sinusitis

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Case Report

Sinonasal Mass in the Setting of Prior Maxillofacial Surgery and Solid Organ Malignancy

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Abstract: Fungal rhinosinusitis (FRS) can be classified into invasive and non-invasive forms, with the fungal ball (FB) representing a common non-invasive type with generally favorable outcomes post-operatively. The clinical presentation of FB can vary and be non-specific, and it is important to consider a wide differential diagnosis for sinonasal masses, including malignancy. We present the case of a 74-year-old female presenting with a two-year history of nasal obstruction and drainage. She has a history of breast cancer and prior maxillomandibular surgery, and imaging showed a poorly defined mass in the right maxillary sinus with possible hemorrhagic and/or proteinaceous content. Rigid nasal endoscopy revealed a friable mass, and endoscopic sinus surgery findings were consistent with FB. This case exemplifies the need to consider a broad set of differential diagnoses when evaluating sinonasal masses, especially if the patient has a prior malignancy or maxillomandibular surgical history, including FB and metastases to the paranasal sinuses. Given the presence of non-specific symptoms, it is important to consider early imaging for patients with distorted anatomy and a history of malignancy. Endoscopic sinus surgery, with high success rates, is the gold-standard treatment for FB.

Keywords: rhinology; sinus; nasal obstruction; fungal rhinosinusitis; fungal ball

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1. Introduction

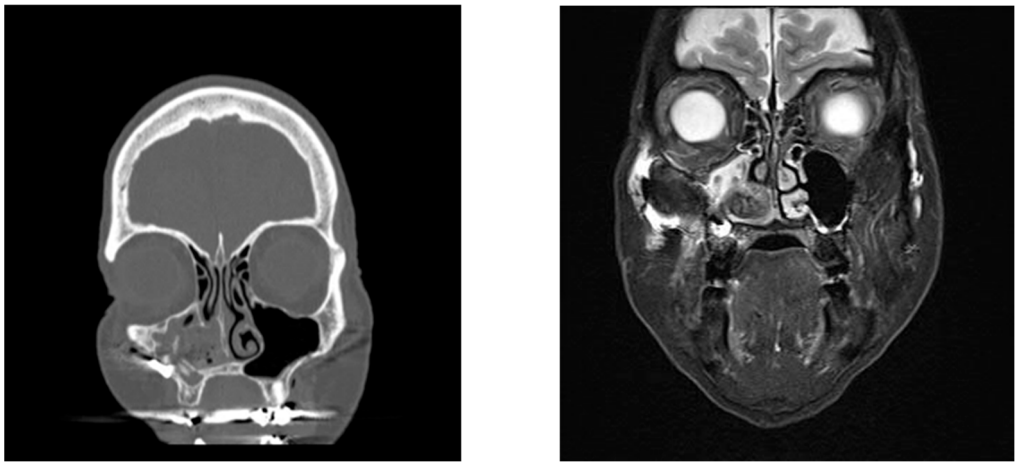
Fungal rhinosinusitis (FRS) can be categorized as invasive and non-invasive based on histopathology, which commonly corresponds with immunocompetency status and may be associated with significant morbidity and mortality [1]. Fungal ball (FB) is a type of non-invasive fungal rhinosinusitis with an excellent prognosis after surgical treatment [2]. FB is most commonly caused by *Aspergillus* spp. and most often affects the maxillary sinus [3]. Patients can be asymptomatic or complain of non-specific symptoms such as headaches, facial pain, and postnasal drip [4].

We present the case of a 74-year-old female with a unique presentation of the common rhinologic entity of FB. The unique radiological and clinical presentation are influenced in part by a prior history of LeFort fractures secondary to a remote history of maxillomandibular surgery. Her history also portends a useful discussion of risk factors for primary malignancy and metastasis to the paranasal sinuses. Lastly, this case provides meaningful context to discuss the imaging, clinical presentation, and treatment of FB.

2. Case Presentation

A 74-year-old female was referred to the rhinology clinic due to concern for a right-sided nasal mass. She was seen by her primary care doctor for complaints of two years of

persistent right nasal obstruction and drainage. Computed tomography (CT) demonstrated a poorly defined mass in the right maxillary sinus and nasal cavity with heterogeneous attenuation and scattered foci of gas (Figure 1a). Further investigation with magnetic resonance imaging (MRI) demonstrated remodeling of the medial right maxillary sinus wall and a maxillary sinus lesion with peripheral enhancement and central contents suggestive of hemorrhagic and/or proteinaceous material (Figure 1b). Clinical correlation was suggested to rule out a tumor, prompting referral to the ENT surgeon.



(**a**) (**b**)

Figure 1. Pre-operative imaging. (**a**) Coronal CT sinus; (**b**) coronal T2-weighted STIR sequence MRI.

The patient had a history of breast cancer status post lumpectomy 18 years prior and was undergoing additional biopsies at the time of evaluation for the possibility of recurrence. She also had a history of temporal mandibular joint disorder status post multiple maxillofacial surgeries, including LeFort osteotomies and joint replacement 40 years prior. Prior medical management with nasal sprays and rinses, oral antihistamines, and oral antibiotics was ineffective. She had a 2.5-pack-year smoking history and reported drinking more than seven drinks of alcohol a week.

Rigid nasal endoscopy revealed a friable mass extending from the inferior meatus to the nasal septum (Figure 2). The patient was offered endoscopic sinus surgery as both a diagnostic and therapeutic intervention. Intra-operative findings were consistent with FB, with thick, inspissated mucinous debris in the right maxillary sinus extending through a defect in the medial maxillary wall. A right maxillary mega-antrostomy was completed. Fungal smear was positive for fungal elements, but there was no definitive growth on final cultures. Pathology demonstrated severe chronic inflammation with fewer than ten eosinophils per high-power field and no evidence of malignancy. Post-operatively, the patient had a prompt resolution of her symptoms without further nasal congestion, facial pressure, nasal drainage, or hyposmia. Three months post-operatively, the patient continued to do well without any nasal symptoms and did not require further follow-up.

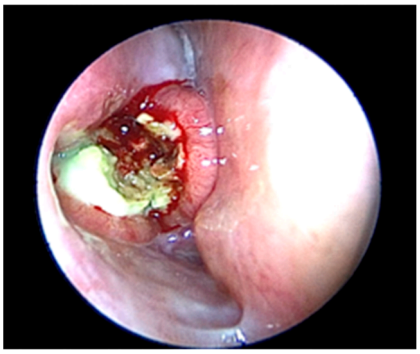


Figure 2. Nasal endoscopy of right inferior meatus.

3. Discussion

Sinonasal masses are challenging to definitively diagnose as benign or malignant through imaging, as the radiologic features of various sinonasal masses are often very similar [5]. Furthermore, the clinical symptoms of sinonasal malignancies often mimic those of common inflammatory conditions, leading to diagnostic oversight. In the case of our patient, evaluating the sinonasal mass on imaging was particularly difficult due to her history of six prior maxillofacial surgeries, which distorted the bony anatomy and interfered with the assessment of lesion extension. This necessitated maintaining a broad differential diagnosis.

LeFort fractures are associated with alterations in the maxillary sinus, including mucosal thickening, decreased sinus volume, and impaired nasal ventilation [6,7]. These changes can complicate the radiologic evaluation of sinonasal masses, emphasizing the use of both CT and MRI to comprehensively evaluate the bony and soft tissue structures. Additionally, prior endodontic treatment in the ipsilateral upper jaw and the presence of dentogenic factors have been hypothesized to predispose individuals to maxillary FBs [8,9].

At the time of evaluation, the patient was also undergoing additional biopsies for the possible recurrence or a new case of primary breast cancer. Although rare, metastasis to the paranasal sinuses from other solid organ tumors can mimic inflammatory sinus disease and create diagnostic dilemmas. A study reviewing 167 case reports between 1951 and 2012 found that renal carcinoma was the most common primary cancer metastasizing to the paranasal sinuses, followed by breast, lung, and prostate cancers [10]. Metastases typically involve a single sinus, most commonly the maxillary sinus [10]. Accurate diagnosis and appropriate management in such cases require a high index of suspicion and thorough histopathological evaluation.

This case underscores the variable differential diagnoses of chronic obstructive symptoms in the presence of a paranasal mass, particularly in patients with a history of malignancy or maxillofacial surgery causing a subsequent distortion of anatomy.

FRS can be classified as invasive or non-invasive based on histopathology and depends primarily on a patient's immunocompetence status. Non-invasive forms, such as FB of the paranasal sinuses and allergic fungal rhinosinusitis, generally occur in immunocompetent and non-atopic patients [11]. Previously referred to as mycetoma or aspergilloma, FB results from fungi overgrowth in the sinuses, forming an intertwined ball of fungus. The incidence and prevalence of FB are unclear, but it is increasingly recognized as a clinical entity. Symptoms range from asymptomatic to indistinguishable from that of chronic rhinosinusitis, with drainage, facial pain, nasal obstruction, and headaches [2]. While the maxillary sinus is most commonly involved, FBs have been demonstrated in all paranasal sinuses [2,12].

CT imaging classically demonstrates partial or complete heterogenous opacification of an isolated sinus. Iron-like signal with a metal-dense area is a specific but not sensitive

finding on imaging [2,12]. MRI, though less frequently used due to cost, can provide additional detail. It demonstrates heterogenous signal intensity with prominent hypointensity on T2-weighted imaging due to a low water content in the debris [12].

The gold standard for treatment is endoscopic sinus surgery, which is almost universally curative, with success rates exceeding 98% [13]. Post-operative antifungal and antibiotic agents do not offer significant benefits. Fungal cultures often fail to yield growth, with some case studies reporting growth in less than 30% of cases [2,14]. When successful, *Aspergillus* species are the most commonly identified [3,14]. Histopathology will often demonstrate fungal branching hyphae, and ultramicroscopic analysis may also be utilized to provide detailed tissue characterization and aid in differential diagnosis in complex cases [15].

In our patient, the FB was successfully removed, resulting in the complete resolution of symptoms. This case highlights the importance of thorough evaluation, particularly in patients with anatomical distortions or a history of solid organ malignancy, when imaging findings are inconclusive.

The limitations of this study include the absence of fungal growth in cultures and the inability to isolate the fungal species. Furthermore, as a single case report, the findings cannot be generalized to a broader population.

4. Conclusions

This case highlights the importance of the careful evaluation and differential diagnoses of sinonasal masses in patients with a complex surgical history and non-specific symptoms. Distinguishing benign conditions such as FB from potential malignancies is critical for accurate diagnosis and management.

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Conflicts of Interest: The authors declare no conflicts of interest.

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