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IMAGES IN CLINICAL NEUROLOGY

Cavernous sinus thrombosis due to mucor infection of ethmoid sinus

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Herein, we discussed the evaluation of magnetic resonance imaging (MRI) and histopathologic examination to diagnose sinus mucormycosis and cavernous sinus thrombosis. Furthermore, we aimed to emphasize that early diagnosis and timely treatment are crucial to reducing mortality from this potentially fatal condition.

A 72-year-old female presented to the neurology outpatient clinic with severe headache, periorbital edema, proptosis, and diplopia. The patient had type 2 diabetes mellitus (DM) for five years and used metformin 850 mg twice a day for the past two years. The patient's right frontoparietal headache worsened over 10 days, and diplopia had started five days ago. During the cranial nerve examination, partial gaze restriction was noted in both downward and upward directions in the right eye. Direct and indirect light reflexes were slightly diminished on the right side. Additionally, the patient presented with right periorbital soft tissue swelling and proptosis. Laboratory findings indicated elevated glucose levels (262 mg/dL), high hemoglobin A1c

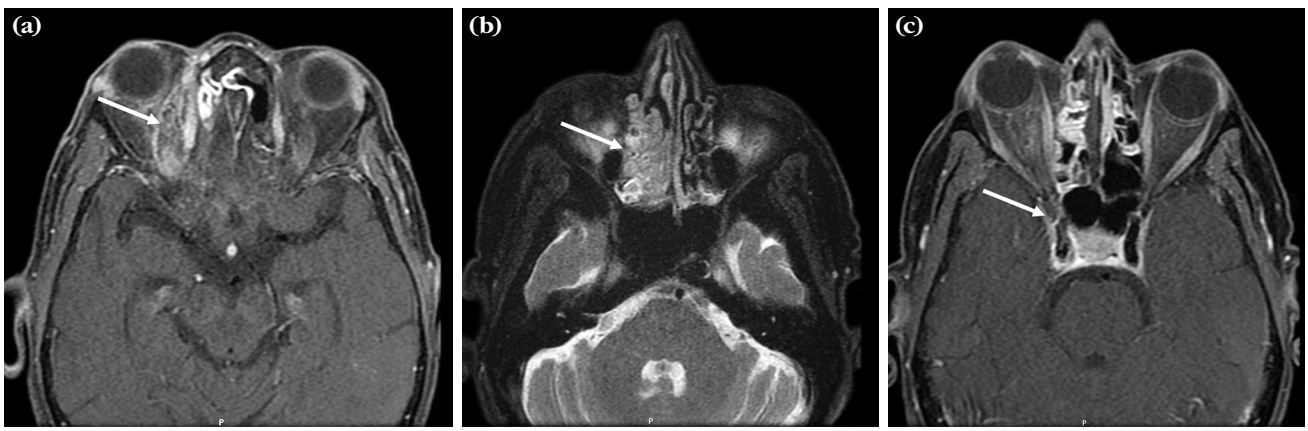

Figure 1. Magnetic resonance imaging (T1-weighted image with contrast enhancement) **(a)** axial and **(b)** T2-weighted image views of the brain at the level of the orbits. **(a)** Contrast-enhanced T1-weighted sequences reveal a hyperintense material filling the right ethmoidal sinus, and **(b)** inflammatory changes with gadolinium enhancement in the sinus mucosa extending through the medial wall of the orbit and the right medial rectus muscle. **(c)** Signal intensity with filling defects on post contrast images in the right cavernous sinus (white arrows).

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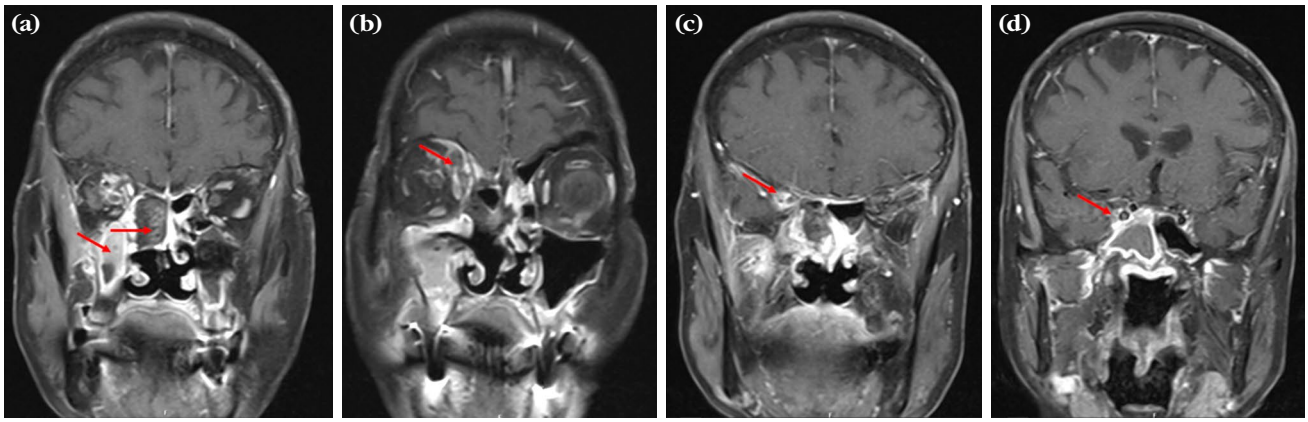

Figure 2. Coronal post-contrast T1 weighted images of the paranasal sinus, orbit, and cavernous sinus. Contrast-enhanced images demonstrate inflammation in the right maxillary and ethmoid sinuses **(a)** extending thorough the medial wall of the orbit, right medial rectus muscle **(b)**, orbital apex **(c)**, and cavernous sinus (red arrows) **(d)**.

(11.2%), normal urea (27 mg/dL), normal creatinine (0.4 mg/dL), elevated C-reactive protein (64.3 mg/L), and high white blood cells (10.99×10^3/uL).

Contrast-enhanced cranial and orbital MRI revealed signs of sinusitis in the right ethmoid sinus cells. Intense contrast enhancement consistent with obliteration and inflammation in the extraconal space was observed in the medial and upper walls of the adjacent orbit on orbital MRI (Figure 1). In the cranial MRI, heterogeneous contrast enhancement was noted in the orbital apex, and there was increased contrast enhancement in the right cavernous sinus compared to the left (Figure 2). The radiology department interpreted the findings as complicated fungal sinusitis. The otolaryngologist decided on nasal endoscopic surgery for the right paranasal sinus (sphenoethmoidectomy) and added amphotericin B (15 mg/kg/day) to the treatment regimen. The pathology report confirmed irregular branching in the fibrinopurulent exudative material, primarily consistent with mucormycosis, featuring thick septate hyphae stained with periodic acid-Schiff (Figure 3). Infectious diseases and clinical microbiology department and ophthalmology department continued to monitor the patient.

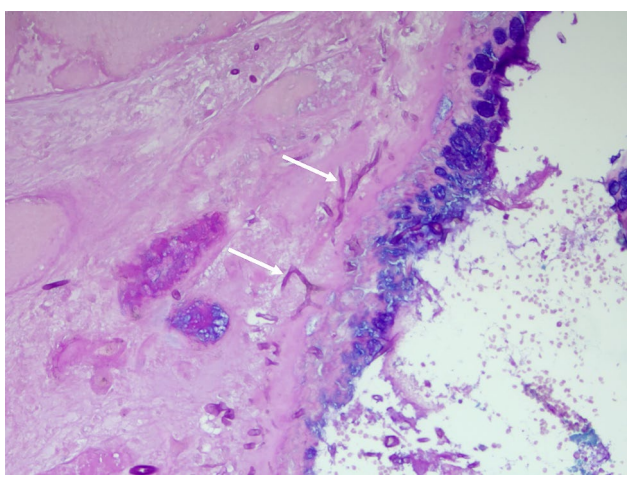

Figure 3. Histopathology of paranasal sinuses (PAS stain: magnification ×40): PAS showed irregularly branching, wide ribbon-like aseptate hyphae in tissues (white arrows).

The diagnosis of mucormycosis is challenging as it relies on culture methods or microscopy of clinical specimens.[1] Poorly controlled DM, malnutrition, iron deficiency, renal failure, hematologic malignancies, and coronavirus disease 2019 (COVID-19) pneumonia are defined as risk factors for cavernous sinus thrombosis due to sinusoidal mucormycosis.[2-4] Fungus spores can directly infiltrate the paranasal sinuses after ingestion, eventually reaching the meninges and brain. This infection can be lethal, underscoring the importance of early detection and effective management.

Here, we describe a patient with type 2 DM who developed sinusoidal mucormycosis leading to cavernous sinus thrombosis.[5]

Patient Consent for Publication: A written informed consent was obtained from the patient.

Data Sharing Statement: The data that support the findings of this study are available from the corresponding author upon reasonable request.

Author Contributions: Idea/concept, writing the article, critical review: Ş.Ç., B.Y.; Design: Ş.Ç., B.B.Ç., H.L., B.Y.; Control/supervision: H.L., B.Y.; Data collection and/or processing: Ş.Ç., B.B.Ç.; Analysis and/or interpretation: Ş.Ç., E.Ö.Ö., A.Ö., H.L., B.Y.; Literature review: Ş.Ç., E.Ö.Ö., A.Ö., B.Y.; References and fundings, references: Ş.Ç.; Materials: B.B.Ç.

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