Comprehensive Management of a Maxillary Odontogenic Cyst in a Pediatric Patient: A Case Report with Diagnostic and Therapeutic Considerations

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***Abstract*—Odontogenic cysts of the jaws are common lesions in pediatric patients and may pose significant diagnostic and therapeutic challenges, particularly when clinical and radiographic features overlap. Dentigerous cysts and odontogenic keratocysts (OKCs) are among the most frequently encountered developmental odontogenic cysts, yet they differ markedly in biological behavior, recurrence potential, and management strategies. This report describes the comprehensive management of an 11-year-old male presenting with a large cystic lesion of the left anterior maxilla associated with an impacted permanent canine. Clinical, radiographic, and surgical findings raised a diagnostic dilemma between a dentigerous cyst and an odontogenic keratocyst. Initial management involved enucleation of the lesion with removal of the impacted tooth and adjunctive platelet-rich fibrin placement. Recurrence necessitated secondary intervention with peripheral ostectomy and chemical cauterization using Carnoy's solution. This case highlights the importance of accurate diagnosis, long-term follow-up, and the role of adjunctive procedures in reducing recurrence of aggressive odontogenic cysts.**

***Index Terms*—Dentigerous cyst, odontogenic keratocyst, impacted canine, Carnoy's solution, peripheral ostectomy, pediatric maxillofacial surgery**

I. INTRODUCTION

Odontogenic cysts are epithelial-lined pathological cavities arising from odontogenic tissues and represent a significant proportion of jaw lesions encountered in oral and maxillofacial practice. Among these, dentigerous cysts and odontogenic keratocysts (OKCs) are particularly relevant in pediatric and adolescent populations due to their association with unerupted teeth and developing dentition [1–3].

Dentigerous cysts originate from the accumulation of fluid between the reduced enamel epithelium and the crown of an unerupted tooth and are most commonly associated with mandibular third molars and maxillary canines [4,5]. In contrast, OKCs arise from remnants of the dental lamina and are characterized by aggressive behavior, a high recurrence rate, and distinctive histopathological features [6–8]. The World Health Organization has emphasized the unique biological nature of OKCs, underscoring the need for meticulous surgical management and prolonged follow-up [9].

Radiographic overlap between dentigerous cysts and OKCs, especially when associated with impacted teeth, may complicate diagnosis and influence treatment decisions [10]. This report presents a pediatric case illustrating these challenges and discusses the rationale for surgical management and recurrence prevention based on current evidence.

II. METHODOLOGY

Patient History

An 11-year-old male patient reported with a chief complaint of painless swelling in the left upper anterior region of the face for a duration of one month. The swelling had shown gradual progression without associated systemic symptoms. Medical and family histories were non-contributory.

Clinical Examination

Extraoral examination revealed facial asymmetry due to a diffuse swelling on the left side of the face, extending from the left ala of the nose to the medial canthus of the eye. Obliteration of the nasolabial fold was evident. The overlying skin appeared normal, with no signs of inflammation.

Intraoral examination demonstrated a firm, non-tender swelling involving the labial aspect of the maxilla extending from the region of the maxillary left central incisor to the primary first molar (21 to 64). Grade III mobility was noted in the primary lateral incisor (62). Palatal expansion corresponding to the labial swelling was also present.

1Preoperative intraoral picture (Labial)

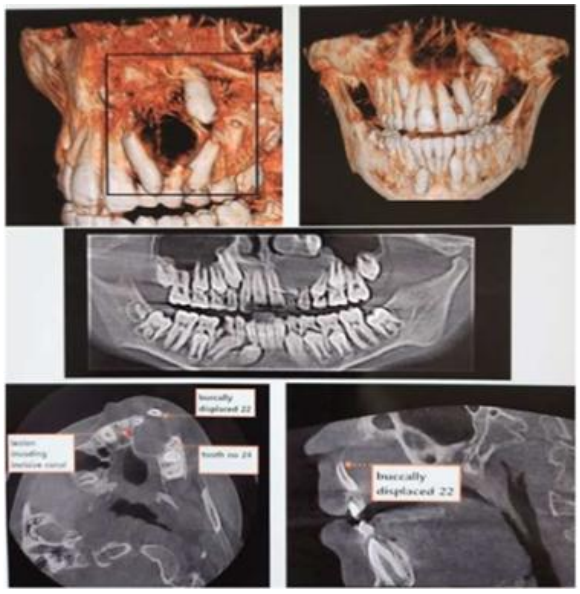
2 Preoperative Intraoral picture (Palatal)

3 Orthopantomograph

Investigations

- Orthopantomogram (OPG): Revealed a well-defined radiolucent lesion in the left anterior maxilla associated with an impacted permanent maxillary canine (23). Displacement of adjacent teeth was noted.
- Cone-beam computed tomography (CBCT): Demonstrated a unilocular cystic lesion with cortical expansion and thinning, involving the anterior maxillary alveolus.
- Fine-needle aspiration cytology (FNAC): Yielded cystic fluid suggestive of an odontogenic cyst.
- Routine hematological investigations: Within normal limits.

Based on clinical and radiographic findings, a provisional diagnosis of a dentigerous cyst with a differential diagnosis of odontogenic keratocyst was considered.

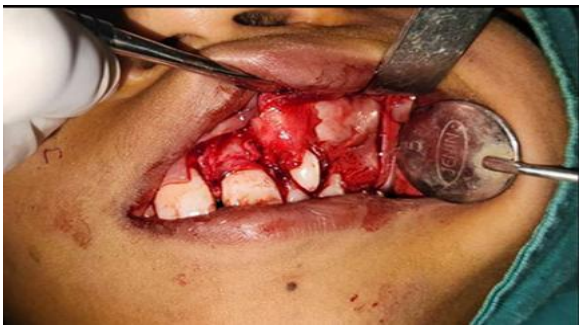


4 CBCT

Surgical Management

Under general anesthesia, a full-thickness mucoperiosteal flap was elevated following a vestibular incision. The cystic lesion was exposed and aspirated. Complete enucleation of the cystic lining was performed along with removal of the impacted maxillary canine. The surgical cavity was thoroughly curetted, and platelet-rich fibrin (PRF) was placed to promote healing. Primary closure was achieved using resorbable sutures.

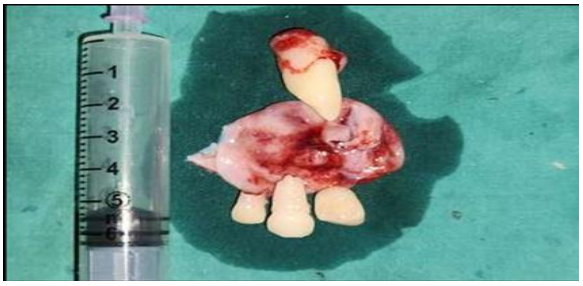
5 Incision



7 Cystic linning exposed

8 Complete cyst enucleations

9 Closure



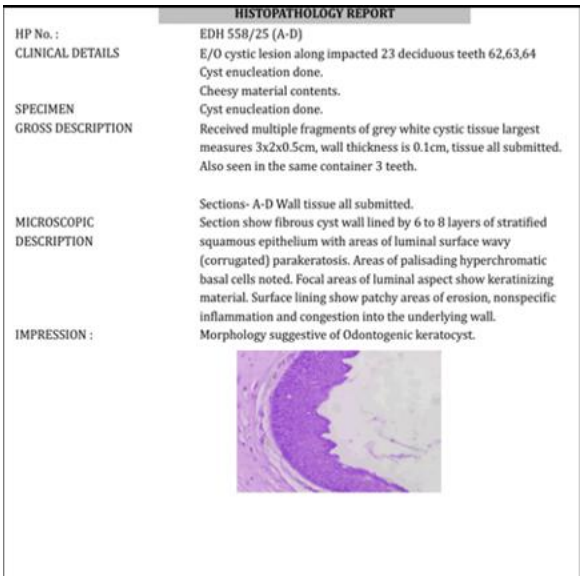
10 Cystic lining enucleated

Histopathological Examination

The excised specimen was submitted for histopathological analysis. Features were suggestive of an odontogenic cyst with keratinized epithelial lining, raising suspicion of odontogenic keratocyst.

Postoperative Course and Secondary Intervention

During follow-up, radiographic evidence of recurrence was noted. The lesion was surgically re-entered, and peripheral ostectomy was performed to eliminate residual epithelial remnants. Chemical cauterization with Carnoy's solution was applied to the bony cavity, followed by PRF placement and closure.



HISTOPATHOLOGY REPORT

HP No. :	EDH 558/25 (A-D)
CLINICAL DETAILS	E/O cystic lesion along impacted 23 deciduous teeth 62,63,64 Cyst enucleation done. Cheesy material contents.
SPECIMEN	Cyst enucleation done.
GROSS DESCRIPTION	Received multiple fragments of grey white cystic tissue largest measures 3x2x0.5cm, wall thickness is 0.1cm, tissue all submitted. Also seen in the same container 3 teeth. Sections- A-D Wall tissue all submitted.
MICROSCOPIC DESCRIPTION	Section show fibrous cyst wall lined by 6 to 8 layers of stratified squamous epithelium with areas of luminal surface wavy (corrugated) parakeratosis. Areas of palisading hyperchromatic basal cells noted. Focal areas of luminal aspect show keratinizing material. Surface lining show patchy areas of erosion, nonspecific inflammation and congestion into the underlying wall.
IMPRESSION :	Morphology suggestive of Odontogenic keratocyst.

III. DISCUSSION

The present case highlights the diagnostic, biological, and therapeutic complexities associated with odontogenic cysts in pediatric patients, particularly when clinical and radiographic findings overlap between dentigerous cysts (DCs) and odontogenic keratocysts (OKCs). Although the initial radiographic presentation in this case demonstrated a well-defined unilocular radiolucency associated with an impacted maxillary canine characteristic of a dentigerous cyst the subsequent histopathological features and recurrence pattern were more consistent with an OKC, underscoring the importance of correlating imaging with biological behavior.

Dentigerous cysts are generally developmental, slow-growing lesions arising from fluid accumulation

between the reduced enamel epithelium and the crown of an unerupted tooth^4,5. They typically exhibit low recurrence rates following simple enucleation, especially in pediatric patients in whom bone turnover and healing potential are higher^1,2. In contrast, OKCs arise from dental lamina remnants and demonstrate a locally aggressive course, with the potential for cortical perforation, satellite cyst formation, and extensive bony involvement^6–8. The World Health Organization (WHO) classification emphasizes the unique behavior of OKCs, previously categorized as keratocystic odontogenic tumors, reflecting their inherent proliferative capacity^9.

Radiologically, OKCs may present as unilocular lesions associated with impacted teeth, mimicking dentigerous cysts and leading to diagnostic dilemmas^10. Studies have shown that up to 40% of OKCs may be misdiagnosed as dentigerous cysts when relying solely on imaging^11. Distinguishing between these two entities is crucial because treatment plans diverge significantly. Dentigerous cysts typically respond well to conservative enucleation or marsupialization, whereas OKCs often require adjunctive procedures to reduce recurrence risk^12,13.

Recurrence remains a major concern in the management of OKCs. Reported recurrence rates range widely from 5% to 62%, depending on the surgical technique used^14,15. High recurrence has been attributed to incomplete removal of the friable cystic lining, residual epithelial islands, daughter cysts, and epithelial budding in the fibrous wall^16. These biological characteristics justify the use of more aggressive adjunctive treatments including peripheral ostectomy, Carnoy's solution, cryotherapy, or resection in recurrent or extensive cases^17–19.

Carnoy's solution has been widely advocated as an effective adjunct after enucleation of OKCs due to its ability to fix and penetrate cancellous bone to a depth of approximately 1.5 mm, thereby eliminating epithelial remnants without excessive thermal damage^17. Voorsmit et al. demonstrated significantly lower recurrence rates when Carnoy's solution was used as an adjunct, dropping recurrence from 26% (enucleation alone) to less than 9%^17. More recent systematic reviews have supported these findings, emphasized its value when applied for 3–5 minutes while protecting adjacent vital structures^18,19.

In pediatric patients, the management of aggressive cystic lesions must be tailored to preserve the developing dentition, maintain growth potential, and minimize morbidity. Marsupialization is often preferred for large lesions in children to decrease cavity size before definitive surgery^20. However, when histopathological features suggest OKC or early recurrence is detected as in the present case definitive surgical management with adjuncts becomes necessary. Peripheral ostectomy combined with Carnoy's solution is considered an effective yet conservative approach to reduce recurrence while avoiding resection, which carries greater morbidity and potential disruption of facial growth^18,21.

Long-term follow-up is indispensable in managing OKCs due to the risk of recurrence even after many years. Recurrences have been reported to occur up to 10–25 years postoperatively, highlighting the need for sustained clinical and radiographic surveillance^14,22. In the context of pediatric patients, follow-up becomes even more critical as the dynamic nature of craniofacial growth may mask subtle recurrences.

Thus, this case illustrates the importance of adopting a holistic diagnostic approach, integrating clinical features, imaging modalities, and histopathology while considering recurrence behavior. The combination of enucleation, peripheral ostectomy, Carnoy's solution application, and PRF placement helped minimize recurrence risk while supporting bone healing in this young patient. This conservative-yet-effective strategy aligns with contemporary recommendations for managing aggressive odontogenic cysts in children.

IV. CONCLUSION

This case underscores the diagnostic complexity of odontogenic cysts associated with impacted teeth in children. Accurate diagnosis, appropriate surgical planning, use of adjunctive recurrence-reducing measures, and diligent follow-up are essential to ensure favorable outcomes. Early recognition of aggressive behavior and timely intervention can significantly reduce morbidity and recurrence.

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