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Case Report: Massive Fronto-Ethmoidal Mucocele with Destructive Orbital Extension - A Clinico-Radiological Diagnostic Pitfall

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Abstract **Case Report**

Mucoceles are benign pseudotumoral lesions of the paranasal sinuses caused by mucus retention within an obstructed sinus cavity. We report the case of a 70-year-old male presenting with progressive frontal facial deformity and left proptosis over 3 years. Combined CT and MRI demonstrated an expansive fronto-ethmoidal cystic lesion causing extensive osteolysis of the orbital roof and frontal bone. MRI defined the proteinaceous and viscous nature of the fluid content (heterogeneous T2 hypointensity) and excluded any enhancing solid tumor component.

Keywords: Mucocele, Frontal sinus, Osteolysis, Orbital extension, T2 hypointensity, Case Report.

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INTRODUCTION & DIAGNOSTIC CONTEXT

Paranasal sinus mucoceles most commonly arise within the frontal sinus and ethmoid complex. Although histologically benign, their potential for continuous expansion driven by trapped mucous secretions induces resorption and osteolytic destruction of adjacent bony boundaries through mechanical pressure and osteoclast activation. Orbital invasion clinically mimics an aggressive malignant neoplasm.

1. CLINICAL CASE PRESENTATION (OBSERVATION)

A 70-year-old male presented with a painless left frontal swelling and progressive facial asymmetry over 3 years. There was no history of prior sinonasal surgery or severe facial trauma.

- **Clinical Examination:** A non-tender, renitent mass fixed to deep planes was palpated over the left fronto-orbital region. The left globe was displaced inferiorly and laterally, producing grade I proptosis and upward gaze diplopia. Visual acuity and fundus examination were preserved.
- **Laboratory Findings:** Inflammatory markers were within normal limits (normal CRP and WBC count).

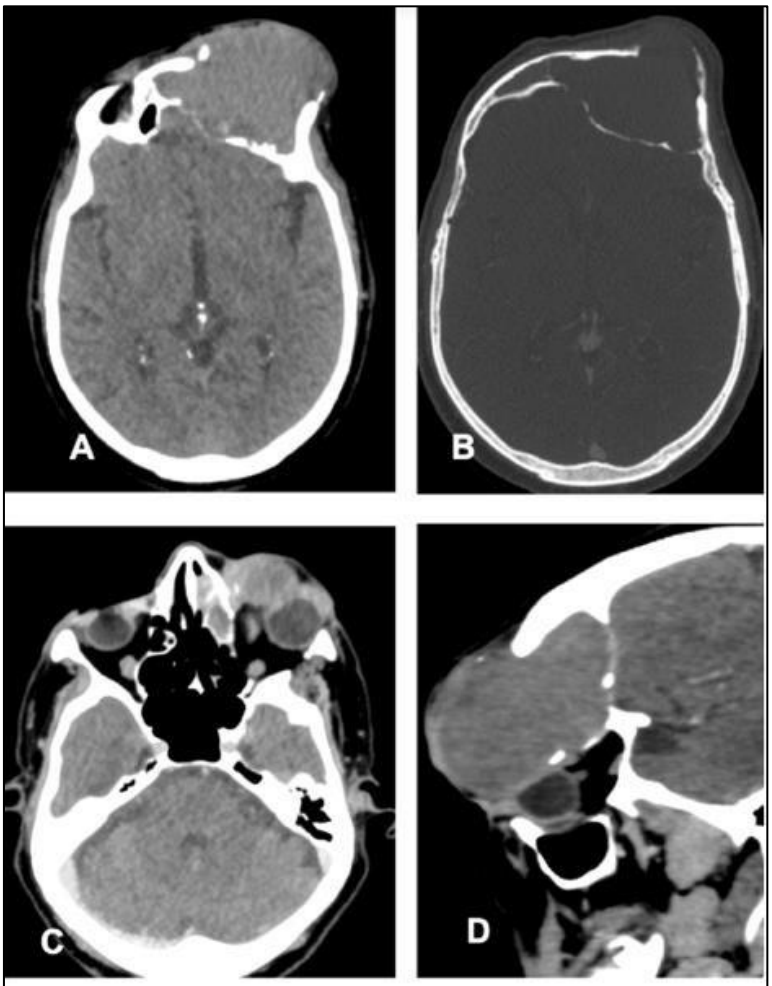
2. Semiological Characterization on CT & MRI

- **Computed Tomography (CT):** Large, expansive cystic mass centered on the left frontal sinus and anterior ethmoid. The lesion eroded the anterior and posterior tables of the frontal sinus and caused osteolysis of the left orbital roof (superior wall). The mass projected directly into the superior orbital cavity, displacing the globe inferiorly.
- **Magnetic Resonance Imaging (MRI):** The mass exhibited variable T1 signal intensity (iso- to slightly hyperintense depending on glycoprotein concentration). On T2-weighted sequences, a marked and heterogeneous hypointensity was identified, characteristic of chronic, highly concentrated, and dehydrated mucus. Following intravenous contrast administration, there was no solid internal enhancement, with only thin peripheral capsular enhancement observed.

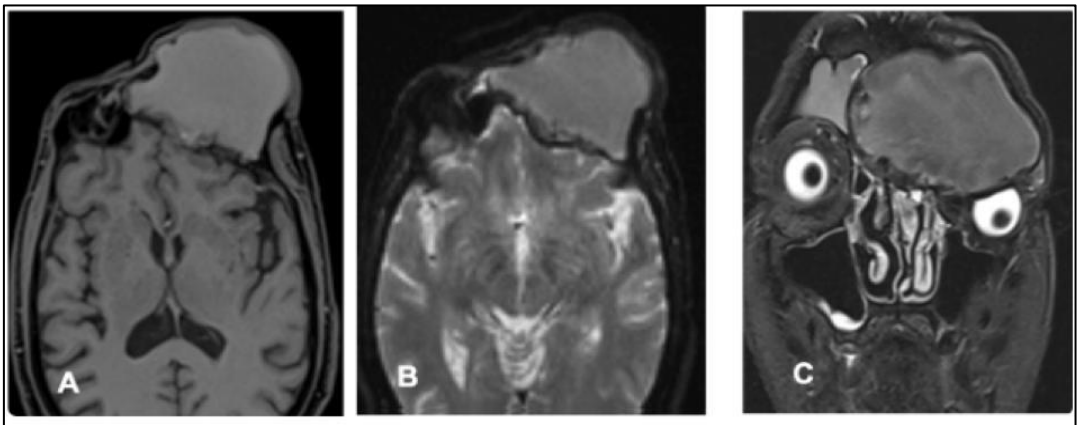
Differential Diagnosis

- **Mucopyocele / Subperiosteal Abscess:** Accompanied by acute systemic and local inflammation (fever, acute pain, cutaneous erythema) and thick peripheral contrast enhancement.
- **Sinonasal Squamous Cell Carcinoma:** Aggressive malignant tumor causing irregular bone destruction with a hypercellular solid mass exhibiting diffusion restriction and heterogeneous enhancement.

- **Sphenoid Wing Meningioma / Frontal Osteoma:** Solid bony or meningeal lesions lacking cystic or mucinous characteristics.



Scanner orbite sinusale en coupes axiales passant par les sinus frontaux en fenêtre parenchymateuse (A) et osseuse (B) et passant par les orbites en coupes axiales (C) et sagittale (D).



IRM orbitaire en coupes axiales en SP T1 (A) et T2 (B) et coronale T2 (C) Lésion fronto-éthmoïdale gauche, en signal intermédiaire T1, hyposignal hétérogène T2, non rehaussée.

Conclusion & Surgical Management

Fronto-ethmoidal mucocele with orbital roof destruction represents a major diagnostic pitfall. The combination of CT (evaluating bone destruction) and MRI (characterizing viscous mucinous contents without solid tissue) establishes a definitive diagnosis. Surgical treatment involved endoscopic endonasal marsupialization and restoration of sinus drainage, leading to complete resolution of proptosis.

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