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Local anesthetic systemic toxicity of levobupivacaine in erector spinae plane block

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Letter to the Editor

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The erector spinae plane block (ESPB) has been reported to have several complications. However, there has been no report of local anesthetic systemic toxicity (LAST). Here, we describe a case of LAST in a patient receiving levobupivacaine for ESPB.

Informed consent for publication was obtained from the patient, and this report was approved by Shimane University Hospital Institutional Review Board (approval no. 4685). We performed ultrasound-guided bilateral ESPB in a 50-year-old male (weight 58 kg, height 163 cm) who underwent endoscopic laminectomy for lumbar spinal canal stenosis. The patient had no medical history other than lumbar spinal canal stenosis.

Before the block, we administered 1 mg of midazolam intravenously (IV) and 1 μg/kg (lean body mass) fentanyl IV. The patient was placed in a prone position. First, we identified the right L4 transverse process on ultrasound after placing a transducer (15-6 Hz, FUJIFILM SonoSite, Japan) in the longitudinal plane. The needle was inserted in-plane, and 15 ml of 0.5% levobupivacaine was injected. We observed linear fluid spreading deep to the erector spinae muscle between the L1 and sacral levels. Next, we performed left-side ESPB as well as right-side ESPB and observed linear fluid spreading between the L2 and sacral levels. Thus, we used a total of 30 ml of 0.5% levobupivacaine. No blood aspiration was observed before or during the local anesthetic infection on either side. However, immediately after the block, the patient engaged in verbal communication with the medical staff. While turning him to the supine position, he suddenly stopped responding to our questions, and when he became supine, he convulsed. At the time of the event, vital signs were as follows; blood pressure: 119/91 mmHg, Heart rate: 61/min, respiratory rate: 12/min; saturation of percutaneous oxygen: 97%.

We did not find arrhythmia on the electrocardiogram monitor. By that time, 15 min had elapsed after the right-side ESPB, and it had been 7 min since the left-side ESPB. We administered 5 mg of midazolam IV, and the patient's convulsions subsided. We additionally administered a lipid emulsion (20% soybean oil 250 ml). No circulatory symptoms, respiratory arrest, or organ damage were detected on blood testing. The patient regained consciousness 30 min after the convulsions. We were unable to check the plasma concentration of levobupivacaine in this case, but the patient had no medical history of epilepsy, and there was no bleeding observed on computed tomography imaging. The operation was performed as planned, and the patient had no sequelae.

Interfascial plane blocks have recently been developed and have attracted attention in large part because they are less technically demanding and safer (i.e., the target is not the nerves, which may be damaged, but rather the space between muscle planes). In particular, ESPB is known to be a simple and safe technique because sonoanatomy is easily recognizable, and there are no structures at risk of needle injury in the immediate vicinity [1]. However, there is a relatively brief history of ESPB in clinical practice; the technique

was first reported in 2016 by Forero et al. [1]. LAST is a rare event and is a potentially fatal complication of local anesthetic use. This is the first case report to demonstrate LAST after ultrasound-guided bilateral ESPB.

No information is available on how local anesthetic absorption occurs after ESPB. The differences in the time course of plasma concentrations are caused by the number of blood vessels around the space where the local anesthetic was injected [2].

Levobupivacaine is commonly used as the local anesthetic of choice in peripheral nerve blocks because its long-acting duration is useful for postoperative analgesia. Thus, we used levobupivacaine in this case because we expected it to have a longer effect than other local anesthetics.

Some reviews of ESPB have been published in the literature [3,4]. These studies reported the use of lidocaine, bupivacaine, ropivacaine, and levobupivacaine as local anesthetics in ESPB. When ESPB was performed bilaterally, the maximum volume of local anesthetics was 60 ml (in one case, 60 ml 0.5% ropivacaine = 300 mg ropivacaine was used, and in the other case, 20 ml 0.5% bupivacaine + 20 ml 2% lidocaine + 20 ml saline mixture = 100 mg bupivacaine and 400 mg lidocaine was used). When ESPB was performed, the maximum concentration of local anesthetics was 0.75% (20 ml 0.75% ropivacaine = 150 mg ropivacaine). We used 30 ml 0.5% levobupivacaine = 150 mg levobupivacaine. This dose was not greater than that in previous reports. One study reported plasma concentrations of local anesthetics after IV injection in rats [5]. The plasma concentrations at the onset of seizure did not differ significantly between levobupivacaine and ropivacaine. However, the plasma concentration of local anesthetic at the onset of dysrhythmia and asystole was higher with the administration of ropivacaine than with levobupivacaine. Therefore, it is possible that levobupivacaine is associated with a higher risk of LAST than ropivacaine.

This case report underscores the importance of awareness of possible LAST after ESPB, even though it is considered a simple and safe technique. Care must be taken when performing bilateral ESPB because large volumes of local anesthetics are used. Best practice might include using ropivacaine rather than levobupivacaine and reducing the dose of local anesthetics as much as possible. Further studies to evaluate the changes in plasma concentrations of local anesthetics after ESPB are needed to increase the safety of ESPB.

Conflicts of Interest

No potential conflict of interest relevant to this article was reported.

Author Contributions

Shunsuke Yawata (Conceptualization; Writing – original draft)
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