Case Report

DOI: 10.7860/IJARS/2021/43321:2604

Radiology Section

Post-Traumatic Tension Pneumocephalus in a Nigerian Male: A Case Report

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ABSTRACT

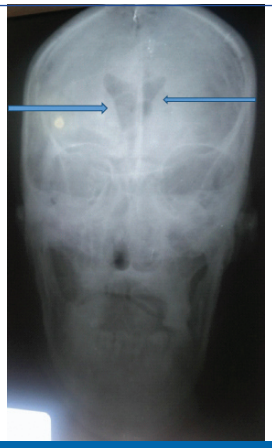
Pneumocephalus is a rare condition that usually arises from severe head and facial trauma, tumours of the skull base and surgical procedures involving the base of the skull. Tension Pneumocephalus (TP) is a clinical condition and a neurological emergency characterised by continuous accumulation of air inside the cranial cavity leading to irregular pressure being exerted on the brain which leads to neurologic deterioration. This is a case of a young motorcyclist who was involved in a Road Traffic Accident (RTA) and presented with deteriorating level of consciousness and plain skull radiograph and Computed Tomography (CT) of the brain showed skull fractures, presence of air in both lateral ventricles and brain parenchyma confirmed the diagnosis of post-traumatic TP, but unfortunately patient was succumbed to death.

Keywords: Aeroceles, Cranial, Consciousness, Lateral ventricles

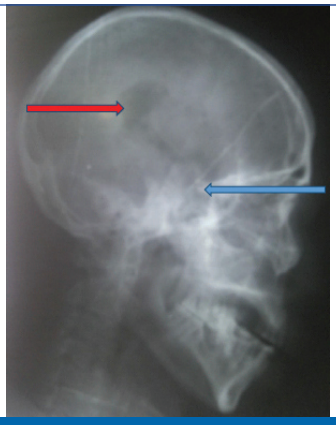
CASE REPORT

A 38-year-old male motorcycle rider who presented with chief complaint of altered consciousness, incoherent speeches, excess cough and sneezing, bleeding from nose and head bruises following a RTA. Patient's relatives reported that he was riding a motorcycle and was hit by a fast moving vehicle. The patient was taken to the peripheral centre by ambulance. He was reported to have bleeding through the nose with associated Cerebrospinal Fluid (CSF) rhinorrhea instantly. The patient had injuries on the right frontal and parietal skull vault. No loss of consciousness was noticed at the time of the accident. The patient was observed to have deterioration in his behavioural attitude with incoherent speeches, drowsiness and inability to do most of his routine necessities without the support of his relatives on the fourth day of the incident.

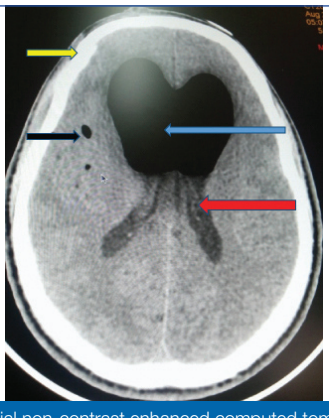
The patient was referred from a peripheral centre for a plain skull radiograph and a CT scan of the brain. On examination, patient was average built and not oriented to time, place and person. He had a low Glasgow scale of less than 6. The patient had injuries; bruises and swellings in the frontal and parietal regions of the skull. The pulse rate was 80 beats/min, the blood pressure was 120/80 mmHg with normal heart sounds; S1 and S2. The plain radiographs of the skull done in the antero-posterior view [Table/Fig-1] with the lateral view [Table/Fig-2] showed lucencies outlining the lateral ventricles, these lucencies were observed to arise from the sphenoid paranasal air sinus on the lateral view [Table/Fig-2]. Marginal irregularities were also noted in the frontal region on the anterior-posterior view. The CT of the brain [Table/Fig-3] showed fractures of the right frontal and parietal skull vaults, air density area (HU=-987) in the lateral ventricles bilaterally forming an air-CSF level conforming to air in the ventricles and pockets of air noted in the brain parenchyma on the right cerebral hemisphere; aeroceles. No intracranial haematoma or shift of the midline or downward shift of the brain was demonstrated.



[Table/Fig-1]: An anterior-posterior view of a skull radiograph showing radiolucency outlining the anterior horns of both lateral ventricles (blue arrows).



[Table/Fig-2]: A lateral view of a skull radiograph showing radiolucency tracking along the ventricle (red arrow) and seem to arise from the base of the skull from the region of the sphenoidal paranasal air sinus (blue arrow).



[Table/Fig-3]: An axial non-contrast enhanced computed tomogram at the level of the lateral ventricles showing marked negative density (HU=-987) area forming a layer with the CSF (red arrow) of both ventricles conforming to air(left blue arrow) within both anterior horns of the two lateral ventricles. Fracture of the right frontal and parietal skull vault (yellow arrow) and pockets of air (black arrow) in the right cerebral hemisphere are also demonstrated.

Hence, radiological diagnosis of pneumocephalus was made but patient succumbed to death on same evening.

DISCUSSION

The presence of air in the cranial cavity is referred to as pneumocephalus. Pneumocephalus is termed as tension with a build up of air in the cranial cavity and subsequent development of neurologic deteterioration [1-3]. The index case had accumulation of air in the cranial cavity and in the brain parenchyma and ventricles with development of neurologic deterioration conforming to these literatures. Pneumocephalus is a rare condition that usually arise from severe head or facial trauma, tumours of the skull base and surgical procedures involving the base of the skull [4-8].

TP is a neurological emergency and as such its early detection is crucial, it is a clinical condition characterised by continuous accumulation of air within the cranial cavity leading to abnormal pressure been exerted on the brain leading to neurologic deterioration [1-3]. The patient had worsening of his symptom at the fourth day of the incident with subsequent deterioration of his conscious level with associated behavioural changes in agreement to these literatures. TP is believed to occur with as little as accumulation of about 65 mL of air, however some authors believe that the volume of air is independent to the occurrence of TP [1,9,10]. The patient had estimated value of about 83 mL of air in both lateral ventricles with features of deterioration of neurologic status and behavioural changes which is in agreement to these literatures. Most cases of pneumocephalus presented with features of skull base fractures like bleeding from orifices and CSF rhinorrhea [1-11]; the index case also had these symptoms at the time of the accident.

The ball-valve effect; air passing through dural tear by elevated upper airway pressure that occurs during coughing or sneezing and the inverted pop bottle effect; when CSF leaves the intracranial space through the dural leak and the resultant negative pressure causes air to rush in a similar way an inverted pop bottle. These are the main mechanism behind development of pneumocephalus [12-14]. These mechanism of development of pneumocephalus may also be responsible for accumulation of air in the intracranial cavity in this index case.

Plain skull radiographs and CT of the brain are vital in making the diagnosis of pneumocephalus [1-11], the presence of "Mount Fuji" sign on CT; the downward compression of both frontal lobes of the brain by air is considered a critical finding, following which prompt patient evaluation and appropriate institution of management is required [1,10,13]. Plain radiographs of the skull with CT of the brain was used in establishing the diagnosis in the index case, however the classical Mount Fuji sign on CT was not established in this case. The mainstay of treatment is surgical intervention and if done promptly may save the patient's life [1-15]; unfortunately the diagnosis rather came late in the case and he passed away before having any intervention instituted.

CONCLUSION(S)

TP is often associated with head trauma mostly from RTA, prompt examination of cases of head trauma with basic radiographic techniques like plain skull radiographs to rule out pneumocephalus should be encouraged in order to salvage the lives of these victims.

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PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Nov 28, 2019
- Manual Googling: Feb 27, 2020
- iThenticate Software: Dec 23, 2020 (11%)

ETYMOLOGY: Author Origin

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Nov 28, 2019**
Date of Peer Review: **Feb 07, 2020**
Date of Acceptance: **Feb 27, 2020**
Date of Publishing: **Jan 01, 2021**