled with iodoform packwas changed after seven days and animpression for non-functional obturator was made using elastomeric impression material.On 10^{th} postoperative day, a non-functional removable acrylic obturator (fig.6) was delivered to the patient . The child and her parents were instructed on maintaining hygiene of the cystic lumen using saline gargle twice daily. The patient was recalled after 2 weeks for stentadjustment, followed by monthly review until complete healing of the lesion and eruption of the successor teeth (fig.7). All follow-up visits for 8 months were uneventful, with no reported complications.

FIG.1 Extra oral photographFIG. 2Intraoral photograph

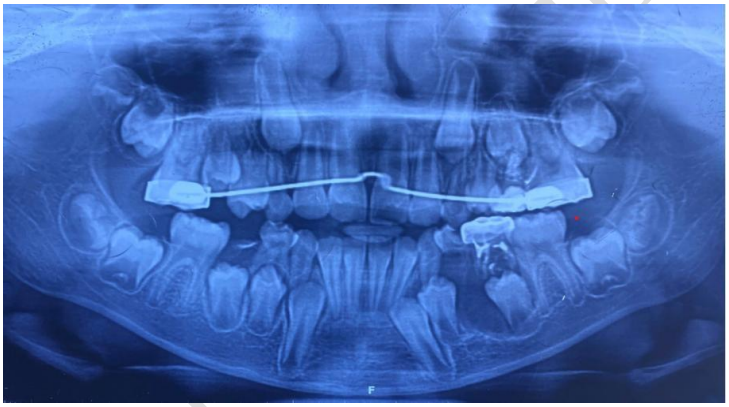
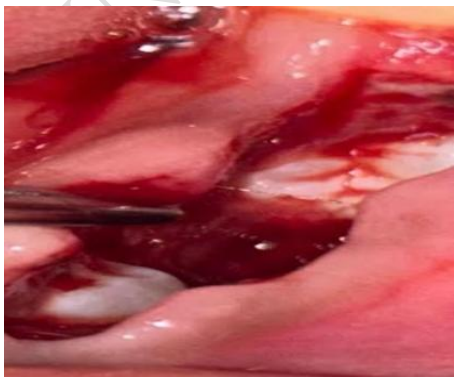


FIG.3Pre-operative OPG



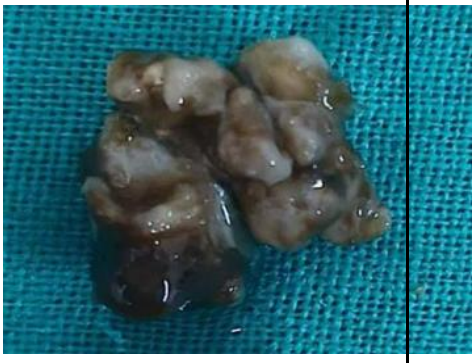


FIG. 4 Marsupialisation procedure

FIG.5 Specimen

FIG.6Non –functional acrylic obturator

FIG.7 Review after 1 month, 2 months and 8 months

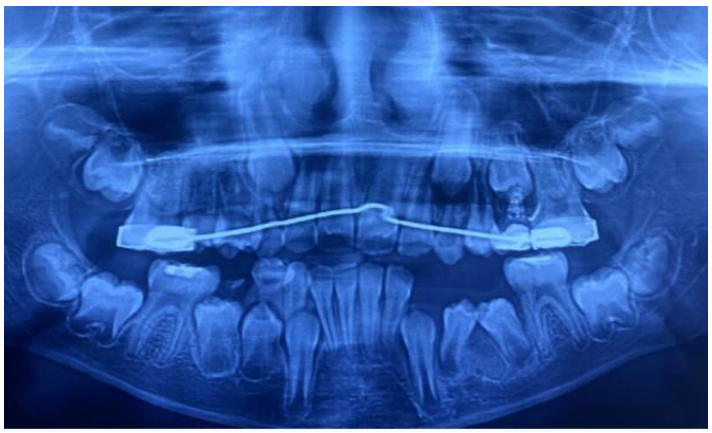


FIG.8 OPG after 3 months

DISCUSSION

Benn and Altini (1996) categorized dentigerous cysts into developmental and inflammatory types. The developmental variant predominantly affects mandibular third molars and is associated with impacted mature teeth. Conversely, the inflammatory type involves a developing permanent tooth and arises secondary to inflammation from an infected or necrotic primary tooth that stimulates the follicle of the successor tooth.Based on the patient's young age and the characteristic clinical features, the present lesion was provisionally diagnosed as an inflammatory dentigerous cyst.[9]

Bloch(1928) proposed that dentigerous cysts may originate from a necrotic overlying deciduous tooth, with the resulting periapical infection spreading to the follicle of the unerupted permanent successor. This inflammatory process leads to the accumulation of exudate and subsequent formation of a dentigerous cyst [11] which could be the reason in the present case also as the overlying primary molars where infected.

Several factors influence the choice of treatment for dentigerous cysts. In cases associated with a supernumerary tooth, complete enucleation of the cyst with removal of the involved tooth is generally recommended.[12] Conversely, when preservation of the associated tooth is a priority, marsupialization represents a conservative and tooth-saving treatment approach.[13]

Numerous factors influence the spontaneous eruption of premolars.Hyomoto et al. evaluated several parameters, including the cusp depth of the impacted tooth, the angle between the long axis of the impacted tooth and the bisector of the long axes of the adjacent teeth, root maturity, cystic area, and the available eruption space. Their findings indicated that younger patients had a higher likelihood of spontaneous eruption. A depth of inclusion of approximately 4.4 mm, a tooth angulation of 20.4° ± 21.8° and half root formation were

associated with successful spontaneous eruption of impacted teeth. Various angular and linear measurements from orthopantomography has to be evaluated for this. Furthermore, the authors reported that the space available for eruption did not significantly influence the eruption outcome.[14]

Fujii et al. (2008) analysed parameters similar to those described by Hyomotoet al.. They concluded that spontaneous eruption of impacted teeth associated with dentigerous cysts following marsupialization is more likely in patients younger than 10 years. Their findings further indicated that a depth of inclusion of less than 5.1 mm, a tooth angulation of less than 25°, an eruption space greater than 1 cm, and incomplete root formation were favourable predictors for spontaneous eruption .[15] Yahara etal. reported that spontaneous eruption occurred at a mean age of 9.8 years. They also observed that a reduced depth of inclusion was associated with a higher likelihood of eruption and also concluded that a tooth angulation close to 60° was favourable for eruption without the need for orthodontic traction .[16] In the present case tooth angulation, developing roots, resorbed overlying bone, sufficient space for eruption, and age was more favourable for the spontaneous eruption of the pre molars.

Marsupialization, also termed decompression, is a conservative surgical technique that reduces intracystic pressure by establishing a secondary opening into the cystic cavity.[4]Hyomoto et al. (2003) reported that this approach promoted spontaneous eruption of the associated tooth in 72.4% of cases, supporting its use as a first-line treatment modality in paediatric patients. [14]

Indeed, management of the DC in a 9 years-old patient with mixed dentition, needs special consideration for the preservation of development of permanent teeth. Accordingly, marsupialization was the treatment of choice.

In this case, the surgical procedure was completed uneventfully. One week postoperatively, a non functional removable acrylic obturator extending into the cystic cavity was fabricated and delivered to facilitate decompression.

Iodine gauze was placed in the bony defect for only one week, as prolonged use is associated with patient discomfort, halitosis, and delayed epithelialization due to disruption of the surface blood clot during repeated replacement, which may also lead to secondary bleeding according to Jovanovic etal. (2019).[17]

A Non-functional removable acrylic obturator was employed in this case because of its multiple advantages, including maintenance of space, prevention of food impaction, contamination of the cystic cavity, preservation of the blood clot and prevents fibrous scar formation .[13]

Failure to maintain patency of the cystic opening may adversely affect eruption of the permanent successor tooth. The patient and his parents were advised to clean the cystic cavity with saline gargle after each meal to ensure adequate hygiene of the cystic pouch, along with regular cleaning of the obturator.

Follow-up appointments were scheduled at 2 weeks and subsequently at 1month interval. Clinical evaluation included assessment of the cystic cavity lining and adjustment of the removable acrylic obturator as required, while radiographic follow-up was conducted at 3 months.

Marsupialization of dentigerous cysts associated with developing tooth buds in paediatric patients necessitates prolonged follow-up until eruption of the permanent tooth, both to monitor healing and to detect possible recurrence or ameloblastic transformation of residual cystic epithelium.[18]

During the follow-up period, progressive clinical and radiographic improvement was observed. At the 3rd month review, a significant reduction in lesion size was evident, with obliteration of the cystic cavity and eruption of the pre molars. Normal tooth eruption along with root development was observed at 8 months follow up.

CONCLUSION

Dentigerous cysts are relatively uncommon in the paediatric population, particularly during the first decade of life in the mixed dentition period, and undiagnosed or untreated lesions may result in significant complications. Children generally exhibit a more favourable prognosis than adults due to their greater capacity for bone regeneration; therefore, thorough assessment of patient history combined with careful clinical and radiographic evaluation is essential for early diagnosis and timely management.

Marsupialization offers several advantages, including reduced risk of injury to adjacent anatomical structures such as the inferior alveolar nerve and maxillary sinus, gradual reduction in cavity size, preservation of surrounding bone with stimulation of osteogenesis, and facilitation of eruption of the associated tooth. However, this technique also has limitations, notably the requirement for sustained patient cooperation and long-term follow-up until tooth eruption, which may not be feasible for all patients and can contribute to treatment failure.

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