

# Frontal Sinus Osteoma Presenting with Pneumocephalus Causing Progressive Hemiparesis and Seizures: A Rare Presentation

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## A B S T R A C T

**Introduction:** Osteomas of paranasal sinuses are a common benign osseous tumor usually observed as incidental findings in imaging studies which include the para nasal sinuses. Most of the paranasal sinus osteoma are asymptomatic. However, sometimes paranasal sinus osteomas may be complicated by mucocele, cerebrospinal fluid (CSF) fistula, meningitis, and pneumocephalus. The presentation may vary from headache to ptosis and diplopia. However, osteomas complicated by pneumocephalus and presenting with progressive hemiparesis and seizures is rare.

**Case report:** We discuss a case of a 31-year-old male presenting with left-sided progressive hemiparesis with seizures for 3 months. On imaging with non-contrast CT scan of head, pneumocephalus secondary to frontal sinus osteoma was identified. Patient underwent surgery for excision of osteoma and dural flap repair and showed improvement following surgery.

**Conclusion:** Paranasal sinus osteoma, a seemingly benign pathology may cause erosion of inner sinus wall and lead to complications like CSF fistula, pneumocephalus and meningitis. A dural flap and ball valve like mechanism may result in enlarging pneumocephalus which causes mass effect on the neuroparenchyma resulting in symptoms like hemiparesis and seizures.

**Keywords:** Paranasal Sinus, Osteoma, Pneumocephalus, Hemiparesis, Seizures, CT Scan

## INTRODUCTION

Osteomas are slow growing, benign osteogenic tumors composed of mature bone, usually involving the skull mandible or paranasal sinuses, but may involve long bones as well<sup>1</sup>. Usually single but may also be multiple in Gardner syndrome. Paranasal sinus osteomas are mostly incidentally discovered in approximately 3% of the CT scan of paranasal sinuses and 80% of these are seen in the frontal sinuses<sup>2</sup>. They are usually detected in 20-50 years age group with a male predilection<sup>3</sup>. Usually, the paranasal sinus osteomas are asymptomatic but may become symptomatic either by direct mass effect or obstruction of the nasal sinus drainage in which case it least to formation of a mucocele. Paranasal sinus osteoma especially of the frontal sinuses may encroach upon the brain with erosion of the overlying sinus bone, dura resulting into cerebrospinal fluid leak, pneumocephalus or intracranial infection<sup>4,5,6</sup>. The most common causes of pneumocephalus are mechanical trauma and surgical intervention<sup>5</sup>.

## CASE REPORT

A 31 year male patient presented with progressive left sided hemiparesis for 3 months and also has a persistent headache

for 2 years. No history of head injury or prior surgery. Facial deviation noted towards right side. Patient was taken for non-contrast CT scan.

Plain CT scan (Figures 1 and 2) revealed a large extra-axial pocket of air in the right frontal region with indentation of the right lobe. No shift of midline structures noted.

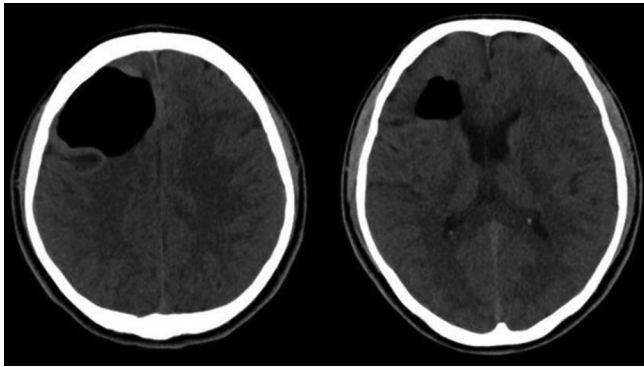
Plain CT scan at the level of frontal sinuses [Figures 3 and 4] revealed well-defined lobulated, homogeneous bone density mass lesion with no discernible medullary cavity within the right frontal sinus. There were erosions noted in the posterior wall of the frontal sinus with intracranial extradural extension of the lesion in the right frontal region.

A diagnosis of frontal sinus osteoma with erosion of posterior wall of sinus causing pneumocephalus and mass effect over right frontal lobe was arrived.

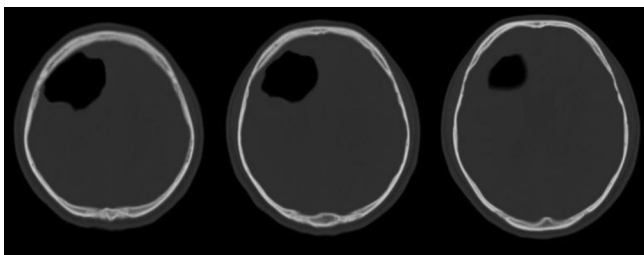
The treatment is mainly surgical with resection of the osteoma and closing of the sinus bony defect.

Treatment of other complications like meningitis, and hemiparesis is recommended depending upon the follow up conditions.

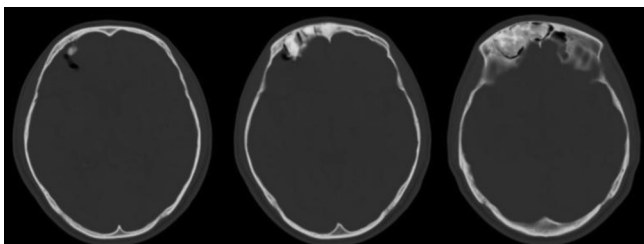
Differentials for ossific density lesion in the region of frontal sinus include osteomas, fibrous dysplasia, calcified meningioma, and Paget's disease. Differential of extra-axial intracranial lucent lesion include pneumocephalus,



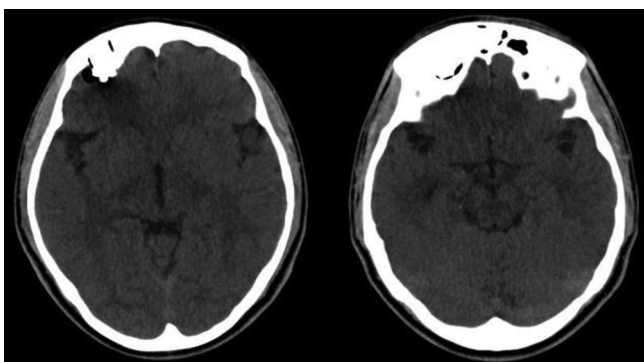
**Figure-1:** Axial non contrast CT scan of the head in brain parenchyma window settings. The scan shows large pneumocephalus noted in the right frontal region with displacement of the right frontal cortex. No midline shift. No parenchymal edema.



**Figure-2:** Axial non contrast CT scan of the head in bone window settings. The scan reveals pneumocephalus in the right frontal region. Overlying cranium appears intact.



**Figure-3:** Axial non contrast CT scan of the head in bone window settings. The scan reveals ossific density lesion noted in the right frontal sinus causing expansion of the sinus and erosion of the posterior wall of right frontal sinus. Adjacent pneumocephalus is noted.



**Figure-4:** Axial non contrast CT scan of the head in brain window settings. The scan reveals ossific density lesion noted in the right frontal sinus causing expansion of the sinus and erosion of the posterior wall of right frontal sinus. Adjacent pneumocephalus is noted. No parenchymal edema.

fat containing lesions like lipoma and dermoid – these however can be distinguished based on attenuation value and comparison with extracranial air. Other causes of pneumocephalus include posttraumatic and post-surgical sino-cranial fistula.

## DISCUSSION

Osteomas are benign, and slow-growing bony tumors occurring mainly in the paranasal sinuses and majority occurs in frontal sinuses. They tend to be incidentally detected asymptomatic findings, however, sometimes may present with complications such as headache, cerebrospinal fluid fistula, meningitis, ptosis, diplopia, and pneumocephalus<sup>5,6</sup>. Pneumocephalus is a rare complication of frontal sinus osteomas. Pneumocephalus is commonly encountered after trauma with skull bone fracture and neurosurgical procedure<sup>7</sup>. This patient had an initial presentation of progressive hemiparesis secondary to intracranial pneumocephalus due to erosion by the frontal sinus osteoma. The pneumocephalus develops due to a defect in the inner wall of frontal sinus and the dura causing one way air flow inside and air getting trapped, like a "one-way ball valve mechanism" and may have remained unnoticed for a long period of time, Treatment involves surgical resection of the osteoma and closing of the sinus bony defect and management of other complications like meningitis, and hemiparesis is recommended depending upon the follow up conditions. Post treatment complications may include CSF rhinorrhea and meningitis.

## CONCLUSION

Pneumocephalus is a common intracranial abnormality but is mostly secondary to trauma and neurosurgical procedures. Pneumocephalus is a rare but known complication of paranasal sinus osteoma especially the frontal and ethmoid sinuses. Although the osteomas themselves are benign and slow growing the complications may cause significant morbidity and can progress at faster pace. Paranasal sinus osteoma therefore should be followed up and correlated with any existing symptoms esp. sinus wall erosion and other intracranial complications. Surgical resection is usually curative.

## REFERENCES

1. Nielsen GP, Rosenberg AE. Update on bone forming tumors of the head and neck. *Head Neck Pathol.* 2007;1(1):87-93.
2. Cheng, K., Wang, S., & Lin, L. Giant osteomas of the ethmoid and frontal sinuses: Clinical characteristics and review of the literature. *Oncology Letters* 2013;5(1): 1724-1730.
3. Maroldi R, Nicolai P, Antonelli AR. Imaging in treatment planning for sinonasal diseases. Springer Verlag. (2005) ISBN:3540423834
4. Vishwakarma R, Joseph ST, Patel KB, Sharma A. Giant frontal osteoma: Case report with review of literature. *Indian J Otolaryngol Head Neck Surg* 2011;63(Suppl 1):122-6.
5. Attane F, Tannier C, Vayr R. Pneumocephalus complicating osteoma of the frontal sinus. *Rev Neurol*

(Paris) 1996; 152(3):279-82.

6. Onal B, Kaymaz M, Araç M, Dođulu F. Frontal sinus osteoma associated with pneumocephalus. *Diagn Interv Radiol* 2006; 12(5):174-6.
7. Babl FE, Arnett AM, Barnett E, Brancato JC, Kharasch SJ, Janecka IP. Atraumatic pneumocephalus: A case report and review of the literature. *Pediatr Emerg Care* 1999; 15(3):106-9.

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