

RADIOLOGICAL ASPECT OF FUNGUS BALL WITHIN A MUCOCELE OF THE SPHENOID SINUS

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Paranasal sinus fungus ball is within the non-invasive forms and is characterized by the presence of aggregated hyphae that do not invade the sinus mucosa. Mucoceles are benign, expansile, cyst-like lesions of the paranasal sinuses. The mucoid secretions of mucoceles are usually sterile. However, secondary infections, mostly bacterial, may lead to the development of pyocoeles. Although an association between a fungus ball and a mucocele is rare in the paranasal sinuses, this disease entity should be considered in the differential diagnosis of expansile, cystic sinus lesions.

In this article, clinical and radiological findings of a 61-year-old male patient with isolated sphenoid sinus fungus ball within a mucocele presented with headache and periorbital pain were discussed with recent literature.

Key-word: Fungus ball, mucocele, sphenoid sinus, computed tomography.

Fungal sphenoid sinusitis is an infectious disease caused by the development of a fungus in the sphenoid sinus. It is considered rare but its incidence appears to increase (1). Fungal sinusitis has been classified into invasive and noninvasive forms. Paranasal sinus fungus ball is within the non-invasive forms and is characterized by the presence of aggregated hyphae that do not invade the sinus mucosa (2).

Mucoceleles are benign, expansile, cyst-like lesions of the paranasal sinuses (1). The mucoid secretions of mucoceles are usually sterile. However, infections of paranasal sinuses, mostly bacterial, may lead to the development of pyocoeles. In contrast, sphenoid sinus fungus ball within a mucocele is extremely rare (3).

In this article, clinical and radiological findings of a 61-year-old male patient with isolated sphenoid sinus fungus ball within a mucocele presented with headache and periorbital pain were discussed with recent literature.

Case report

A 61-year-old male patient presented to our hospital with a complain of blood stained nasal discharge off and on for the last 6 months and occasional postnasal discharge and moderately left sided periorbital pain and headache. The patient's visual acuity and fields were bilaterally normal and he had no history of nasal surgery and allergies. The patient had already taken medical treatment

for his complaints in the form of the antibiotics, local and systemic decongestants. He did not have any systemic medical disease. Physical examination revealed no abnormalities and no significant evidence of respiratory tract infection. All his routine laboratory investigations including hematological, serological

and allergy tests were within normal limits.

Endoscopic examination of the nasal cavity was unremarkable, with the exception of edema in the sphenoidal recess and a slight fullness of the anterior wall of the sphenoid sinus. Keeping in mind his past treatment history, a computed tomography scanning (CT) of paranasal sinuses and brain were ordered.

CT scanning of the paranasal sinuses revealed a large, expansile, low-attenuation mass in the left sphenoid sinus, and which consisted of high-density material containing calcifications (Fig. 1). CT



Fig. 1. — Axial unenhanced computed tomography scan shows a large, expansile, low attenuation mass and the typical hyperattenuating fungus ball with calcific foci (arrows) in the left sphenoid sinus.

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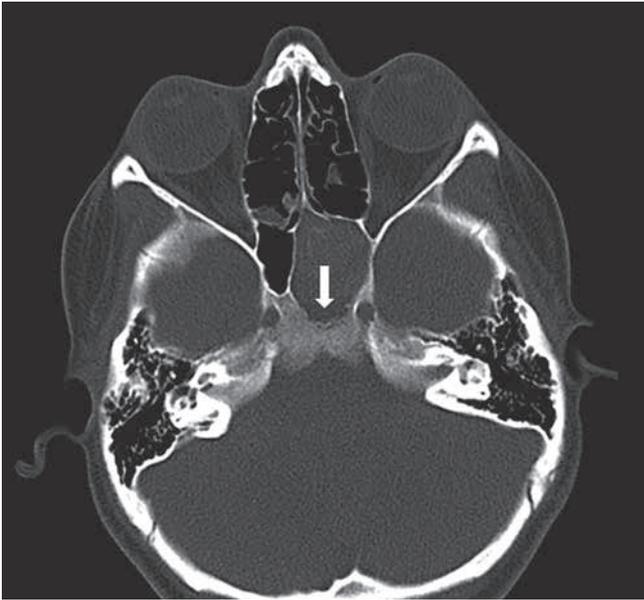


Fig. 2. — Axial bone-window CT image shows expanded sinus and focal areas of erosion from pressure necrosis at posterior wall of the left sphenoid sinus (arrow).

images also showed expanded sinus and focal areas of erosion from pressure necrosis at posterior wall of the left sphenoid sinus as typically seen in fungus ball (Fig. 2).

No abnormality was detected on the CT scan in any of the other sinuses and brain. Then, a MRI study was ordered to rule out any complication of this lesion and tumoral process accompany to this lesion. T1- and T2-weighted magnetic resonance imaging (MRI) scans showed a lobulated, expansile, non-homogeneous sphenoid sinus mass. The mass had high T1-weighted and low T2-weighted signal intensities (Fig. 3, 4). The pre-operative diagnosis was a mucocele with high protein content according to endoscopic and radiologic findings.

The patient was underwent endoscopic sinus surgery under local anesthesia. The sphenoid sinus was filled with mucus and cream-colored fungus ball. The fungus ball and mucous secretions were successfully drained endoscopically. The material evacuated was sent for fungal smear and histopathology. Fungal smear was positive and the histopathological examination was suggestive of aspergillosis. The sinus mucosa did not show any invasion by the fungus. Patient has been completely relieved of his symptoms for the last 3 months and is on regular follow up.

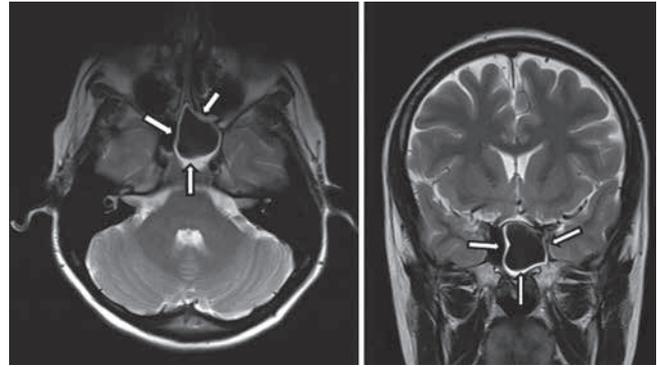


Fig. 3. — Axial (A) and coronal (B) T2-weighted magnetic resonance imaging scans shows a low signal intensity lobulated, expansile, non-homogeneous mass in the left sphenoid sinus (arrows).

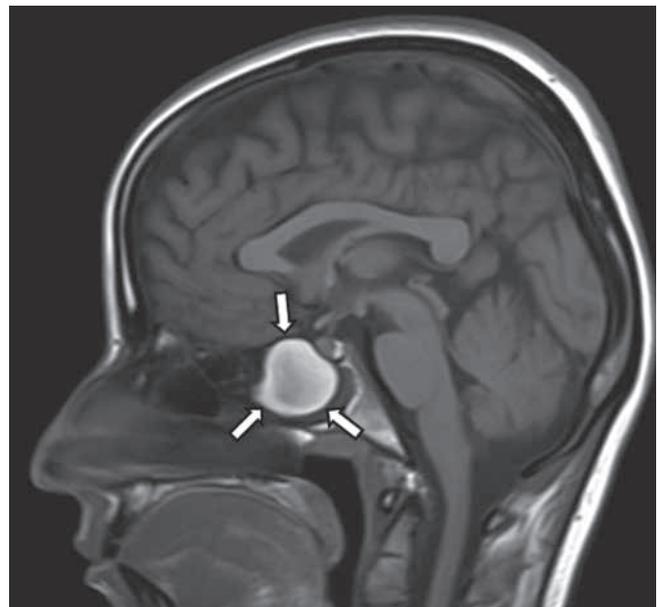


Fig. 4. — Sagittal T1-weighted magnetic resonance imaging scans shows high signal intensity lobulated mass in the left sphenoid sinus (arrows).

Discussion

Fungus ball is described as a non-invasive accumulation of a dense conglomeration of fungal hyphae in a paranasal sinus. The pathophysiology of the fungus ball is not totally understood, existing some theories to try to explain its appearance. The most widely accepted pathogenesis theorizes a deficient mucociliary clearance mechanism in which fungal organisms deposited in the paranasal sinuses are inadequately cleared. Organisms germinate, replicate, and incite an inflammatory response within the paranasal sinus. The fungus ball represents a tangled collection of fungal hyphae in the absence of allergic mucin (4). A muco-

cele is an expansile lesion of the paranasal sinuses. The coexistence of a fungus ball within a mucocele can be explained by the hypothesis that the fungus ball within the sinus causes recurrent infections, which leads to obstruction of the sinus ostium and the development of a mucocele (3).

Fungus ball tends to occur in older individuals with an apparent female predilection. Afflicted individuals are usually immunocompetent. Patients are either asymptomatic or have minimal symptoms. Individuals commonly describe a chronic pressure sensation involving one of the paranasal sinuses (5). Other common symptoms of fungus ball are purulent posterior rhinorrhea, nocturnal cough, purulent unilateral anterior

rhinorrhea and nasal obstruction. Ocular disorders are not uncommon; they include diplopia, paralysis of oculomotor nerves, and/or decreased visual acuity (6).

CT scan is the cornerstone of radiological diagnosis of sphenoid sinus disease. Fungus ball appears as a subtotal or total sphenoid sinus opacity which is usually heterogeneous (7). Spontaneous hyperdensities often appear within the sinus opacity, owing to the content of the FB in iron, manganese, and calcium (6). A few cases may demonstrate radioopaque densities within the sinus opacity which represent microcalcifications or dense hyphae (1, 6). Common findings are bone thickening or sclerosis of sinus walls. Foci of partial bone erosion of sphenoid sinus walls can occasionally be found on CT, even if the FB itself is not invasive (7). MRI is not very helpful in the diagnosis. Bone is not well seen on MRI, and both air and fungus ball are hypointense on T2 images, which does not help to clarify the content of the sinus. Hyperdensities seen on the CT are not easily identified on MRI. MRI can be performed to rule out another cause of the headache, or to evaluate complications (7).

A differential diagnosis has to be kept in mind, including allergic fungal sinusitis, mucocele, cholesterol granuloma (8). In allergic fungal sinusitis, CT scans show mixed high and low attenuation in the involved sinus. Areas of highly attenuated CT signal correspond to fungal and mucous material (9).

Mucoceles often present as homogeneous opacifications on CT, hypointense lesions on T1 weighted MRI, and hyperintense lesions on T2-weighted MRI. In contrast-enhanced MRI images, the sinus mucosa enhances as a thin line surrounding the mucocele. However, the MRI appearance of mucoceles varies depending on their protein concentration, which changes over time (10).

Cholesterol granulomas are seen with high signal intensity on both T1- and T2-weighted MRI images, related to the paramagnetic effect of methaemoglobin and granulations (11). Although mucoceles with high concentrations of protein may appear similar to cholesterol granulomas on

T1-weighted MRI images, mucoceles have a lower signal intensity on T2-weighted scans, compared with cholesterol granulomas.

In our case, MRI showed a high signal intensity lesion on T1W and low signal intensity lesion on T2W images in the left sphenoid sinuses. High protein and low water concentration of allergic fungal mucin and high concentration of various metals such as iron, magnesium, and manganese concentrated by the fungal organisms responsible for iso/high signal intensity on T1W and low signal intensity on T2W images on MRI (12, 13). Therefore, fungus ball within a mucocele can mimic an aerated sinus because of its specific MRI features as seen in our case. CT is the useful tool to make the distinction. In our case, CT images showed a lobulated, heterogeneous, low-attenuation, cystic lesion of the left sphenoid sinus with calcifications. There were also focal areas of erosion from pressure necrosis at posterior wall of the sphenoid sinus and an increased central opacity on CT images as typically seen in fungal ball.

The only curative treatment for fungus ball within mucocele is surgery, which allows removal of fungal debris from the affected sinus and re-establishes its proper ventilation and drainage. Antifungal medications are generally unnecessary and should be reserved for the immunocompromised patient. Two endoscopic approaches are used to open the sphenoid sinus in case of isolated fungus ball: the transnasal approach and the posterior transethmoidal approach (14).

Sphenoid sinus fungus ball within a mucocele is extremely rare. Although the advance of the diagnostic methods and the examinations of image, the diagnosis still remains a challenge. The fungus ball must be considered in all the patients with chronic sinusitis, when it does not respond to medical treatment. Understanding the clinical presentation and knowing its characteristic radiologic features allows the radiologist to play a crucial role in alerting the clinician to use appropriate diagnostic techniques for confirmation. Prompt diagnosis and initiation of appropriate treatment are essential

to avoid a protracted or serious outcome.

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