Case 13764

Eurorad

Post-traumatic tension pneumocephalus: CT findings

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Section: Neuroradiology
Area of Interest: Neuroradiology brain
Procedure: Diagnostic procedure
Imaging Technique: CT
Special Focus: Trauma Case Type: Clinical Cases
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Patient: 72 years, male

Clinical History:

A 72-year-old patient was admitted to our hospital in a coma situation with a Glasgow Coma Scale (GCS) of 5 and cephalematoma. His relatives reported the possibility of a fall inside his home 5-6 hours earlier after alcohol consumption. An emergency Computed Tomography examination was requested by the clinician.

Imaging Findings:

At CT scout, an intensely hypoattenuating area in the anterior portion of the cranial vault and adjacent fracture were depicted.
Non-enhanced CT of the brain revealed multiple cranial vault fractures, extensive pneumocephalus, especially in the subdural spaces, but also in subarachnoid spaces and inside the brain parenchyma, as well as subarachnoid haemorrhages and brain oedema. There were no fractures involving the paranasal sinuses walls.
The bilateral frontal subdural pneumocephalus, which measured up to 24.5 mm in depth, caused compression of the frontal lobes as well as widening of the interhemispheric space between the tips of the frontal lobes with separation of these. The imaging had the appearance of the silhouette of Mount Fuji, hence the "Mount Fuji sign".
Despite the emergency transfer to the neurosurgery department for decompression, the patient succumbed during the burr hole procedure because of cardiac arrest.

Discussion:

Pneumocephalus, the presence of air within the cranial cavity, is most commonly caused by head trauma with skull fractures or paranasal sinuses fractures, post-surgical procedures of the head, tumours or infections.
The "Mount Fuji sign" on CT scans of the brain is useful in discriminating tension from non-tension pneumocephalus. Tension pneumocephalus can be a neurosurgical emergency, unlike non-tension pneumocephalus [1].
Free intracranial air implies communication with the atmosphere or paranasal sinuses, although pneumocephalus can be secondary to infection from gas-forming organisms. Tension pneumocephalus occurs when air enters in the subdural spaces in sufficient volume to exert an extraaxial mass effect on the brain, leading to compression of the frontal lobes and brain oedema [2, 3].
Clinical presentation of tension pneumocephalus may include headache, altered level of consciousness, generalized seizures, confusion, pupillary changes, and frontal lobe syndrome [4].
Plain X-rays can be used as the initial imaging examination for post-traumatic pneumocephalus diagnosis.
Computed tomography (CT) is the examination of choice for the diagnosis of tension pneumocephalus. Bilateral subdural hypoattenuating collections of air (approximately 1000 HU), causing compression and separation of frontal

lobes and widened interhemispheric fissure between the tips of the frontal lobes were described as the"Mount Fuji sign". This CT finding is pathognomonic sign of tension pneumocephalus [1, 5, 6].
In our case, except from the extensive subdural air, there was subarachnoid and intracerebral air, due to extremely high pressure of air in the subdural spaces.
The treatment for tension pneumocephalus is surgical and includes urgent decompression usually via burr hole, repair of the skull defect and closure of the dural fistula [3].
CT examination plays a definite role in developing a treatment plan, with discrimination between tension and non-tension pneumocephalus.
Differential Diagnosis List: Post-traumatic tension pneumocephalus, Iatrogenic tension pneumocephalus, Post-infection pneumocephalus (by gas-producing microorganisms)

Final Diagnosis: Post-traumatic tension pneumocephalus

References:

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Schirmer CM, Heilman CB, Bhardwaj A (2010) Pneumocephalus: Case illustrations and review. Neurocrit Care 13:152-8 (PMID: 20405340)
Thapa A, Agrawal D (2009) Mount Fuji Sign in tension pneumocephalus. Indian J Neurotrauma 6:161-2

Figure 1

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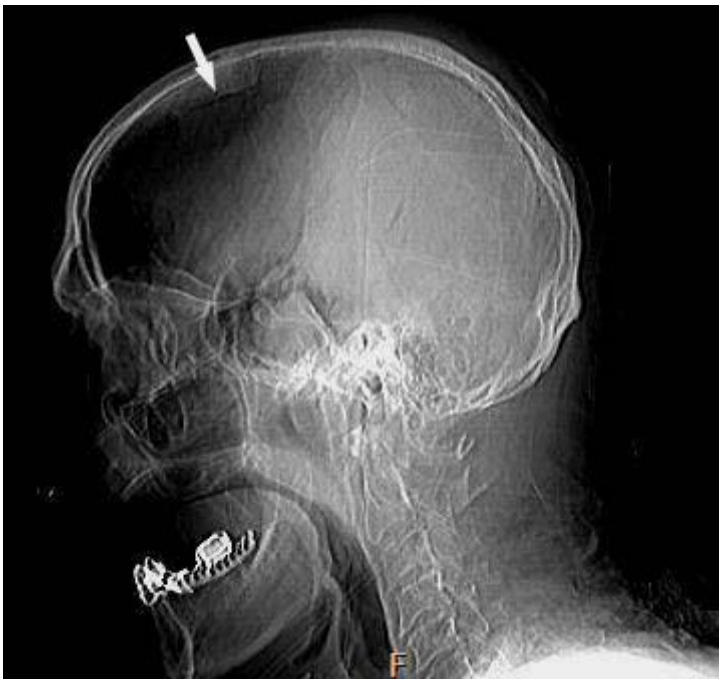

Description: Intensely hypoattenuating area in the anterior portion of the cranial vault and adjacent fracture. **Origin:** Department of Radiology, General Hospital of Kozani, Greece

Figure 2

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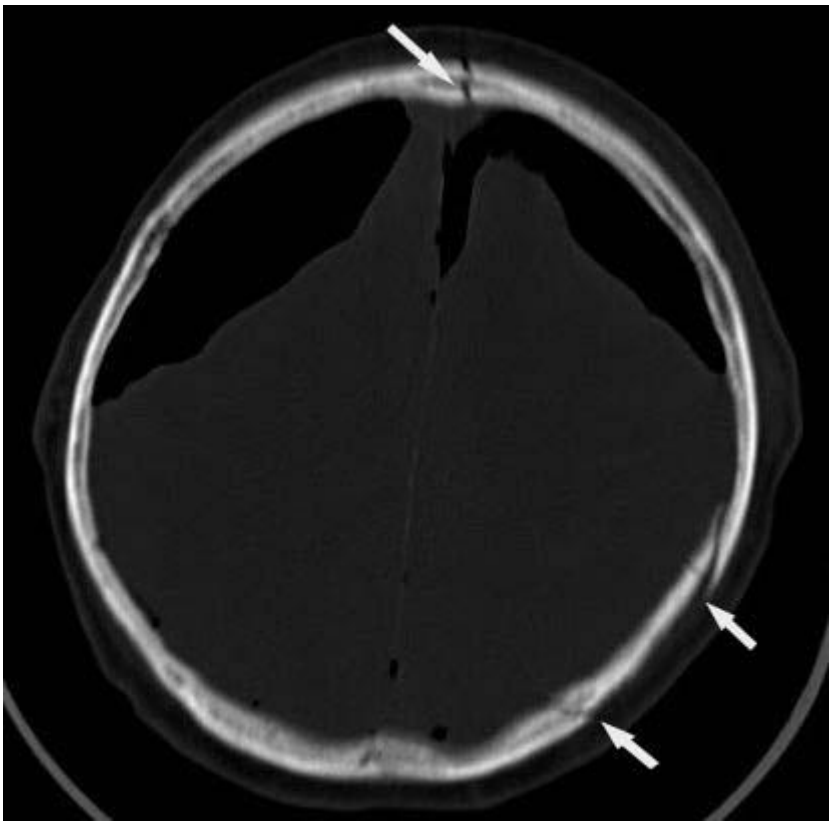

Description: Multiple cranial vault fractures. **Origin:** Department of Radiology, General Hospital of Kozani, Greece

Figure 3

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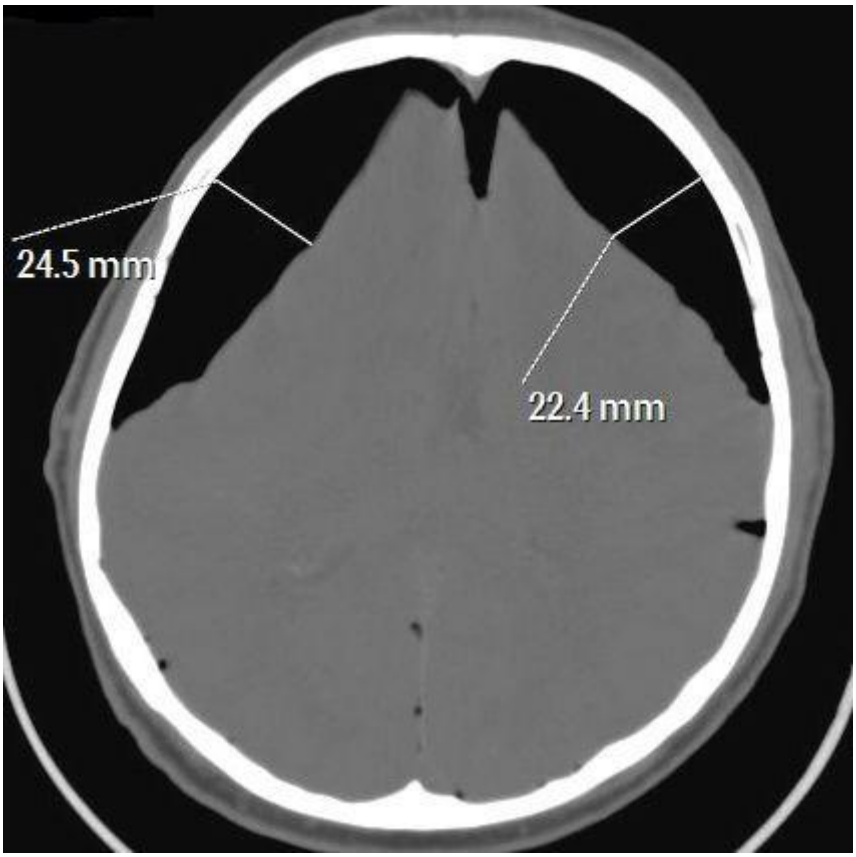

Description: Bilateral subdural pneumocephalus (the "Mount Fuji sign"). **Origin:** Department of Radiology, General Hospital of Kozani, Greece

Figure 4

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Description: Subdural pneumocephalus, brain oedema, scattered air bubbles. **Origin:** Department of Radiology, General Hospital of Kozani, Greece

Figure 5

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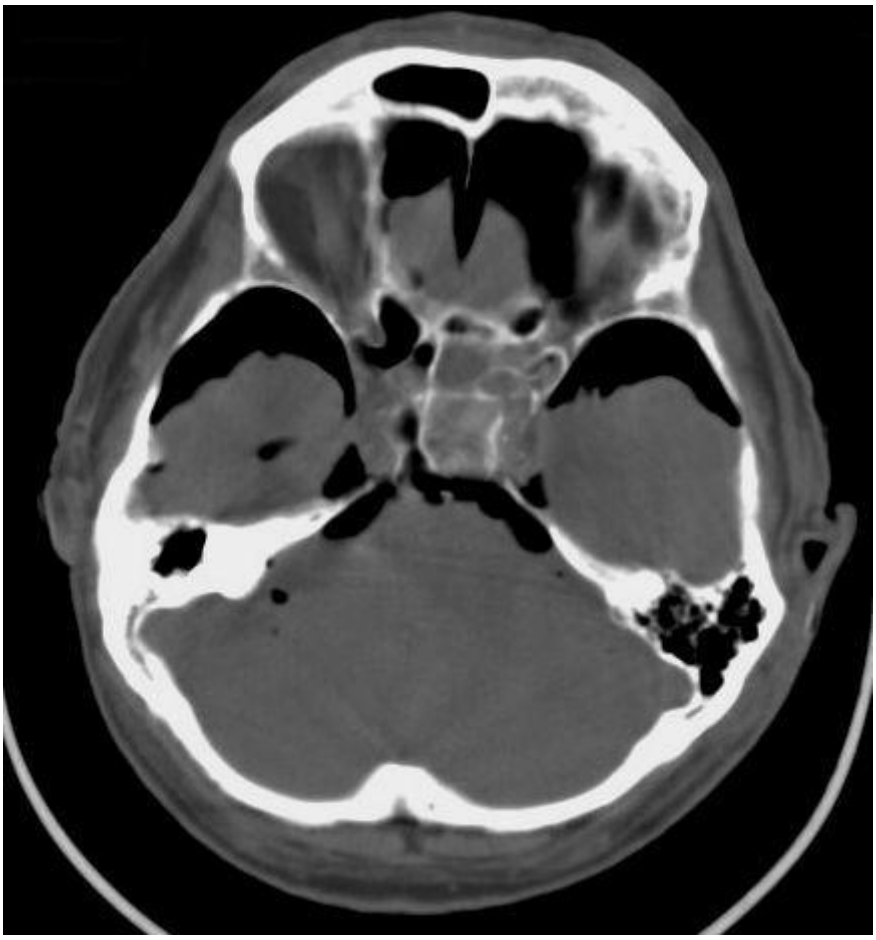

Description: Axial image in lower level shows subdural and subarachnoid air. **Origin:** Department of Radiology, General Hospital of Kozani, Greece

Figure 6

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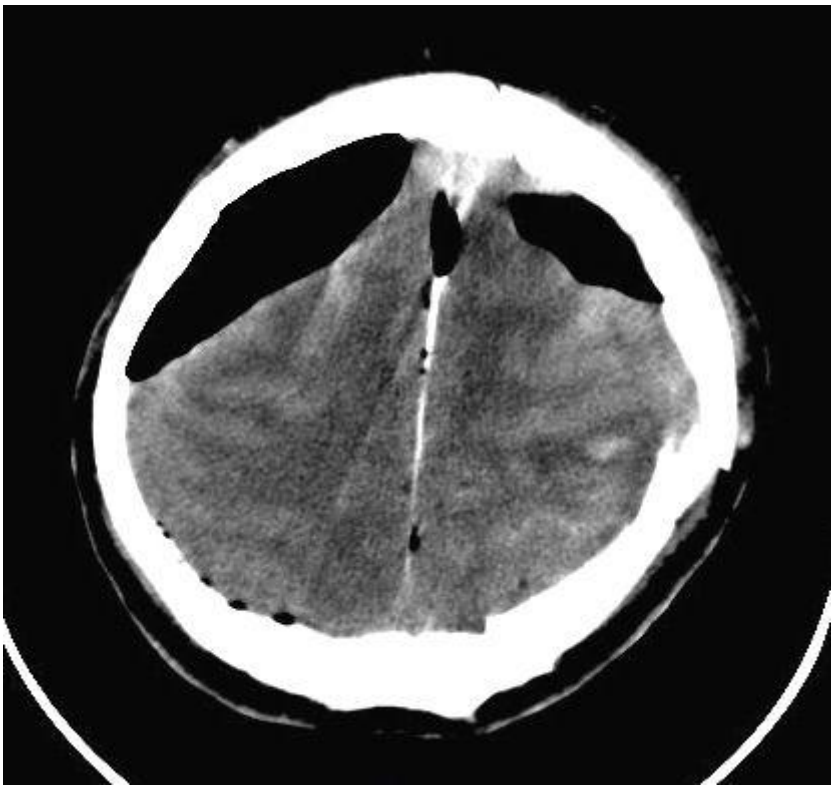

Description: Subarachnoid haemorrhage in the left cerebral hemisphere. **Origin:** Department of Radiology, General Hospital of Kozani, Greece