Chronic maxillary sinusitis masquerading as a maxillary sinus neoplasm: A case report

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Abstract. Chronic inflammatory diseases of the maxillary sinus can present well-defined, expansile radiolucent features, necessitating differential diagnosis from true neoplasms. Pleomorphic adenoma, although rare, is one of the neoplasms included in the list of differential diagnoses, and it may occasionally arise in the maxillary sinus. However, inflammatory conditions such as mucoceles, postoperative maxillary cysts and chronic bacterial maxillary sinusitis can also cause thinning and expansion of the sinus walls due to prolonged obstruction. The present study describes a case of chronic maxillary sinusitis masquerading as a neoplasm in a 53-year-old man. Although the lesion was initially diagnosed as pleomorphic adenoma on incisional biopsy, histopathological examination of the entire lesion ultimately revealed it to be chronic maxillary sinusitis.

Introduction

Lesions of the maxillary sinus span an inflammatory-to-neoplastic spectrum that often looks deceptively similar on clinical examination and imaging (1-3). Chronic inflammatory disease may present as a well-circumscribed, expansile radiolucency with bony remodeling, features that are characteristic of benign tumors, while true neoplasms can remain radiographically indistinct until late in their course. Such overlap is a recognized diagnostic pitfall that can lead to overtreatment when an aggressive surgical approach is chosen for a problem that could be managed otherwise (2).

Among the neoplasms in the list of differential diagnoses is pleomorphic adenoma, a benign salivary-gland tumor that only rarely arises in ectopic sites such as the paranasal sinuses (4,5). In a retrospective study conducted on Asian populations, pleomorphic adenoma arising in the maxillary sinus accounted for approximately 0.06% (6). Although uncommon, pleomorphic adenoma is frequently cited because its sharply demarcated margins and tendency to displace adjacent structures can mimic other benign expansile processes on cone-beam computed tomography (CBCT) or Magnetic Resonance Imaging (MRI) (7). However, inflammatory entities, including mucoceles, postoperative maxillary cysts, fungal sinusitis, and chronic bacterial sinusitis, can produce identical radiologic hallmarks, especially when longstanding obstruction leads to progressive sinus expansion and cortical thinning (8-11).

Herein, we report a case of chronic maxillary sinusitis masquerading as a neoplasm in a 53-year-old man whose large, well-defined maxillary sinus lesion was initially interpreted as pleomorphic adenoma on incisional biopsy. The case highlights i) the importance of correlating histopathology with the full clinical-radiologic picture, ii) the limitations of small biopsies in heterogeneous sinus lesions, and iii) practical strategies to avoid unnecessary radical surgery. By highlighting these diagnostic challenges and their resolution, this report aims to refine the clinician's approach to expansile maxillary sinus lesions and to contribute to the growing literature on inflammatory mimics of sinonasal tumors. This study was exempt from review by the Institutional Review Board of Gangneung-Wonju National University Dental Hospital (exemption no. GWNUDH-IRB2025-A007; Gangneung, South Korea).

Case report

A 53-year-old man was referred to Gangneung-Wonju National University Dental Hospital (Gangneung, Republic of Korea) in November 2024 after a routine panoramic radiograph revealed a large, well-circumscribed radiolucent lesion occupying the right maxillary sinus. The lesion was clinically silent as the patient, who reported having no prior sinus infection, denied experiencing pain, nasal obstruction, epistaxis, or visual disturbance. His medical history included chronic hepatitis B and a remote thoracic operation for a benign chest tumor, but no maxillofacial trauma or surgery. Three years earlier the first and second right maxillary molars had been extracted without complication.

CBCT revealed an expansile mass measuring 53x43x49 mm with smooth cortical thinning, focal perforations of both buccal

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and palatal plates, upward displacement of the orbital floor, and mild deviation of the nasal septum (Fig. 1). The interior of the lesion was homogeneously radiolucent, lacking calcifications or septa, and demonstrated no mucosal thickening or fluid levels typical of inflammatory sinus disease. These features indicated toward a benign epithelial tumor-most plausibly a pleomorphic adenoma-although the differential diagnoses included a mucocele, postoperative maxillary cyst, and odontogenic lesion.

Intraoral incisional biopsy under local anesthesia yielded scant, myxoid spindle-cell tissue interpreted as 'pleomorphic adenoma like'. Because this histology did not fully explain the degree of bony expansion, and because orbital support might be jeopardized after tumor removal, we created a patient-specific titanium implant (PSI) to reconstruct the orbital floor if necessary. Since PSI placement required wide exposure, a Weber-Ferguson approach was followed.

During surgery the mass was easily separated from surrounding bone except at points of dense adhesions to the nasal mucosa (Fig. 2). Once the mass was removed, the underlying orbital floor was found to be just thinned but not absent; the position of the globe was stable, and PSI insertion was deferred. A small communication between the sinus and the nasal cavity was closed, and Vaseline-gauze was packed for hemostasis.

Definitive histopathology revealed a chronically inflamed respiratory mucosa with granulation tissue, cholesterol clefts, and fibrosis, but no salivary-gland or odontogenic tumor elements, findings diagnostic of chronic maxillary sinusitis with mucocele-like expansion (Fig. 3). Postoperative CBCT performed 6 months later confirmed orbital volume preservation, and the patient showed no clinical manifestations of recurrence after six months of follow-up (Fig. 4).

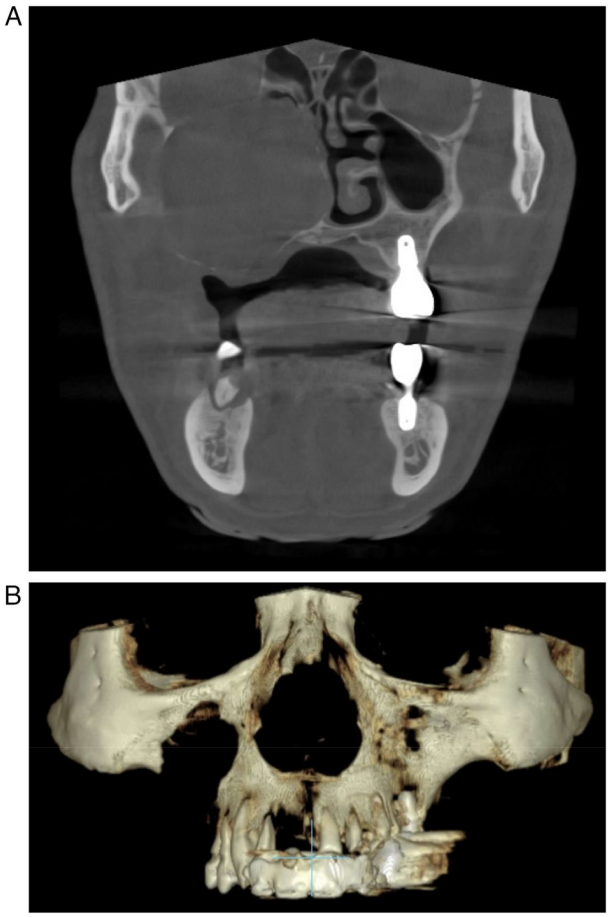

Figure 1. Preoperative cone-beam computed tomography images showing a large, expansile mass with smooth margins. The lesion is radiolucent and lacks septa or a fluid level. (A) Coronal view. (B) Three-dimensional reconstructed image.

Discussion

Expansile, well-demarcated lesions of the maxillary sinus are classically attributed to benign tumors or cysts (12); however, chronic inflammatory conditions, such as longstanding bacterial sinusitis, fungal sinusitis, or obstructive mucoceles, may generate identical imaging features when trapped secretions create sustained hydrostatic pressure on the bony walls (13). In the present case, a 5-cm radiolucency with cortical thinning, focal perforation, and orbital floor elevation strongly suggested a salivary or odontogenic tumor. However, definitive histology demonstrated only chronically inflamed Schneiderian mucosa with fibrosis and cholesterol clefts, confirming an inflammatory origin. Clinicians should therefore keep 'tumor-like sinusitis' in mind whenever an expansile maxillary mass lacks the internal septations or heterogeneous enhancement typical of true neoplasia (14).

Several entities were considered preoperatively. First, pleomorphic adenoma was high on the list because the lesion's smooth cortical expansion, orbital displacement, and sharply defined borders resembled salivary-gland tumors reported in the sinus. Despite a myxoid fragment from the first biopsy strengthening this suspicion, the excised specimen ultimately showed no salivary epithelial or myoepithelial elements, ruling the diagnosis out. Sampling error is common because inflammatory sinus cavities often contain reactive granulation tissue and metaplastic epithelium that mimic neoplastic stroma (15). Reliance on a single limited sample can misdirect treatment toward unnecessarily radical surgery. In general diagnostic practice, the prevalence of misdiagnosis has been reported to range from 5 to 15%, highlighting the importance of coordinated clinicopathologic and radiologic evaluation to ensure appropriate management (16,17). Accurate diagnosis of maxillary sinus lesions requires close collaboration among oral and maxillofacial surgeons, radiologists, and pathologists. Whenever radiology, endoscopy, and the patient's clinical presentation do not align with the results of an initial biopsy, repeat or deeper sampling, or endoscopic sinus culture and lavage, should be considered before definitive resection. A mucocele or postoperative maxillary cyst was the next possibility; both can produce a large, uniformly radiolucent cavity and remodel surrounding bone when the ostium is chronically obstructed (8,9,11). In our patient, however, there was no prior sinus surgery, no obstructive history, and no true cystic lining on histology; findings more compatible with diffuse inflammatory change than with a discrete cyst. Odontogenic lesions were also weighed. An odontogenic keratocyst can scallop bone and expand the sinus from below, whereas a myxoma often shows internal trabeculae or a 'soap-bubble' pattern (18). In this case the epicenter lay within the sinus walls rather than in the alveolar ridge, and neither keratin nor myxoid stroma

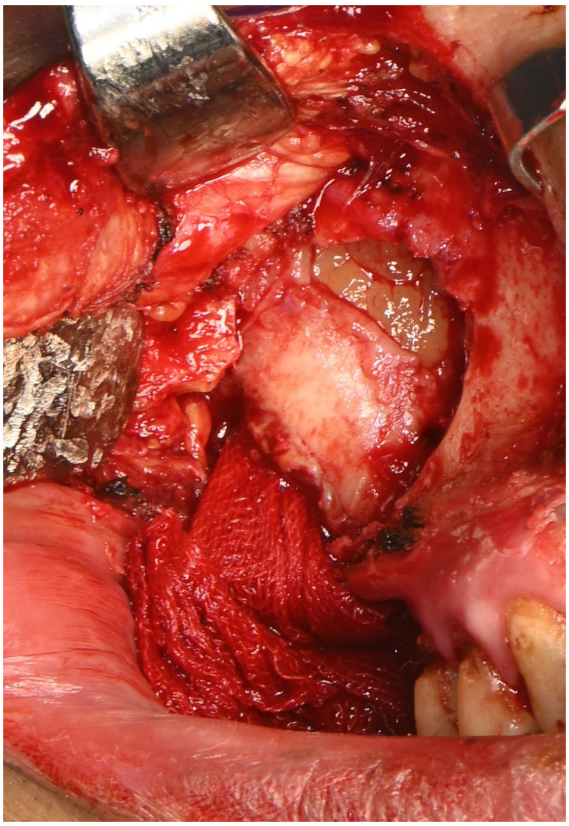

Figure 2. Intraoperative clinical photograph of the lesion.

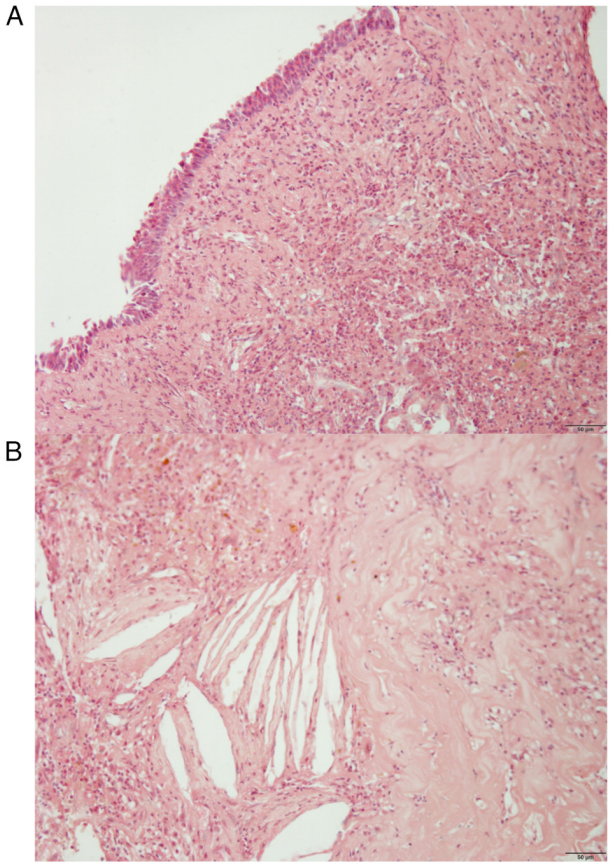

Figure 3. Histopathologic features of the lesion. (A) Chronically inflamed respiratory mucosa showing granulation tissue and fibrosis. (B) Cholesterol clefts within the lesion (hematoxylin and eosin staining; scale bar, 50 μm).

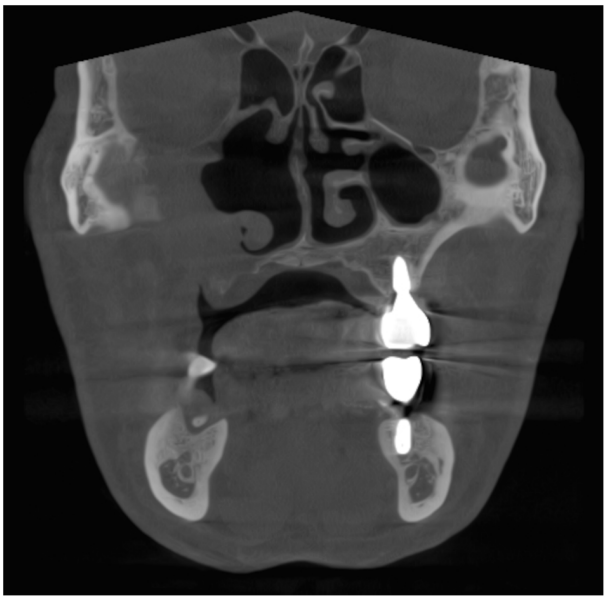

Figure 4. Coronal view of cone-beam computed tomography performed 6 months postoperatively, showing no signs of recurrence.

was identified microscopically, making these diagnoses unlikely. Invasive fungal sinusitis can mimic neoplasm when it erodes bone, especially in immunocompromised hosts, and scattered hyperdense foci on CBCT sometimes betray fungal concretions (19). Finally, a cholesteatoma of the maxillary sinus, which is rare but well documented, was contemplated because it also causes bone erosion and may appear as a soft-tissue mass (20). Intraoperative inspection revealed none of the pearly keratin debris typical of cholesteatoma, and the resected tissue lacked keratinizing epithelium. By systematically excluding these alternatives through clinical history, imaging features, and definitive histopathology, we arrived at the final diagnosis of chronic inflammatory sinusitis with mucocele-like expansion.

In conclusion, this case illustrates how, due to a chronic inflammatory condition, the maxillary sinus can insidiously become a large, expansile cavity that radiologically and histologically mimics benign neoplasms. Thorough correlation of clinical findings, cross-sectional imaging, and, crucially, the pathology of the entire resected specimen was required to reach the correct diagnosis and avoid unnecessary orbital reconstruction. Two practical lessons emerge: i) An expansile, sharply marginated sinus lesion should not automatically trigger oncologic surgery until repeated or wide-field sampling confirms a tumor, and ii) preoperative virtual planning with patient-specific implants is prudent when orbital support appears threatened, but intraoperative reassessment can spare patients foreign-body implantation when residual bone proves adequate. Recognizing the inflammatory masquerade of maxillary sinusitis can therefore reduce surgical morbidity and guide more measured, evidence-based management of similar lesions.

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Availability of data and materials

The data generated in the present study are included in the figures and/or tables of this article.

Authors' contributions

JHO contributed to the conception and design of the report and drafted the initial manuscript. SYK collected clinical data, organized the data, revised the manuscript and handled correspondence with the journal. SGK contributed to the study design and interpretation of clinical findings, supervised the overall project, and provided critical revisions for important intellectual content. JHO, SYK and SGK confirm the authenticity of all the raw data. All the authors have read and approved the final version of the manuscript.

Ethics approval and consent to participate

This study was exempted from review by the Institutional Review Board at Gangneung-Wonju National University Dental Hospital (exemption no. GWNUDH-IRB2025-A007).

Patient consent for publication

Written informed consent was obtained from the patient for publication of this case report and its accompanying images.

Competing interests

The authors declare that they have no competing interests.

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