

## Pneumocephalus and Seizure in Patient after Epidural Lumbar Puncture: Case Report

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### ABSTRACT

Lumbar epidural analgesia is using widely as an alternative method for anesthesia. Although it has its benefits such as the low risk of complications in contrast with general anesthesia, also it has some adverse effects, for instance: headache, loss of consciousness, pneumocephalus, dizziness, and seizure. Pneumocephalus is a rare complication of lumbar epidural block.

In this case of study, a patient represents stenosis in the site of anastomosis of colon and duodenum candidate for a repair surgery with the lumbar epidural block. Epidural catheter insertion was done in the sitting position; local anesthesia was administered at the 4th and 5th lumbar vertebral interspace. A 17-gauge Husted needle was inserted using the loss-of-resistance (LOR) by air technique. Immediately the patient complained of headaches and then deteriorated to a tonic-clonic movement accompanied by post-seizure sleep, which ended up in termination of the procedure. The first-day CT-scan revealed multiple pneumocephalus. Supporting treatment was administered for 10 days; another CT-scan taken from the patient demonstrated improvement and the patient was discharged without any neurological deficit.

Regional analgesia should be administered if possible under the superintendence of an expert, however, complications of an epidural catheter, such as accidental dural puncture, can postpone the recovery of the patient.

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Anesthesia with the lumbar epidural block is used widely instead of general anesthesia, if possible. Although several complications have been reported for epidural analgesia, it has been used for various procedures with or without catheterization. One of the scarce complications of epidural analgesia is pneumocephalus. Epidural anesthesia or injection of pain relief medication can be a potential cause of dural puncture; the incidence of pneumocephalus of can vary from 1 to 2% [1]. The potential amount of air that can cause pneumocephalus is 2 to 4ml of air [2]. A study demonstrates the possibility of pneumocephalus in blood patch application. In this study, a case of

pneumocephalus diagnosed with a CT scan is reported. The patient developed seizures once, at the beginning of the procedure, and continued non-symptomatic. The condition was managed conservatively till the second CT-scan after 7 days which revealed an improvement.

### Case Report

The case of this study is a 51 years old man with a history of the colon to duodenum anastomosis candidate for repair surgery due to stenosis in the site of surgery. He has no history of seizure, dizziness, loss of consciousness, and drug abuse. Systemic examination

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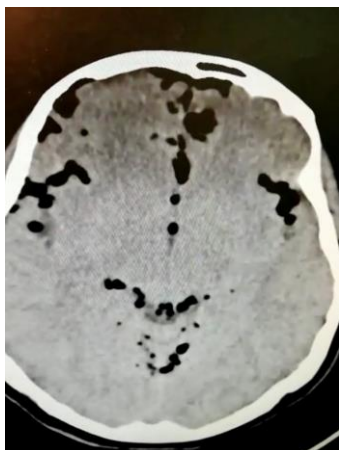
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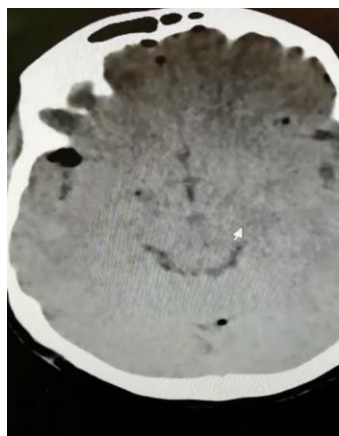
was within normal limits. Ordinary hematological and biochemical laboratory analysis was found to be within normal. Echocardiography showed a normal sinus rhythm. The epidural catheter was performed after cleaning and draping. Local anesthesia was administered at the level of lumbar 4th and 5th intervertebral space. After primary epidural analgesia, immediately the patient reported a headache which continued by tonic-clonic movement in right limbs and an upward gaze which remained for less than a minute. A CT scan established, a pneumocephalus in several cuts (Figure 1).

**Figure 1- First CT scan with multiple pneumocephalus spot**



After gradually increasing his consciousness, he has not had any memory of the incident. A supportive and symptomatic treatment was established for the patient. His symptoms like headache resolved and he became completely oriented, without any lateralized symptoms, and normal deep tendon reflex. After 7 days of the operation, a controlled CT scan revealed improvement of pneumocephalus and just a little air remained which demonstrates the resolving of the pneumocephalus (Figure 2).

**Figure 2- Follow up CT scan 7 days after operation with gross improvement in pneumocephalus spots sizes.**



## Discussion

Pneumocephalus is the presence of air in the cranial cavity due to the complicated puncture of the dural breach. Pneumocephalus can be a complication of neurosurgical or otorhinolaryngeal procedure, disruption of the skull, and rarely in epidural analgesia [3]. The common symptoms and signs of pneumocephalus are sudden-onset headache, unconsciousness, dizziness, hemiparesis, or generalized tonic-clonic seizure. Pneumocephalus headache has been reported immediately after the puncture of the dural breach [4]. Some symptoms of pneumocephalus are due to increased intracranial pressure. Studies reported the increased risk of dural breach puncture in thoracic epidural injection and obese patients [5]. Two studies demonstrate the pneumocephalus in obstetrics patients and in intestinal carcinoma which has been reported immediately and after 10 days respectively [6-7]. A study reported seizure in thoracic epidural analgesia in a patient undergoing coronary artery bypass grafting which has been demonstrated an increased risk for thoracic epidural analgesia in contrast with lumbar epidural analgesia. A retrospective analysis described two techniques for the detection of epidural space which are saline or air; saline is a more safe and reliable method instead of using air. Air injection potential complications are pneumocephalus, subcutaneous emphysema, nerve root compression, air embolism, and insufficient analgesia [8-9]. The best diagnostic modality for pneumocephalus is MRI, although CT scan is used widely for diagnosis due to low suspicion of pneumocephalus and its overlapping symptoms and signs with post-dural puncture complications. Pneumocephalus can cause a seizure in patients, although it is difficult to clinically differentiate whether it is because of the presence of air in the meninges layer or other causes such as subarachnoid hemorrhage or metabolic disorders [10].

In the presented case in this study, the patient developed about one minute of tonic-clonic seizure in the right limbs and an upward gaze which was followed by post-ictal sleep. We diagnosed the pneumocephalus with a CT scan.

Treatment of pneumocephalus is symptomatic. Management includes hydration, bed rest, and surgery if tension pneumocephalus occurred [11]. Treatment for the case of this study was symptomatic and no surgery was needed; pneumocephalus resolved within 7 days and the patient was discharged after gross reduction of pneumocephalus which has been controlled with CT scan.

## Conclusion

To conclude, regional anesthesia is a beneficial procedure despite it has its potential complication,

however, it can be reduced by performing it under expert guidance. The complicated epidural catheter can prolong the treatment.

### References

- [1] Hawley JS, Ney JP, Swanberg MM. Subarachnoid pneumocephalus from epidural steroid injection. *Headache*. 2005; 45(3):24-8.
- [2] Van den Berg AA, Nguyen L, von-Maszewski M, Hofer H. Unexplained fitting in patients with post-dural puncture headache. Risk of iatrogenic pneumocephalus with air rationalizes use of loss of resistance to saline. *Br J Anaesth*. 2003; 90(6):810-1; author reply 811-2.
- [3] Avellanal M, Olmedilla L, Ojea R, Rueda ML, Navia J. Pneumocephalus after spinal anesthesia. *Anesthesiology*. 1996; 85:423-425.
- [4] Kasai K, Osawa M. Pneumocephalus during continuous epidural block. *J Anesth*. 2007; 21(1):59-61.
- [5] Ferrante E, Rubino F, Porrinis L. Pneumocephalus: A Rare Complication of Epidural Catheter Placement During Epidural Blood Patch. *Headache*. 2014; 54(3):539-40.
- [6] Sharma M, Mehta Y, Sawhney R, Vats M, Trehan N. Thoracic epidural analgesia in an obese patient with body mass index more than 30kg/m<sup>2</sup> for off pump coronary artery bypass surgery. *Ann Card Anaesth*. 2010; 13(1):28-33.
- [7] Mehta Y, Manikappa S, Juneja R, Trehan N. Obstructive sleep apnea syndrome: anesthetic implications in the cardiac surgical patient. *J Cardiothorac. Vasc Anesth*. 2000; 14(4):449-53.
- [8] Maleki Delarestaghi M, Ahmadi A, Dehghani Firouzabadi F, Roomiani M, Dehghani Firouzabadi M, Faham Z. Effect of Low-Pressure Drainage Suction on Pharyngocutaneous Fistula After Total Laryngectomy. *Ann Otol Rhinol Laryngol*. 2020; 0003489420934506.
- [9] Gómez-Ríos MÁ, Fernández-Goti MC. Pneumocephalus after Inadvertent Dural Puncture during Epidural Anesthesia. *Anesthesiology*. 2013; 118(2):444.
- [10] Rodrigo P, Garcia JM, Ailagas J. General convulsive crisis related to pneumocephalus after inadvertent dural puncture in an obstetric patient. *Rev Esp Anestesiol Reanim*. 1997; 44(6):247-249.
- [11] Lin HY, Wu HS, Peng TH, Yeh YJ, Cheng IC, Lin IS, Liu CH. Pneumocephalus and respiratory depression after accidental dural puncture during epidural analgesia--a case report. *Acta Anaesthesiol Sin*. 1997; 35(2):119-23.