

Isolated Fungal Ball of the Frontal Sinus - A Diagnostic Dilemma

Dr. Lakshmi K.¹, Dr Suchit Roy B. R.², Dr. Susan James³

¹Junior Resident, Department of ENT, Government Medical College, Thiruvananthapuram, Kerala, India

²Professor, Department of ENT, Government Medical College, Thiruvananthapuram, Kerala, India

³Assistant Professor, Department of ENT, Government Medical College, Thiruvananthapuram, Kerala, India

Abstract: Fungal balls, a form of non - invasive fungal sinusitis, pose a diagnostic challenge due to their rarity. This article presents a case of fungal ball of the frontal sinus seen in an immunocompetent individual. The case highlights the multifaceted presentation and differential diagnoses of this condition emphasizing the importance of awareness among clinicians. In such cases, management depends on the extent of disease and can range from simple endoscopic procedures to extensive resections and flap reconstructions.

Keywords: Fungal ball, Frontal sinus fungal ball, Isolated frontal sinus fungal ball, DRAF IIB approach, Radiological features of fungal ball, Non - invasive fungal sinusitis

1. Introduction

Isolated fungal ball of the frontal sinus is extremely rare with only 45 reported cases in English literature so far on PubMed. They pose a diagnostic dilemma as they may mimic mucocoeles, invasive fungal sinusitis or sinus malignancy, all of which require extensive resections. We, hereby present such a case and its management.

2. Case Report

A 60 - year - old gentleman with history of diabetes mellitus and systemic hypertension, presented with left sided headache of 3 year duration with one episode of loss of consciousness. On examination, there was gross deviation of nasal septum touching lateral wall without any tenderness over paranasal sinuses or focal neurological deficit. Examination of face and orbit, other ENT and systemic examinations were within normal limits. On evaluation, Contrast enhanced computed tomography of Brain and Paranasal sinuses showed soft tissue density in left frontal sinus with extension into anterior cranial fossa through a posterior table erosion. (Fig.1).

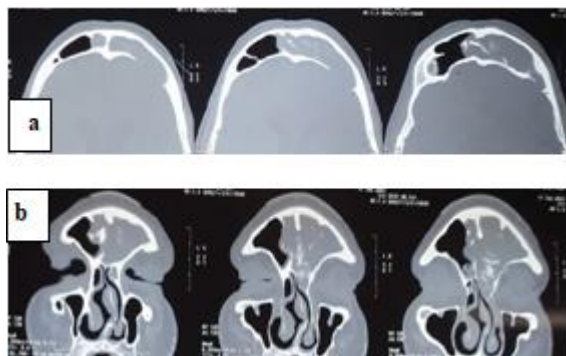


Figure 1: CECT Nose PNS (a) Axial (b) Coronal sections showing calcifications and bony sclerosis of sinus walls

EEG and Brain map analysis were within normal limits. MRI Brain suggested the possibility of invasive fungal sinusitis with dehiscence of posterior wall of left frontal

sinus and dural involvement without parenchymal extension. (Fig.2, 3).

At this point of time, differential diagnoses of invasive fungal sinusitis, mucocoele of frontal sinus and frontal sinus malignancy were made. After discussion with Neurosurgery Department, a combined approach with Endoscopic frontal sinusotomy and external approach was planned.

Intra-operatively, first endoscopic septoplasty was done, frontal recess identified beneath axilla of left middle turbinate and frontal ostium widened. But interestingly, the entire sinus was filled with fungal ball with thinning of the posterior table as evidenced by dural pulsations. (Fig. 4)



Figure 2: MRI Brain T1 weighted (a) without contrast (b) with contrast showing isointense density with few hyperintense areas of calcification

Volume 12 Issue 6, June 2023

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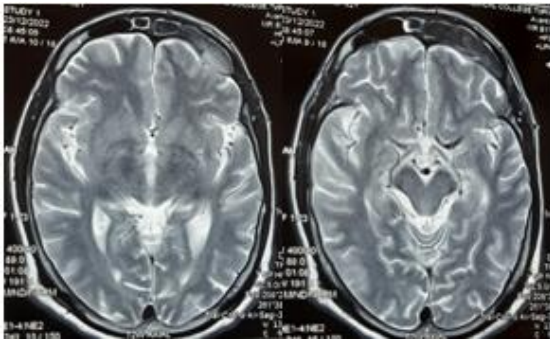


Figure 3: MRI Brain T2 weighted with contrast showing hypointense central area in frontal sinus surrounded by a hyperintense rim of inflamed mucosa.

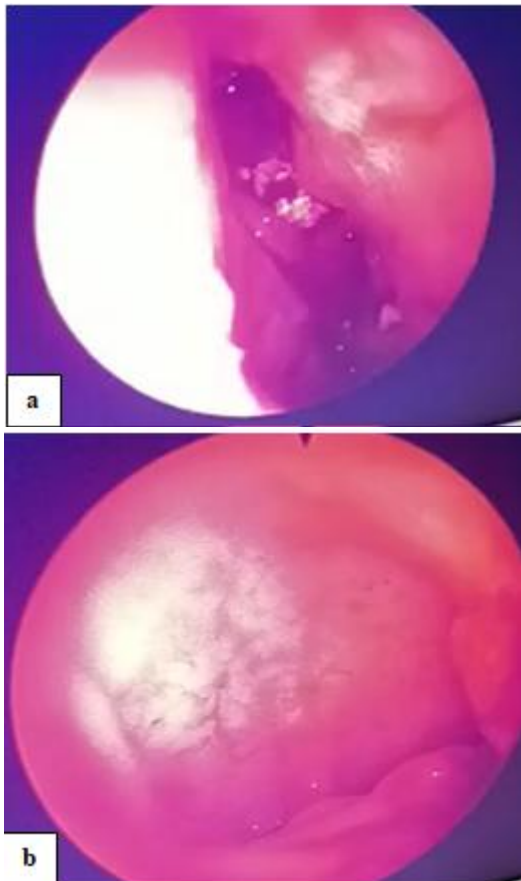


Figure 4: Intra - operative findings. (a) Frontal sinus filled with fungal ball. (b) Interior of frontal sinus after complete removal

Patient underwent Endoscopic frontal sinusotomy DRAF IIB approach. All debris were removed and sent for culture and sinus mucosa was sent for histopathology. No intracranial extension was noted intra - operatively. At the end of the procedure, a scalp vein cannula with needle tip removed and flanges trimmed, snugly fitting the ostium, was introduced for post - operative budesonide douching.

Three weeks after the surgery, during follow up, sinus ostium was patent with normal sinus mucosa. Hence the scalp vein cannula was removed and patient is asymptomatic till date. (Fig.5) Cultures were consistent with *Aspergillus flavus* and histopathology ruled out malignancy and invasive fungal sinusitis.



Figure 5.3: Week Post - op view of (a) Frontal sinus ostium with scalp vein set within, b) Interior of frontal sinus with normal sinus mucosa

3. Discussion

Fungal balls are extramucosal collection of fungal hyphae, usually within a single sinus, without allergic mucin, and with absence of fungal elements in the mucosa, submucosa, bone and blood vessels of the paranasal sinuses.^{13, 14} They are a form of non - invasive fungal sinusitis seen in immunocompetent non - atopic individuals.

Maxillary sinus is the most frequently affected followed by ethmoid and sphenoid sinuses and is marginally more common in females than in males during the fifth and sixth decade of life.⁴ Frontal sinus fungal ball, especially when involving the frontal sinus alone is a rare entity, with an incidence of 1.1% among fungal balls of paranasal sinuses.¹ They occur primarily due to obstruction of the sinonasal mucociliary clearance pathways. *Aspergillus fumigatus* and *Aspergillus flavus* are the most commonly isolated species.

The clinical presentation may vary depending on the sinuses involved, and radiological findings is also highly variable in literature. Since they are asymptomatic for long periods or lurking around with trivial non - specific symptoms, most patients would develop orbital or intracranial complications, if left untreated.⁴

Surgical debridement is the ideal treatment. It is achieved using Endoscopic DRAF Frontal sinusotomies or combined approaches with external Lynch - Howarth approach or osteoplastic frontal flap approaches. Maintenance of aeration and nasal douching can prevent recurrence.

4. Conclusion

Frontal sinus fungal ball, though rare, should be considered among the differential diagnoses of chronic headache in immunocompetent elderly males. Hypointense lesions with a surrounding hyperintense rim of paranasal sinus mucosa in T2W MRI along with hypointense or isointense T1W images with calcifications as hyperintensities in between can be pathognomonic of fungal balls.²⁻⁶ Endoscopic DRAF IIB or III frontal sinusotomy is an effective choice of treatment in most cases, replacing more conventional extensive external approaches. Post-operative care using cannulas can ensure frontal sinus ostium patency, improve mucosal healing and provide an efficient route for local drug delivery.

Declarations

Consent for publication

Obtained

Availability of data and materials

Data sharing not applicable to this article.

Competing interests

The authors declare that they have no competing interests.

Funding

Nil.

Authors' contributions

All authors read and approved the final manuscript.

Acknowledgements

I acknowledge all faculty of ENT Department for their guidance.

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