

Dentigerous Cyst Expanding into the Maxillary Sinus with Ectopic Anterior Teeth: A Case Report

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Abstract: Abstract Dentigerous cyst is an odontogenic cyst that is generally asymptomatic and most commonly found in the mandible. Involvement of the maxillary sinus, particularly with anterior tooth involvement, is relatively rare. We report a 16-year-old male patient who presented in April 2024 with progressive nasal obstruction and right facial deformity. Radiological examination revealed a cystic lesion measuring 4 × 5 × 6.5 cm extending into the maxillary sinus, nasal cavity, and approaching the orbital rim. The patient underwent enucleation of the cyst and tooth extraction on 16 April 2024 via a lateral rhinotomy with medial maxillectomy approach. Histopathological examination confirmed the diagnosis of dentigerous cyst without evidence of malignancy. The patient showed good clinical improvement without early complications during a three-month follow-up period. This case represents a rare presentation of a dentigerous cyst with extensive involvement of the maxillary sinus, nasal cavity, and proximity to the orbital rim, particularly associated with anterior teeth, which is scarcely reported in the literature.

Keywords: anterior tooth, dentigerous cyst, lateral rhinotomy, maxillary sinus

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Introduction

Dentigerous cysts involving the maxillary sinus with anterior tooth involvement represent a rare and diagnostically challenging clinical presentation, often leading to delayed recognition and increased surgical complexity. Although dentigerous cysts are among the most common odontogenic cysts, accounting for approximately 27% of cases, they are typically asymptomatic and more frequently located in the

mandible (Franklin et al., 2021). Maxillary involvement is relatively uncommon, reported in approximately 5.5% of cases, while extension into the maxillary sinus particularly involving anterior teeth such as incisors remains exceedingly rare (Noujeim & Nasr, 2021) ; (Vinereanu et al., 2021). These atypical presentations are clinically significant, as progressive lesion expansion may involve adjacent anatomical structures, including the nasal cavity and orbital region, resulting in

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functional impairment and posing challenges in surgical planning.

Dentigerous cysts can be classified into developmental and inflammatory types. Developmental cysts are associated with impacted or unerupted teeth and arise due to fluid accumulation between the reduced enamel epithelium and the tooth crown (Önay et al., 2019). In contrast, inflammatory cysts are more frequently observed in younger patients and are associated with infection from non-vital primary teeth (Kammer et al., 2024). Clinically, most dentigerous cysts are asymptomatic and are often detected incidentally during radiological examinations; however, larger or infected lesions may present with swelling, pain, bone expansion, and functional impairment. In cases involving the maxillary sinus, patients may develop nasal obstruction, septal deviation, palatal remodeling, and even orbital symptoms (Franklin et al., 2021). Management typically involves cyst enucleation with extraction of the associated tooth, although marsupialization or decompression may be considered in selected cases, particularly for large lesions or those involving critical anatomical structures.

Despite existing literature, reports describing dentigerous cysts with simultaneous involvement of the maxillary sinus and anterior teeth with extensive expansion into adjacent structures remain limited. This rarity contributes to challenges in diagnosis and selection of the optimal surgical approach. Therefore, this case report aims to present a rare and extensive dentigerous cyst involving the maxillary sinus and anterior teeth, emphasizing its clinical, radiological, and surgical challenges, as well as the importance of early diagnosis and careful treatment planning to optimize clinical outcomes.

Case Presentation

A 16-year-old male patient presented to the Otorhinolaryngology-Head and Neck Surgery outpatient clinic at Dr. Sardjito General Hospital with a chief complaint of progressive right-sided nasal obstruction over the past several months. The patient also reported facial asymmetry in the right cheek region accompanied by localized tenderness. In addition, the patient had palatal swelling and retained right maxillary deciduous lateral incisor (tooth 52) and canine (tooth 53).

On general examination, the patient appeared in good condition with vital signs within normal limits. Facial inspection revealed right-sided facial asymmetry characterized by prominence of the right zygomatic region and a difference in the level of the eyeball compared with the contralateral side (Figure 1).



Figure 1. Clinical photographs demonstrating right-sided facial asymmetry.

Palpation revealed a mass with a firm to slightly soft consistency, suggesting thinning of the surrounding bone. Nasal endoscopic examination showed medial displacement of the right lateral nasal wall with deviation of the nasal septum to the left, resulting in narrowing of the contralateral nasal cavity (Figure 2).

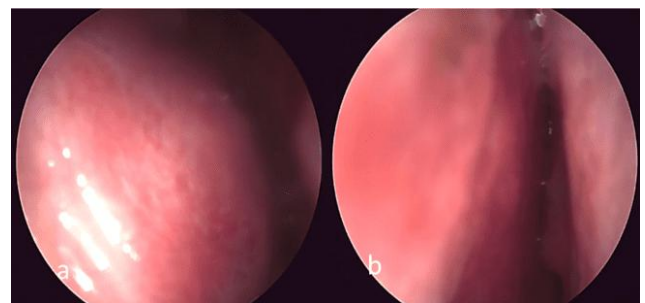


Figure 2. The right nasal cavity (a) shows the lateral wall of the nasal cavity being pushed medially and the nasal septum being pushed to the left, narrowing the left nasal cavity (b) Intraoral examination confirmed the presence of a retained right maxillary lateral incisor (tooth 52) and canine (tooth 53). A palatal mass with a firm-to-soft consistency was noted on palpation (Figure 3b).



Figure 3. (a) Retained teeth 52 and 53. (b) Palpation of palatal buldge revealed hard structure.

MSCT of the paranasal sinuses demonstrated a well-defined hypodense lesion with regular margins

involving the right maxilla and extending into the right maxillary sinus and nasal cavity, approaching the orbital rim. The lesion caused leftward deviation of the nasal septum, without evidence of periorbital soft tissue invasion or orbital bone destruction (Figure 4).

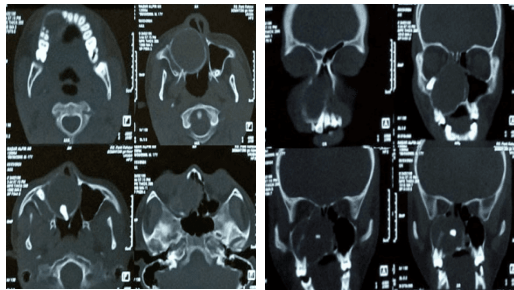


Figure 4. MSCT of the paranasal sinuses showing a well-defined hypodense cystic lesion in the right maxillary sinus with an intralesional tooth crown.

These radiological findings supported the diagnosis of a dentigerous cyst. Based on the radiological findings, the differential diagnoses considered included radicular cyst, odontogenic keratocyst, and ameloblastoma. However, the cystic lesion surrounding the crown of the unerupted tooth, together with the clinical, radiological, and histopathological findings, supported the diagnosis of a dentigerous cyst. Enucleation of the lesion was subsequently performed in toto through a Weber-Ferguson lateral rhinotomy approach with medial maxillectomy. The cyst was carefully separated from the surrounding tissues through the bone defect created. During the procedure, partial rupture of the cyst wall occurred due to the large size of the lesion. The cyst

contained yellowish serous fluid. Exploration was continued to ensure complete removal of the cystic capsule, and extraction of the associated right maxillary deciduous lateral incisor (tooth 52) and canine (tooth 53) was performed. Macroscopically, the specimen appeared as a cystic sac containing two tooth components (Figure 5).



Figure 5. (a) Intraoperative appearance of the dentigerous cyst. (b) Post-excision defect. (c) Excised cystic specimen with associated dental components.

The choice of an open surgical approach was based on several considerations. First, the large dimensions of the lesion ($4 \times 5 \times 6.5$ cm) required adequate surgical exposure to facilitate complete enucleation. Second, the cyst extended into the maxillary sinus and nasal cavity and approached the orbital rim, with associated septal deviation and palatal remodeling, requiring broad visualization of the lesion and adjacent anatomical structures. Third, further intrasinus exploration was required to identify and remove the associated ectopic dental components. Therefore, a lateral rhinotomy with medial maxillectomy was selected to provide adequate visualization and surgical access for complete removal of the cyst capsule and associated teeth.

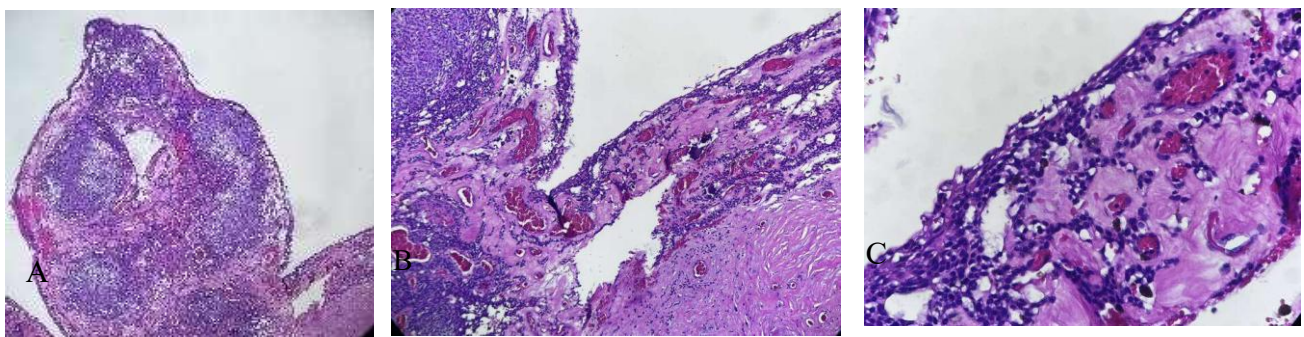


Figure 6. Histopathological findings of the cyst. (A) Low-power view (40 $\times$) showing focal epithelial tufting toward the cystic lumen. (B) Higher-power view (100 $\times$) showing an intraepithelial microcyst with edematous connective tissue stroma, vascular dilatation, erythrocyte extravasation, and scattered lymphocytes and histiocytes. (C) High-power view (400 $\times$) showing no evidence of malignant cells.

Histopathological examination revealed a cystic lesion lined by cuboidal to columnar epithelium with eosinophilic and focally clear, monomorphic cytoplasm

and variable epithelial thickness. Focal epithelial tufting toward the lumen and intraepithelial microcysts were observed. The underlying connective tissue stroma was edematous, with vascular dilatation, erythrocyte

extravasation, and scattered lymphocytes and histiocytes. No malignant cells were identified (Figure 6).

The patient was followed up for three months after surgery and no complications, clinical recurrence, or additional complaints were observed. Clinical and radiological follow-up examinations showed good outcomes without residual lesions. However, the follow-up period in this report remains relatively short. Considering that recurrence of dentigerous cysts may occur over a longer period, periodic long-term monitoring is still necessary to evaluate the overall success of treatment. At the end of the observation period, both aesthetic and functional outcomes were considered satisfactory. Written informed consent for publication of the case report and accompanying clinical documentation was obtained from the patient and the patient's family.

Result and Discussion

Accordingly, the selection of a surgical approach for dentigerous cysts involving the maxillary sinus should consider lesion size, the extent of anatomical involvement, and the available surgical facilities. In this case, the open approach resulted in good clinical outcomes with improvement of nasal obstruction symptoms without early complications.

This report highlights that dentigerous cysts with extensive expansion into the maxillary sinus and nasal cavity, with proximity to the orbital rim, may produce significant clinical manifestations and require individualized surgical strategies based on comprehensive radiological evaluation. Comprehensive radiological assessment plays a key role in determining the optimal surgical strategy and preventing residual lesions and long-term complications. The limitation of this report is the relatively short follow-up period of three months; therefore, longer follow-up is necessary to evaluate the possibility of recurrence.

Dentigerous cysts are epidemiologically more common in males and typically occur during the second to fourth decades of life (Franklin et al., 2021); (Alqadi et al., 2023). Nevertheless, involvement of the maxillary sinus is relatively uncommon, particularly when anterior teeth are involved. Previous studies have reported that dentigerous cysts involving the maxillary sinus are more frequently associated with impacted third molars rather than anterior teeth (Noujeim & Nasr, 2021); (Jiang et al., 2020). Compared to these reports, the present case demonstrates a rarer presentation due to the involvement of anterior teeth and extensive expansion into adjacent anatomical structures, including the orbital region.

Most dentigerous cysts are asymptomatic and are often discovered incidentally during radiological examinations (Vinereanu et al., 2021). However, in large lesions, cyst expansion may lead to displacement and remodeling of adjacent anatomical structures. Medial expansion may displace the lateral wall of the nasal cavity, resulting in septal deviation and nasal obstruction. Superior expansion involving the orbital wall may lead to asymmetry in the level of the eyeballs and even diplopia (Bernardi et al., 2018). Similar cases reported in the literature have shown that delayed diagnosis may lead to significant expansion and involvement of adjacent anatomical structures. This finding is consistent with the current case, where the lesion resulted in facial asymmetry, septal deviation, and protrusion of the palate and infraorbital region.

From a pathophysiological perspective, a dentigerous cyst is a lesion attached at the cemento enamel junction and surrounds the crown of an unerupted tooth. The growth of a dentigerous cyst is associated with the accumulation of intracystic fluid, which increases hydrostatic pressure and subsequently induces bone resorption and progressive expansion into adjacent structures (Vinereanu et al., 2021). This mechanism explains the tendency of dentigerous cysts to expand into surrounding areas, including the maxillary sinus, as observed in this case, where the lesion measured approximately $4 \times 5 \times 6.5$ cm and caused deformation of surrounding anatomical structures (Bansal & Bansal, n.d.).

Complete enucleation of the cyst capsule was prioritized to minimize the risk of residual disease and recurrence. In this case, the lateral rhinotomy with medial maxillectomy approach provided wide surgical exposure and facilitated direct visualization of the cyst wall and associated dental components within the maxillary sinus. This was particularly important given the large size of the lesion, its extension into the maxillary sinus and nasal cavity, and the need for thorough intrasinus exploration.

According to the literature, management of dentigerous cysts involving the maxillary sinus can be performed using the Caldwell Luc procedure or through an endoscopic transnasal approach via inferior or medial meatal antrostomy (Alhashim et al., 2021); (Gaurkar et al., 2022). The endoscopic approach offers advantages such as minimal invasiveness and better cosmetic outcomes. However, several studies have suggested that endoscopic approaches are more suitable for small to moderate-sized lesions with limited extension (Alhashim et al., 2021); (Gaurkar et al., 2022). In contrast, in large lesions with extensive bone remodeling and involvement of multiple anatomical structures, an open approach may provide better control of the cyst wall and

facilitate complete in toto removal of the cyst capsule. This consideration is particularly relevant in cases with extension toward the orbital rim, where complete visualization is essential to prevent residual disease. In this case, the lesion size exceeding 6 cm and the proximity of the lesion to the orbital rim made the open approach a more appropriate option to ensure complete excision and minimize the risk of residual lesion and recurrence.

Therefore, the selection of a surgical approach for dentigerous cysts involving the maxillary sinus should consider lesion size, the extent of anatomical involvement, and the available surgical facilities. In this case, the open approach resulted in good clinical outcomes with improvement of nasal obstruction symptoms without early complications. Correlation between clinical findings and radiological assessment is essential to guide appropriate surgical decision-making and optimize treatment outcomes. The limitation of this report is the relatively short follow-up period of three months; therefore, longer follow-up is necessary to evaluate the possibility of recurrence.

Conclusion

This case demonstrates that dentigerous cysts involving the maxillary sinus with anterior tooth involvement represent a rare and clinically significant condition that may lead to extensive anatomical expansion and diagnostic challenges. Comprehensive radiological evaluation plays a crucial role in determining the extent of the lesion and guiding appropriate surgical planning. In large lesions extending toward the orbital rim, an open surgical approach provides better exposure and facilitates complete removal of the cyst, thereby reducing the risk of recurrence. Early recognition and individualized management are essential to optimize clinical outcomes in such complex cases.

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