



Image Report

Pneumocephalus after subcutaneous emphysema

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ABSTRACT

Background: Pneumocephalus is the presence of air in the intracranial cavity secondary to communication with the extracranial compartment. It occurs spontaneously, after trauma, or after a cranial surgery.

Case Description: A 62-year-old female, a known case of diabetes mellitus, presented to our emergency department with a sudden thunderclap headache. She was diagnosed with subarachnoid hemorrhage secondary to ruptured anterior communicating artery aneurysm. Twenty days later, she developed pneumonia and subsequently had a cardiac arrest. She was revived after 26 min of cardiopulmonary resuscitation. She developed pneumothorax requiring a chest tube insertion. After the first trial, she developed a diffuse subcutaneous emphysema, and the chest tube was reinserted. Afterward, she became unresponsive with dilated pupils. A computed tomography (CT) scan of the brain showed a diffuse subcutaneous emphysema reaching up to the face with air around the ventriculoperitoneal shunt distal catheter and extending through the burr hole to the ventricles causing pneumocephalus. There was no evidence of skull base fractures on brain CT. Unfortunately, the patient did not recover and passed away 3 days later.

Conclusion: This report describes the presentation and radiological findings of an interesting case of pneumocephalus following iatrogenic diffuse subcutaneous emphysema. It aims to increase the emphasis on early anticipation of such rare complication after subcutaneous emphysema.

Keywords: Emphysema, Iatrogenic, Pneumocephalus, Trauma

CLINICAL IMAGE

A 62-year-old female, known case of diabetes mellitus, presented to our emergency department with a sudden thunderclap headache accompanied by decreased level of consciousness. She was diagnosed with subarachnoid hemorrhage secondary to ruptured anterior communicating artery aneurysm; therefore, she underwent coiling of the aneurysm and insertion of ventriculoperitoneal (VP) shunt to treat the hydrocephalus. Her level of consciousness improved and she was started on physical therapy.

Twenty days after the surgery, she developed pneumonia that was complicated by a cardiac arrest. She was revived after 26 min of cardiopulmonary resuscitation. She developed pneumothorax requiring a chest tube insertion. After the first trial, she developed a diffuse subcutaneous emphysema, and the chest tube was reinserted. Afterward, she became unresponsive with dilated pupils.

A computed tomography (CT) scan of the brain was done which showed diffuse subcutaneous emphysema reaching up to the face with air around the VP shunt distal catheter [Figure 1a arrows]

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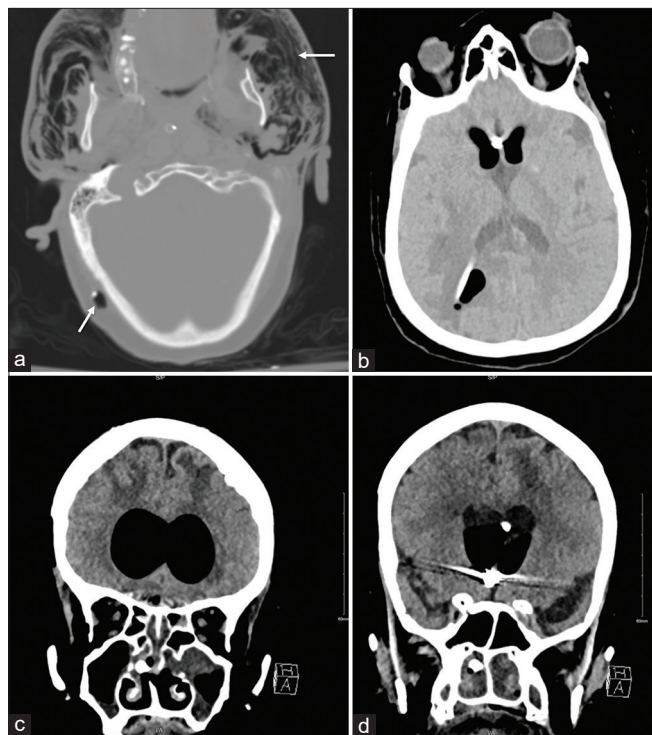


Figure 1: Axial CT scan of the brain showing diffuse subcutaneous emphysema (a) reaching the face with air around the VP shunt distal catheter [arrows], (b) extending through the burr hole to the ventricles causing pneumocephalus, and (c and d) coronal CT scan of the brain showing intact skull base with no evidence of fractures.

extending through the burr hole to the ventricles causing pneumocephalus [Figure 1b]. There was no evidence of skull base fractures on brain CT [Figures 1c and d]. Unfortunately, the patient did not recover and passed away 3 days later.

Pneumocephalus is the presence of air in the intracranial cavity secondary to communication with the extracranial compartment. It occurs spontaneously, after trauma, or after a cranial surgery.^[2] It can be classified as simple or tension, acute (<72 h) or delayed (\geq 72 h), and early (<7 days) or late (\geq 7 days).^[2-4] It is mostly present in the subdural space, but can be located in the subarachnoid, epidural, intraventricular, or intracerebral space.^[1]

There are two theories that can explain the pathophysiology of pneumocephalus. Ball valve theory states that air moves in one direction from outside to inside through cerebrospinal

fluid (CSF) leakage.^[1] Inverted-soda-bottle effect states that air accumulates when CSF is lost excessively secondary to a fistula or external drainage. This leads to a decrease in the intracranial pressure which permits air entry.^[1]

CONCLUSION

Upon review of the literature, pneumocephalus is an extremely rare complication after iatrogenic subcutaneous emphysema and remains insufficiently reported. We are reporting the presentation and radiological findings of an interesting case of pneumocephalus following iatrogenic diffuse subcutaneous emphysema. This report aims to increase the emphasis on early anticipation of such rare complication after subcutaneous emphysema.

Declaration of patient consent

Patient's consent not required as patient's identity is not disclosed or compromised.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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