

# Overview Of A Case Of Spontaneous Non-Traumatic Pneumocephalus Extending To Ventricles

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## Abstract

Spontaneously occurred Pneumocephalus is rarely found. Extension of the air bubbles into the ventricles is far more rare. For cases, complaining of abrupt attack of intense headache, a rare condition of extra dural, subdural and subarachnoid, intracerebral, and intra ventricular pneumocephalus with defect in the sinus wall could be considered as a possible etiology. Here we present a patient with dilated frontal sinus reported with spontaneous pneumocephalus extending to ventricles and extra cerebro spinal fluid (CSF) spaces with an overview of this rare condition.

PSD- Pneumosinus dilatans

CSF -Cerebro Spinal Fluid

## INTRODUCTION

Definition of pneumocephalus is presence of air intracranially. Spontaneous and atraumatic pneumocephalus is not a common aetiology (0.6%)<sup>2,3</sup>. Pneumosinus dilatans (PSD)<sup>1,2</sup> is a condition of abnormally hypertrophied paranasal air sinus without any radiological findings of destruction local bone cortex or thickening mucous membrane. Other common causes of pneumocephalus are barotraumas, valsalva maneuvers,<sup>3,4</sup>.

A case report of spontaneous pneumocephalus extending to ventricles and extra cerebral CSF spaces along with PSD is described here.

## REPORT OF CASE

An Indian housewife, 46 years old, was brought to in KPC Medical College and Hospital, Kolkata, India, with syncope and excruciating headache. Following a severe bout of cough due to common cold and pharyngitis, the lady developed abrupt intense headache. There was no history of recent trauma or any cranial surgical intervention.

Thorough physical examination by physicians of internal medicine and neurology and consultants could not find any abnormality except that she had fever of 38.8 Celsius (102 degrees Fahrenheit)

To rule out intracranial pathology CT scan was done. It showed multiple small air bubbles (Densities -1000 and above HU) in sylvian fissures subdural and extra axial CSF spaces, perisellar & peri ganglionic regions and within the ventricles.(Figures 1,2,3).

## Figure 1

Air bubbles are seen in the frontal subdural, sylvian fissures and right lateral ventricle.



**Figure 2**

Air bubbles are noted within the subdural and sub arachnoid spaces, ventricles and cerebral cortex.



**Figure 3**

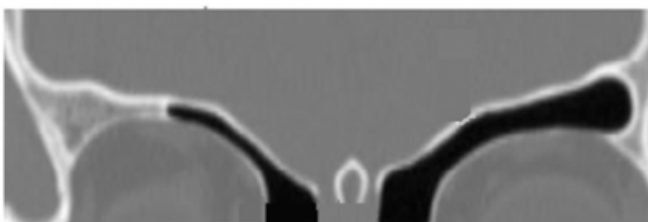
Air bubbles are noted within the frontal subdural, sub arachnoid spaces, sulci of cerebral cortex and ventricles.



Frontal sinus was markedly prominent (Figure 4).

**Figure 4**

Frontal sinuses



As she had fever, CSF was examined by performing a

lumbar puncture procedure. All the parameters of the CSF analysis came out as within physiological limits.

After admitting in HDU (high dependency unit), she was kept in total bed rest. Oral analgesic and oxygen (1.5 L/min) were administered. For pharyngitis, first line antibiotic and to avoid further bouts of cough anti tussives were given. She was advised to avoid valsalva maneuvers. Results of all pathological examination, on admission, were within normal limits

Spiral HRCT scan with multi axial reformation in bone-window setting revealed the probable point of air leakage in the frontal sinus. No other pathologic condition like sinusitis or neoplastic lesion could be detected.

On 14th days after the onset of the pneumocephalus, she was released from the hospital.

### OVERVIEW

Definition of pneumocephalus is presence of air bubbles within the cranium. In absence of any underlying pathology like trauma, surgical intervention, tumor, infection or inflammation, the term “spontaneous” was coined 5. For the development of pneumocephalus any of these basic conditions has to be satisfied6,. There has to be a source of extra cranial positive pressure or a negative intracranial pressure differences producing the condition7.

In cases of Ventriculo Peritoneal(VP) shunt placement there is a possibility of dural leak leading to reduced intracranial pressure resulting CSF leak and allowing entry to air 8.

Air bubbles can gain entry through the paranasal sinuses to the subperiosteal spaces due to a gap in the bony wall. As it accumulates there, any trivial trauma, cough or even minimal valsalva maneuver, will result in pneumocephalus 7,8. This can occur even long time after bone micro fractures, sinus walls defect or dura mater lacerations. Patients of Pneumocephalus usually present with intense headache with or without other probable sign and complaints of CSF rhinorrhoea, papilloedema, cranial nerve involvement or paralysis like hemiplegia, paresis, , and signs of meningeal involvement or irritation 9.

Diagnosis is usually uncertain due to absence of any specific mode of presentation of this entity.

In spite of vivid search we could not identify the exact cause of this particular case. But due to the presence of preexisting

PSD, break of the sinus wall appear to be the etiology<sup>1</sup>.

As the lady had pneumosinus dilatans, the ball valve mechanism was taken as causative factor that had given rise to the condition after violent bouts of coughing from pharyngitis<sup>10</sup>. No hypercellularity of the mastoid air cells are present which is a potential cause of the spontaneous pneumocephalus<sup>11</sup> as well. We followed line of watchful conservative management, especially because there was no sign of systemic infection.

In literatures, few cases of non-traumatic spontaneous pneumocephalus have been reported<sup>9,10,11</sup>. But pneumocephalus extending to ventricles and extra axial CSF spaces are very rare<sup>2</sup>. This case attracts the gravity of consideration of this particular diagnosis in a case with abrupt attack of unexplained headache without any neuro deficit.

We decided to follow conservative treatment with watchful policy through serial imaging. Surgery could be kept in consideration mainly to deal with recurrent or infected cases and to relieve intracranial pressure. In these cases fistulotomy may have to be done, <sup>13</sup>14.

However, a wider clinico-pathological survey for arriving in to correct diagnosis is required. More over treatment protocol to be chosen as per the need.

### SUMMARY

A patient with abrupt onset of intense headache & syncope, in absence of obvious neuro deficit, may develop spontaneous pneumocephalus. Review of the literatures suggests a CT scan of brain can reveal disseminated

intracranial, subarachnoid and intra ventricular pneumocephalus along with large frontal sinus with or without any bony defect.

### References

1. Lee JS, Park YS, Kwon JT, Suk JS, Spontaneous Pneumocephalus Associated with Pneumosinus Dilatans, *J Korean Neurosurg Soc.* 2010 May;47(5):395–398.
2. Wakefield BT, Brophy BP. Spontaneous pneumocephalus. *J Clin Neurosci.* 1999;6:174–175.
3. Hermans PE, Bracke PG, Demeyer IV. Pneumocephalus due to barotrauma : CT demonstration. *AJR Am J Roentgenol.* 1992;159:1351–1352
4. Schrijver HM, Berendse HW, Pneumocephalus by Valsalva's maneuver. *Neurology.* 2003 Jan 28;60(2):345-6
5. 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(2):106-9
6. Ninghui Zhao, Doris D. Wang, Xiaobin Huang, Surya K. Karri, Haiying Wu, Mingxiu Zheng, Spontaneous otogenic pneumocephalus presenting with occipital subcutaneous emphysema as primary symptom.: *Journal of Neurosurgery,* October 2011, Volume 115, Issue 4 Pages 669–873
7. Nash R, Wilson M, Adams M, Kitchen N, Spontaneous pneumocephalus presenting with alien limb phenomena, *J Laryngol Otol.* 2012 Jul;126(7):733-6
8. Hanish Banshal, Rakesh Kaushal, Manish Munjal, Pneumocephalus after ventriculo peritoneal shunt: Diagnostic dilemma and its Endoscopic Management, *Indian journal of Clinical Practice,* March 2014; 24(10):962-3
9. Khaled M. Krisht, Ilyas M. Eli, Cheryl Ann Palmer, Richard H. Schmidt, Giant Spontaneous Epidural Pneumatocele: Case Report and Review of the Literature, *World Neurosurgery.* 2015; 84, 2075.e7-2075.e12
10. Richards SD1, Saeed SR, Laitt R, Ramsden RT, Hypercellularity of the mastoid as a cause of spontaneous pneumocephalus, *J Laryngol Otol.* 2004 Jun;118(6):474-6.
11. Spontaneous Otogenic Pneumocephalus Roberto A. Villa, M.D., and Abelardo Capdevila, M.D. *N Engl J Med* 2008; 358:e13 March 20, 2008 DOI: 10.1056/NEJMicm063225

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