

## Ultrasound Guidance for Axillary Plexus Block Does Not Prevent Intravascular Injection

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DIRECT visualization of anatomy by ultrasound during regional anesthesia was considered to likely minimize the incidence of complications of regional anesthesia due to needle misplacement. Neural impalements have been reported under direct vision of the brachial plexus. We report a case of inadvertent vascular puncture leading to a seizure during an ultrasound-guided axillary block.

### Case Report

A 27-yr-old man, American Society of Anesthesiologists physical status IE, was admitted for a penetrating trauma on the volar aspect of his right hand. Brachial plexus block was accepted by the patient and was performed under ultrasound guidance, associated with nerve stimulation as currently done at our institution. Standard monitoring was installed, and the patient received oxygen (3 l/min) *via* nasal prongs. A high-quality transverse sonogram of the axilla was obtained (Aloka Prosound 4000 S with a 12-MHz probe; Aloka Holding Europe AG, Zug, Switzerland), and all major structures, *i.e.*, the four nerves, the axillary artery, and two veins, were clearly identified. A resident performed the block under direct control of an experienced anesthesiologist (P.J.Z.). The needle was introduced using the in-plane approach. The median nerve was approached first, and a typical motor response was obtained by nerve stimulation. After two negative aspiration test results, two boluses of 4 ml mepivacaine, 2%, were slowly injected, and a “doughnut sign” was obtained after the needle was displaced from the anterior (4 ml) to the posterior (4 ml) aspect of the nerve. The radial nerve was then approached according to the same procedure (typical motor response during nerve stimulation, two boluses of 4 ml of the same solution slowly injected after negative aspiration test results). The needle was then redirected toward the ulnar nerve, which was located in the right upper quadrant.<sup>1</sup> The ulnar nerve was also easily located, and the injection was begun according to the same procedure. At that moment, approximately 4 min after the first injection, the patient became agitated and unresponsive, and perioral myoclonias were observed. The injection was immediately stopped, and the needle was

withdrawn. No sign of abnormal bleeding was observed in the axilla. Mask ventilation was difficult because a generalized seizure occurred. Approximately 2 min after the seizure had started, tracheal intubation was performed after administration of 350 mg thiopental and 100 mg suxamethonium. Seizures stopped immediately, and oxygen saturation was 100% as soon as a signal could be obtained. On the electrocardioscope screen, sinus rhythm and rare premature ventricular beats were noted. After a 10-min observational period, because the patient was stable under general anesthesia maintained with sevoflurane in oxygen, it was decided to proceed with the surgical procedure. Opioids were not needed during the 1-h surgical procedure, suggesting that the block was efficient. This was confirmed in the recovery room because motor and sensory blocks were complete and totally resolved 3 h after injection. The patient fully recovered without any sequelae and was discharged uneventfully on the following day. No blood sampling was performed.

### Discussion

Intravascular injection of local anesthetics remains a major risk of regional anesthesia and peripheral nerve blocks.<sup>2</sup> A repeated aspiration test is recommended but may not rule out an intravascular injection with certainty.<sup>3</sup> Administration of an epinephrine-containing test dose is not often performed during peripheral nerve blocks because of either simplicity or reluctance to use epinephrine. Ultrasound guidance, which allows the anesthesiologist to see the tip of the needle during the whole procedure, is thought to prevent intravascular injection. In this case, however, intravascular injection was likely. The time interval between injection and seizure was short and probably incompatible with local absorption of the drug. Importantly, intravascular injection was not detected by direct visualization, and we did not suspect vessel puncture at any time before the complication occurred. The two first injections had distorted the anatomy of the axilla, and the veins were probably displaced or compressed by the local anesthetic, making their visualization more difficult.

In conclusion, ultrasound guidance for nerve block, even in experienced hands and with a clear sonogram of the needle and anatomical structures, does not eliminate the risk of intravascular injection. Standard safety rules should not be minimized because of ultrasound guidance.

This article is accompanied by an Editorial View. Please see: Hadzic A, Sala-Blanch X, Xu D: Ultrasound guidance may reduce but not eliminate complications of peripheral nerve blocks. *ANESTHESIOLOGY* 2008; 108:557–8.

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### References

1. Retzl G, Kapral S, Greher M, Mauritz W: Ultrasonographic findings of the axillary part of the brachial plexus. *Anesth Analg* 2001; 92:1271–5
2. Auroy Y, Benhamou D, Bargues L, Ecoffey C, Falissard B, Mercier FJ, Samii K: Major complications of regional anesthesia in France: The SOS Regional Anesthesia Hotline Service. *ANESTHESIOLOGY* 2002; 97:1274–80
3. Guay J: The epidural test dose: A review. *Anesth Analg* 2006; 102:921–9