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Case Report

Total Spinal Anesthesia and Pneumocephalus as a Complication of Epidural Analgesia: A Case Report

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Abstract

Total spinal anesthesia (TSA) is a life-threatening, rare complication that occurs as a result of accidental injection of anesthetics at the wrong site. TSA is characterized by a sudden decrease in blood pressure, rapidly increasing motor block, temporarily loss of breathing, loss of consciousness, dilated pupils, apnea, and even cardiac arrest. Pneumocephalus usually results from accidental injection of air into the intrathecal space from the "loss of resistance to air (LORA)" technique, which is used to identify the epidural space during epidural anesthesia.

In this article a case of TSA and pneumocephalus after epidural analgesia undergoing colon surgery during combined general-epidural anesthesia.

Keywords: *Epidural Anesthesia; Complication; Total Spinal Anesthesia; Pneumocephalus*

Abbreviations

TSA: Total Spinal Anesthesia; LORA: Loss of Resistance to Air; PCEA: Patient-Controlled Epidural Analgesia; ICU: Intensive Care Unit

Introduction

Epidural analgesia is considered an imperative procedure after open abdominal surgery since epidural analgesia has been shown to provide superior pain relief and decreased the rate of postoperative complications after abdominal surgery [1]. Complications are uncommon and include hemorrhage, cerebrospinal fluid leak, and infection. A rare complication is pneumocephalus, and total spinal anesthesia (TSA) described in only a few case reports of epidural anesthesia [2-4].

We report a case of TSA and pneumocephalus after epidural analgesia in a 58 years old man undergoing colon surgery during combined general-epidural anesthesia.

Case Report

A 58-year-old male patient with diabetes mellitus type II was taken to the operating room for laparoscopic colon surgery due to colon cancer. Following monitoring, the patient was pre-medicated using midazolam 2 mg. After sterilization in the sitting position, an anesthetist is injected lidocaine 2% into the L1-2 intervertebral space and tried to insert an 18-gauge Tuohy needle into the epidural space using the loss of resistance to air (LORA) technique. An epidural catheter was threaded into epidural space for 5 cm. Test dose agent was administered. Subsequently, the patient was given 10 ml bupivacaine 0.125% through the catheter. Patient's pulse rate and blood pressure levels were stable after epidural injection. General anaesthesia was induced with fentanyl 2 mcg/kg and propofol 2 mg/kg, given iv, and tracheal intubation was facilitated with rokuronyum 0.6 mg/kg. Anaesthesia was maintained with desflurane in oxygen and air at

flow rate of 0.5 L/min. The laparoscopic colon surgery was completed uneventfully within 90 minutes. At the end of surgery, residual neuromuscular block was antagonized with neostigmin and atropine, and the tracheal tube was removed when the patient breathed spontaneously and smoothly. Because of some technical issues, the preparation of the patient-controlled epidural analgesia (PCEA) pump took a long time and it could not be started till the completion of the operation. The epidural catheter was re-checked at the end of the operation: aspiration tests were negative. Although an epidural analgesic solution attempted to be administered, it could not be transmitted through the catheter. It was planned to position the patient appropriately after awakening to check whether the catheter caused kinking or not. However, till that time, the patient was given 100 mg tramadol iv infusion. The epidural catheter was checked again while the patient became conscious and cooperative at the recovery room. No problem was observed associated with the catheter as aspiration tests were negative again. Since the patient's pain scores were above 6 and the PCEA could not be prepared yet, the patient was given 10 ml bupivacaine 0.25% with epidural catheter. Nearly two minutes after the epidural injection, the patient stated a decrease in his pain level which was followed by an immediate loss of consciousness accompanied with superficial breathing. Patient's pulse rate fell to 80 bpm from 100 bpm while his arterial blood pressure decreased to 110/70 mmHg from 140/100 mmHg. He did not show response to the painful stimulus. Saturation levels were above 95%. He was immediately intubated with no requirement for any medication. An infusion of 30 ml/kg 0.09% NaCl solution was started. Anisocoria was identified. Patient's Glasgow Coma Score was 3. His head was elevated. As the patient's condition worsened following the epidural injection, Epidural anesthesia complications were considered. First, the patient was thought to develop TSA; however, there was no significant hemodynamic disruption. For this reason, emergency cranial CT and diffusion-weighted MRI were obtained not to miss another potential simultaneous neurological situation. The results of the cranial CT and MRI demonstrated pneumocephalus in the lateral ventricles and subarachnoid space of the brain (Figure 1). Patient was transferred to the Intensive Care Unit (ICU) and connected to a mechanical ventilator. His epidural catheter was withdrawn. At the ICU, his vital signs remained stable. Patient regained consciousness almost two hours after intubation which was followed by a regression in the motor block of the upper extremity. Three hours later, he was extubated. At the 4th hour, the lower extremity block also regressed slowly. After being followed-up at the ICU unit nearly for 24 hours, the patient was transferred to the clinic. He was mobilized without any neurological deficit. At the 8th postoperative day, his follow-up CT indicated that pneumocephalus was absorbed, and thus, the patient was discharged from the hospital.

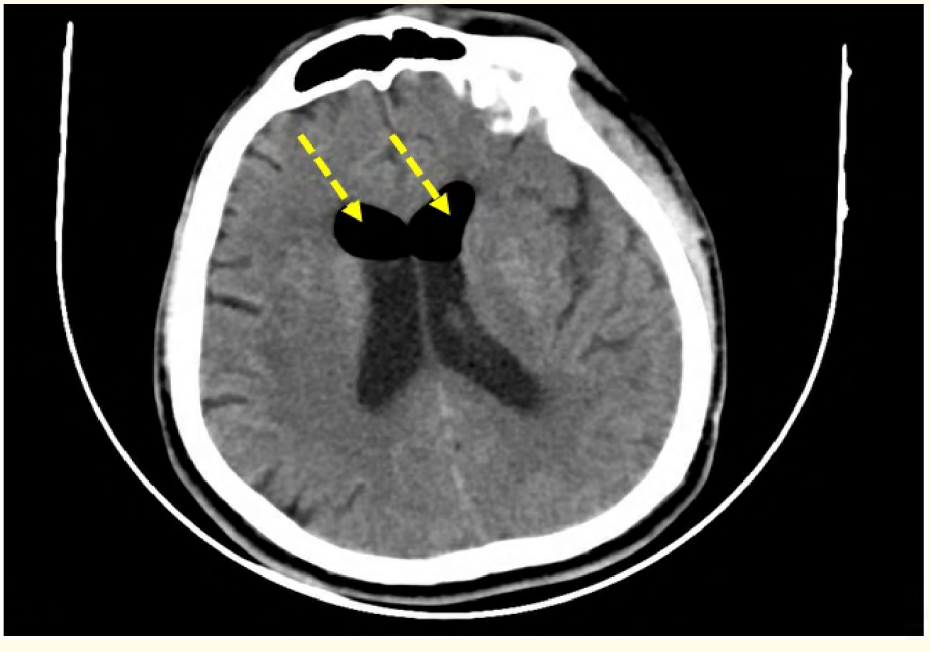

Figure 1: *CT Brain within one hour. Focal air pocket in the frontal horn of the ventricle of the brain noted. (Shown by arrow).*

Discussion

TSA is a rare but life-threatening complication that occurs as a result of accidental injection of anesthetics at the wrong site. TSA is characterized by a sudden decrease in blood pressure, rapidly increasing motor block, temporarily loss of breathing, loss of consciousness, dilated pupils, apnea, and even cardiac arrest [5]. In this case, motor block increased rapidly, consciousness quickly lost, and anisocoria developed. But we did not observe severe hypotension and cardiac arrest because of the patient was given enough fluid during the operation.

TSA has been reported as an infrequent complication of many procedures, mostly was reported as a complication of epidural anesthesia in the past 30 years [4,6]. In one obstetric patient, hypotension did not happen on, because of the phenylephrine infusion, thus avoiding a serious cardiac compromise in the presence of TSA [7]. Albi-Feldzer., et al. [8] reported TSA as a complication of ultrasound-guided thoracic paravertebral block in 2016. A full epidural dose of the local anaesthetic can cause TSA if administered into the subarachnoid space. A test dose of local anaesthetic is given in order to recognize intravascular or subarachnoid catheter placement and prevent intravascular injection or TSA [9]. Although we did not observe blood or cerebrospinal fluid aspiration from the epidural catheter, our patient developed TSA.

Pneumocephalus is defined as the presence of intracranial air, including the intraventricular, intraparenchymal, subarachnoid, subdural, and epidural compartments. Although rare, it can also be encountered after other invasive procedures, including lumbar puncture and spinal/epidural anesthesia. Cases of pneumocephalus following accidental dural puncture during epidural anesthesia have been reported in the literature [10,11]. They typically featured patients receiving epidural anesthesia while in the sitting position and experiencing immediate onset of headache after epidural catheter insertion [10,11]. Pneumocephalus following spinal or combined spinal/epidural anesthesia usually results from air injected into the intrathecal/subarachnoid space during use of the LORA technique that is used to identify the epidural space. There has been no consensus on the use of air vs saline for this technique, although complications associated with the use of air include pneumocephalus, spinal cord and nerve root compression, retroperitoneal air, subcutaneous emphysema, and venous air embolism, none of which are associated with the use of saline [11,12]. We employed the LORA technique for our patient and applied unintentional dural puncture. The most common clinical presentations of pneumocephalus include headache, nausea, vomiting, seizures, dizziness, cranial nerve palsies, hemiparesis, and encephalopathy. Headaches associated with pneumocephalus have a rapid onset, are severe, are typically worse or not relieved in recumbency, are sensitive to movement, and are attributed to cephalad migration of intracranial air with irritation of the intracranial meninges [10-12]. As TSA and pneumocephalus developed together, we failed to identify the signs of pneumocephalus.

Conclusion

It is known that the absence of blood or cerebrospinal fluid aspiration in epidural anesthesia is not completely countable. Despite all appropriate measures being taken, it is still possible to face with subarachnoid injection. TSA is a rare but a serious complication of epidural analgesia that can occur without hemodynamic instability when enough volume is provided before the epidural injection. Nevertheless, as in our case, early diagnosis and quick actions can achieve recovery without neurological deficit.

Conflict of Interest

This study has received no financial support. The authors declare that we have no conflict of interest.

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