

Complicated Pneumocephalus after Epidural Anesthesia: A Case Report

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SUMMARY

Pneumocephalus is a well known complication of spinal and epidural anesthesia, but subclinical pneumocephalus complicated by fever leading to intracranial mass effect (tension pneumocephalus) is extremely rare. We report a case of sudden and progressive bifrontal headache and confusion after a dural puncture during the procedure of epidural anesthesia. The pneumocephalus resolved spontaneously after 5 days. Possible mechanisms for this occurrence, along with steps that can be taken to prevent this complication, are discussed.

Key words: *Pneumocephalus, spinal anesthesia, epidural anesthesia*

ÖZET

Epidural Anestezi Sonrası Komplike Pnömocefali: Olgu Sunumu

Pnömocefali, spinal ve epidural anestezinin iyi bilinen komplikasyonlarından biridir. Bulgu olmaksızın seyredirken ateş nedeniyle kitle etkisine neden olarak bulgu vermesi çok nadirdir. Bu yazıda, epidural anestezi sırasında yapılan dural ponksiyona bağlı ani başlangıçlı, ilerleyici baş ağrısı ve konfüzyon ile seyreden ve 5 gün sonra kendiliğinden düzelen pnömocefali olgusu sunulmuştur. Yazıda, bu durumun muhtemel oluşum mekanizmaları ve bu komplikasyonu önlemek için hangi adımların atılabileceği tartışılmıştır.

Anahtar kelimeler: *Pnömocefali, spinal anestezi, epidural anestezi*

Introduction

The use of air during epidural anesthesia may cause iatrogenic morbidities. In most of the reported cases, air was injected while the operator was identifying the epidural space by the loss-of-resistance technique (LOR), using air (1,2). These include pneumocephalus (causing headache, nausea, vomiting, seizures, and/or hemiparesis (3)), spinal cord and nerve root compression (causing transient back pain (4), radicular pain (5), motor weakness, paresthesia or paraplegia (6)), patchy block (7), subcutaneous (8) or retroperitoneal (9) emphysema, and venous air embolism (10). The symptoms of pneumocephalus include severe frontal headache, paresthesias, restlessness, apprehension, vegetative symptoms, and changes in blood pressure. The specific symptoms depend on the intracranial distribution of the air, whereas the duration and severity of the symptoms are related to the amount of air. It is interesting to note that a literature search revealed no reported case of fever-complicated pneumocephalus causing serious mass effect.

Case Report

65-yr-old woman (155 cm, 78 kg) with mild hypertension history was scheduled for elective left knee arthroscopy. Epidural anesthesia was chosen for this purpose and the patient's back was prepared in the sitting position and draped in an aseptic fashion, and 2% lidocaine was infiltrated for skin analgesia at the L3-4 interspace. An 18-gauge needle was introduced using LOR to air technique. During the first attempt, an accidental dural puncture occurred with free flow of cerebrospinal fluid from the needle. Inadvertently, approximately 1 or 2 mL of air was injected into the subarachnoid space. A second,

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successful epidural attempt was performed at the L4-5 interspace using the LOR to saline technique. The patient was completely normal and the procedure was continued. An epidural catheter was introduced 3 cm into the epidural space, and a 2-mL test dose of 2% lidocaine was administered. Thereafter, the patient was positioned supine. Incremental doses of carbonated 2% lidocaine were administered until a sensory level of T10 was reached. A total volume of 11 mL was needed. The arthroscopy was performed without difficulty. The duration of the surgery was 50 min. In the recovery room, the patient was completely normal except minimal headache. She was taken to the service room and an analgesic was given to relieve headache. Approximately 5 hours after the operation, the patient suddenly complained of severe bifrontal headache. She had minimal confusion with loss of place, time and person orientation. The arterial pressure decreased to 80/45 mm Hg, and the patient reported respiratory difficulty. Peripheral oxygen saturation did not decrease. Laboratory tests were within normal limits. The strength of her upper extremities was normal. An urgent computed tomography brain scan was performed 6 h after the accidental dural puncture and demonstrated subarachnoid air including intraventricular region (Figure 1). The patient's discomfort persisted and worsened. The body temperature of the patient was 38,2 °C. Lactated Ringer's solution 1000 mL, two doses of ephedrine 10 mg IV, and oxygen via a face mask were administered. Her body temperature was decreased to 36 °C in half an hour by using ice pads, rectal indomethazin and Paracetamol 1g/100 ml solution for infusion. The blood pressure promptly returned to normal levels. The body temperature was tried to retain below 37 °C. The patients' confusion was completely resolved and she continued to complain of minimal headache although she was conscious. The origin of the fever was not identified clearly and it was accepted as postoperative fever with unknown origin. The patient showed no signs of postdural puncture headache, and she was discharged from the hospital after 5 days. At the time of discharge, the patient was in good general condition and free from any neurological sequelae.

Discussion

Pneumocephalus usually occurs due to head trauma and neurosurgical procedures. Infection due



Figure 1. Computerized tomography of the cranium. Air is visible within the lateral ventricles and subarachnoid space anteriorly and along the falx over the convexities of the brain.

to gas-forming organisms, mucocoeles, congenital neuroenteric cysts, and dural defects may cause spontaneous pneumocephalus (11). Onal B et al. concluded that growing paranasal sinus osteomas may erode the sinus wall, dura mater and arachnoid membrane, allowing air into the cranial cavity (11). Nelson AS et al. postulated that the lumbar puncture may result in the creation of a negative pressure system and that this perpetuated the inflow of air into the cranium from an eroded sinus wall (12). The patient's radiological studies revealed no any bone defect or osteomas in the paranasal sinuses. But these types of lesions should be considered in differential diagnosis.

In a study on 3730 patients who received an epidural blockade for acute or chronic pain, Aide et al. (13) showed that, after an accidental dural puncture, the incidence of headache was significantly higher when LOR to air instead of LOR to saline was used. The possibility of pneumocephalus should be checked for by CT scan when a patient complains of severe headache during continuous epidural block. Nitrous oxide should not be used in these patients, because it would cause tension pneumocephalus (14).

In our case, the amount of air used to identify the epidural space was obviously lower than needed, and, unfortunately, it was accidentally injected into the

subarachnoid space before the flow of cerebrospinal fluid was noticed. Normally, there must be enough air present to cause symptoms and be detected by radiologic studies. In our patient, pneumocephalus was complicated with fever. The increase of the body temperature leading to expansion of the intracranial air (tension pneumocephalus) is the most probable reason of the symptoms. It was trapped in a mass and had a compressive effect on the brain in spite of its small volume. In addition to progressive headache, the patients' confusion and disorientation was probably secondary to mass effect of the expanded air. With decrease in body temperature and slow reabsorption of the air, symptoms disappeared progressively.

The stylet should be replaced only after ensuring that the needle contains fluid and not air, and large deep breaths during the procedure by the patient should be avoided. In suspicion of injecting of air into subarachnoid space (even it is in small amount), the patient should be observed carefully and the body temperature should not permitted to increase.

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