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Pneumocephalus after Ankle Surgery: A Case Report

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ABSTRACT

Introduction: Pneumocephalus, or air in the cranial cavity, can have various causes. Traumatic brain injury is the most common cause of pneumocephalus, accounting for 75% of all cases, particularly in those with skull base fractures. Spinal trauma-related pneumocephalus is rare but has been reported, and patients with this condition are usually treated conservatively. Tumors, infections, and iatrogenic causes are responsible for the remaining 25% of cases. Proper management and a high index of suspicion are critical when considering pneumocephalus as a possible complication, as it can result in significant morbidity and potentially life-threatening consequences. Accidental puncture of the dura mater is a common cause of pneumocephalus secondary to epidural anesthesia, and air entry into the intrathecal space is another known cause.

Case presentation: This is a 64-year-old female patient who underwent elective ankle surgery, the anesthetic technique was epidural-spinal block needle on needle, no complications during procedure. She was discharged from the Traumatology and Orthopedics service the next morning, 24 hours after her hospital discharge, she was brought back, in the emergency area, she was found with psychomotor agitation, disorientation, no auditory hallucinations, paresthesias were denied, no mentation disorder, with a score on the Glasgow Coma Scale of 14: Eye opening 4 points, Verbal response 4 points, Motor response 6 points. After 48 hours the CT brain scan revealed absortion of pneumocephalus.

Clinical discussion: The causes of neumocephalus resulting from epidural or spinal anesthesia procedures are not entirely understood. However, it is believed to occur due to the introduction of air or gas into the subarachnoid or epidural spaces during the puncture, accidental or not . Given the potential severity of this condition, early diagnosis and appropriate management are crucial, even if the symptoms differ from the most common.

Conclusion: This research paper highlights the importance of anesthesiologists being aware of the potential risks associated with epidural or spinal block.

Future research could investigate the long-term outcomes of patients who experience pneumocephalus during anesthesia procedures and identify strategies for preventing and managing this complication

KEYWORDS: pneumocephalus, epidural anesthesia, spinal anesthesia

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INTRODUCTION:

Pneumocephalus, or air in the cranial cavity, can have various causes. Traumatic brain injury is the most common cause of pneumocephalus, accounting for 75% of all cases, particularly in those with skull base fractures. Spinal trauma-related pneumocephalus is rare but has been reported, and patients with this condition are usually treated conservatively. Tumors, infections, and iatrogenic causes are responsible for the remaining 25% of cases. (1)

Iatrogenic causes include spinal or epidural injections, intra- or extracranial neurosurgical interventions such as drainage of subdural hemorrhage, shunt surgeries, other causes include

otorhinolaryngological procedures, positive pressure ventilation, radiotherapy to the cranium, epidural abscess drainage, and spontaneous occurrences. (2)

Diagnosis of pneumocephalus is typically done through a CT scan of the brain, which can detect even small amounts of air in the brain. Several imaging features can help diagnose pneumocephalus, Includes the "peak mark", "Fuji mark" and "bubble mark" seen on CT scans. The peak sign is the first sign of pneumocephalus, while the Mount Fuji sign is unique to tension pneumocephalus and indicates subdural air around and between the two frontal lobes. (3)
In this paper we present a 64 year old female patient, who underwent an ankle surgery, the anesthesia technique was epidural-spinal block.

Pneumocephalus may also be a rare complication of epidural anesthesia, and anesthesiologists should be aware of the potential risks associated with positive pressure mask ventilation in head trauma patients in particular. (4)

Proper management and a high index of suspicion are critical when considering pneumocephalus as a possible complication, as it can result in significant morbidity and potentially life-threatening consequences. Accidental puncture of the dura mater is a common cause of pneumocephalus secondary to epidural anesthesia, and air entry into the intrathecal space is another known cause. (5)

However, for uncomplicated pneumocephalus, conservative management is considered appropriate, positioning the patient in supine, high flow oxygen, and neurologic monitoring is recommended. (6)

Pneumocephalus in patients with a normal pressure in the brain is of unclear importance, but it may contribute to the decreased compliance of the brain in patients with cerebral edema or space-occupying lesions, which is important because it enables the complete absorption of the pneumocephalus. (7)

Small pneumocephalus is asymptomatic in most cases. (8)

CASE REPORT

This is a 64-year-old female patient who underwent elective ankle surgery, in her medical history, smoker for 10 years and dyslipidemia, the surgery to be performed secondary to trimalleolar ankle fracture according to the classification: AO 44B3.2, the anesthetic technique was epidural-spinal block needle on needle, between L2-L3 vertebrae, the anesthetic used was bupivacaine-glucose 10 mg and opioid fentanyl 25 mcg intrathecal, L1-L2 sensory level, with no toxicity data. Transanesthesic status: stable, vital stigns: blood pressure 107/66 mmhg heart rate: 65 bpm respiratory frecuency: 14 rpm Peripheral oxygen saturation 97% Temperature 36.9 °C.

Surgical procedure was performed without complications, the Bromage motor blockade score: 3 points, Aldrete score of 9 points : activity 1 point, respiration 2 points, circulation 2 points, conscious 2 points, oxygen saturation 2 points. Two hours later in post anesthesia care unit she recovered motor response.

She was discharged from the Traumatology and Orthopedics service the next morning, 24 hours after her hospital discharge, she was brought back, in the emergency area, she was found with psychomotor agitation, disorientation, no auditory hallucinations, paresthesias were denied, no mentation disorder, with a score on the Glasgow Coma Scale of 14: Eye opening 4 points, Verbal response 4 points, Motor response 6 points.

She underwent a CT Brain scan, which reported air density images in the suprasellar cistern, left periventricular anterior horn, and left insular cistern. No estimated air volume was reported.

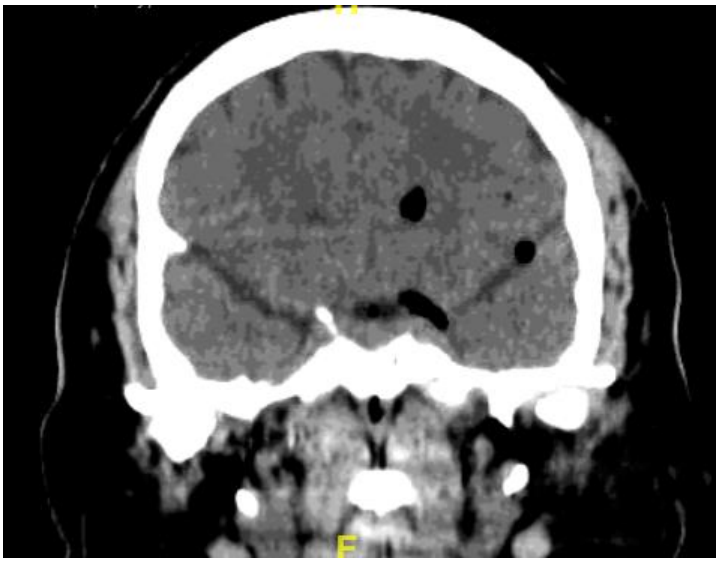

Image 1: Air bubble sign, in suprasellar cistern, anterior third of cistern of corpus callosum, sylvian left cistern.
Source: own

Complete blood count and biochemical profile where taken, other possible causes of the symptoms are ruled out, Neurosurgery service where referred, who rejected the need for surgical treatment, she was hospitalized in joint treatment between anesthesiology and internal medicine service, the treatment based on facial mask oxygen 8 liters per minute, the pharmacological treatment administered was haloperidol 5mg intravenously every 8 hours, with improvement of symptoms in the first 24 hours, the Glasgow Coma Scale of 15: Eye opening 4 points, Verbal response 5 points, Motor response 6 points.

A brain Computed tomography was performed 48 hours later, and revealed no evidence of air-density imaging.

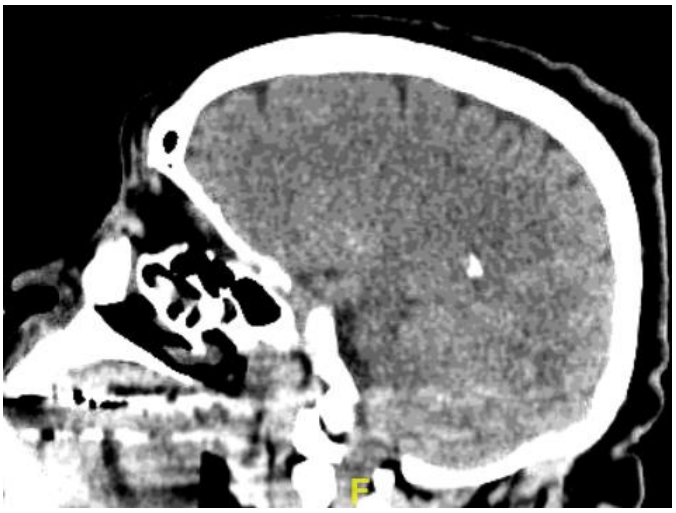

Image 2: No evidence of air density image, absortion of air bubbles. Source: own

The patient was discharged 24 hours after the new image study, with follow-up in the outpatient clinic 15 days later, where new symptoms associated with the pneumoencephalus were denied.

DISCUSSION

The neumocephalus can occur as a complication of anesthesia-related procedures. While this condition is rare, it has the potential to cause significant morbidity and mortality. (4)

The causes of neumocephalus resulting from epidural or spinal anesthesia procedures are not entirely understood. However, it is believed to occur due to the introduction of air or gas into the subarachnoid or epidural spaces during the puncture, accidental or not . Given the potential severity of this condition, early diagnosis and appropriate management are crucial, even if the symptoms differ from the most common. (5)

Other posibility is the positive pressure mask ventilation during the preoxygenation phase of a general anesthesia or ventilatory care for head trauma patients, but in whis case whe didnt use general anesthesia. (4)

Pneumocephalus in patients with no mass effect or deviation of de middle line in CT brain scan, tend to reabsorb and the clinical impact is minor, it may contribute to increase intracranial pressure and boost the severity of the symptoms, in this case the amount of air was not measured, however, it is of a smaller magnitude so as not to have generated tension pneumoencephalus or a neurosurgical emergency but the necessary to trigger decrease in conciousnes and pyschomotor agitation. (7) (8)

CONCLUSION

This research paper highlights the importance of anesthesiologists being aware of the potential risks associated with epidural or spinal block.

Future research could investigate the long-term outcomes of patients who experience pneumocephalus during anesthesia procedures and identify strategies for preventing and managing this complication.

Overall, this research paper provides valuable insights into the potential causes and consequences of pneumocephalus during anesthesia procedures, contributing to the ongoing advancement of knowledge in the field.

CONFLICTS OF INTEREST

None.

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