

## Convulsion due to levobupivacaine in axillary brachial plexus block: Case report

*Aksiller brakial pleksus blokajında levobupivakaine bağlı konvülsiyon: Olgu sunumu*

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### Abstract

Axillary brachial plexus block is an effective method of anaesthesia for the surgeries performed on the hand, forearm and distal third of the arm. However it has the risk of serious complications such as cardiovascular and central nervous system toxicity. Levobupivacaine is a long acting amide local anaesthetic used for epidural, caudal, spinal, infiltration and peripheral nerve blocks. Levobupivacaine is the S (-) isomer of racemic bupivacaine and has a lower risk of cardiovascular, central nervous system toxicity than bupivacaine. However central system toxicity cases due to absorption of the drug into the systemic circulation has been reported. Here, we report a case having no vascular puncture during axillary brachial plexus block performance but developing convulsion due to levobupivacain after the intervention.

**Keywords:** Axillary brachial plexus block, levobupivacaine, central nervous system toxicity, convulsion

### Özet

Brakial pleksusun aksiler yaklaşım ile bloğu el, ön kol ve kolun 1/3 distalinde yapılacak cerrahide etkin bir anestezi yöntemidir. Bununla birlikte kardiyovasküler ve santral sinir sistemi toksisitesi gibi ciddi komplikasyon riskleride bulunmaktadır. Levobupivakain amid yapılı epidural, kaudal, spinal, infiltrasyon ve periferik sinir bloklarında kullanılan uzun etkili bir lokal anesteziktir. Levobupivakain rasemik bupivakainin S (-) izomeridir ve kardiyotoksosite ve santral sinir sistemi toksisitesi riskinin bupivakaine göre azalmış olmasına karşın levobupivakain sonrası ilacın sistemik dolaşıma karışması ile santral sinir sistemi toksisitesi vakaları bildirilmektedir. Burada aksiller brakial pleksus blokajı yapılan bir olguda işlem anında herhangi bir damar ponksiyonu olmamasına rağmen kullanılan levobupivakaine bağlı işlem sonrasında gelişen konvülsiyon olgusunu sunmaktayız.

**Anahtar sözcükler:** Aksiller brakial pleksus blokajı, levobupivakain, santral sinir sistemi toksisitesi, konvülsiyon

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### Introduction

Axillary brachial plexus block is an effective method of anaesthesia for the surgeries performed on the hand, forearm and distal third of the arm. While the said blocking technique included paraesthesia previously, introduction of nerve stimulator has decreased the complications associated with the intervention and improved the success

rate of the block. Moreover, as less local anaesthesia is used as a result of improved nerve localization, toxicity risk associated with local anaesthetic agent has reduced [1, 2].

Levobupivacaine is a long acting amide local anaesthetic used for epidural, caudal, spinal, infiltration and peripheral nerve blocks. Levobupivacaine is the S (-) isomer of racemic bupivacaine. Although levobupivacaine has a lower risk of cardiovascular and central nervous system (CNS) toxicity than bupivacaine, central system toxicity cases due to absorption of the drug into the systemic circulation have been reported [3, 4].

Here, we report a case having no vascular puncture during axillary brachial plexus block performance but developing convulsion due to levobupivacain after the intervention.

### Case report

An axillary brachial plexus block was planned for a 32 years old male patient (170cm tall and weighing 80kg) undergoing an operation for a tendon cut on his right hand. History of the patient revealed no remarkable issues. In the operating room, routine monitoring was applied before administering any premedication. Axillary area was sterilized and block was initiated. Axillary artery was palpated and two injection points positioned above and below the axillary artery were used for the block. Nerves were located by a neurostimulator using a 24 gauge stimulation needle (0.5mA current). 30mL 0.5% levobupivacaine was used for the block. After observing that negative pressure aspiration held every 3 ml produced no fluid or blood, 15mL of solution was injected posterior and 15mL of solution was injected inferior to the axillary artery in 90 seconds. 10 minutes after the procedure, the patient having no change in heart rate, blood pressure, heart rhythm and pulse oximeter values was observed to have no response to verbal stimulus and have a tonic-clonic convulsion. At that point, his blood pressure was 121/81mmHg, pulse rate was 85/min. and SpO<sub>2</sub> was 99%. 5mg intravenous (IV) midazolam was administered to the patient. As his convulsion continued, a general anaesthesia was performed by intubating the patient using IV 5mg/kg thiopental, 0.6mg/kg rocuronium and 1 µg/kg fentanyl induction. After intubation, arterial blood gas (ABG) analysis revealed pH: 7.35, PO<sub>2</sub>:101 mmHg, PCO<sub>2</sub>: 37mmHg, HCO<sub>3</sub>: 20.8 mEq/L and SO<sub>2</sub>: 99%. After a one-hour operation, the patient having normal heart rate, blood pressure, heart rhythm and pulse oximetry values was awakened and taken to the intensive care unit. His cardiac rhythm, ECG, ABG and blood cardiac enzymes were observed to be normal during her stay in the intensive care unit. Postoperative pinprick test revealed that sensorial block continued for 3 hours. After a 24 hour follow-up at intensive care unit, the patient was observed to be normal without any additional problems and thus transferred to the orthopaedics clinic.

### Discussion

We aimed to describe a case of generalized seizure after injection of levobupivacaine for axillary brachial plexus blockade without IV puncture. This patient had no evidence of local anesthetic cardiovascular toxicity or instability, despite the generalized tonic-clonic seizure activity after blockade. The risk of accidental intravascular injection and acute toxicity is present with most neural blockade techniques. The severity of cardiovascular and central nervous system toxicity is directly related to the local anesthetic potency, dose, and rate of administration. CNS or cardiovascular toxicity of local anesthetics may result after accidental IV injection, rapid systemic uptake, or overdosage. Reports of deaths after intravascular injection of local anesthetics, especially bupivacaine and etidocaine during attempted epidural anesthesia in obstetric patients, led to changes in regional anesthetic practice. Awareness of the potential for serious cardiotoxicity with racemic bupivacaine also initiated the search for potentially safer alternatives to bupivacaine such as levobupivacaine.

Levobupivacaine is a long acting amide local anaesthetic composed of S-enantiomer of bupivacaine molecule. Clinical studies have revealed that anaesthetic and/or analgesic

effects of levobupivacaine are largely similar to those of bupivacaine at the same dose. Levobupivacaine is being used increasingly due to its reduced toxicity when compared to bupivacaine [4-6]. Complications such as convulsion, cardiac dysrhythmia or cardiac arrest have been reported in various local anaesthesia methods with different local anaesthetics [5, 7]. The incidence of seizure after peripheral neural blockade is approximately two seizures per 1000 procedures with local anesthetic-induced systemic toxicity [8, 9]. Cardiovascular complications associated with local anesthetic-induced seizure have a much smaller incidence, even when bupivacaine is used as local anesthetic [8, 9]. The studies by Knudsen et al. [10] and Scott et al. [11] found much larger tolerated CNS dose for ropivacaine than for bupivacaine. These two trials were continued until subjects felt more clearly defined CNS symptoms. In a study performed by Bardsley et al. [12], a larger dose of levobupivacaine than bupivacaine was tolerated before the appearance of CNS symptoms. Anesthetic infusions were discontinued at the first sign of CNS symptoms in the case. Cardiac changes normally become apparent only at large doses which required evoking CNS changes. It could also indicate the lack of change in cardiac measurements. In a study by Stewart et al. [13] founded that levobupivacaine had a higher therapeutic index than ropivacaine in healthy volunteers and this findings supports the old studies. As a result, in the literature, the ratio of toxic effects of local anaesthetics on central nervous system varies and it is rare. [14]. Our case shows that serious side effects can be observed even at weight adjusted doses, with appropriate techniques, in experienced hands and with the local anaesthetics considered to be innocent. For this reason, we would like to emphasize the importance of monitoring patients, performing the procedure rigorously, taking all the required measures and ensuring the resuscitation equipment are available.

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