

Complete resolution of myoclonus-like involuntary movements under subarachnoid block after midazolam administration in a patient undergoing cesarean section -a case report-

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Involuntary movement during and after neuraxial anesthesia, such as spinal and epidural anesthesia, is rarely observed. In this report, we describe a case of myoclonus-like involuntary movement of the upper extremities in a patient undergoing a planned repeat cesarean section under spinal anesthesia with bupivacaine that completely subsided after administration of 2 mg of midazolam. The myoclonus-like movement did not recur or cause any apparent neurological side effects.

Key Words: Cesarean section, Involuntary movement, Myoclonus, Spinal anesthesia.

Involuntary movement during and after neuraxial anesthesia, such as spinal and epidural anesthesia, is not frequently observed. Spinal myoclonus is a pathological state that can result in involuntary movement.

In this report, we describe a case of myoclonus-like involuntary movement of the upper extremities in a patient undergoing a planned repeated cesarean section (CS) under spinal anesthesia with bupivacaine that completely subsided after administration of 2 mg of midazolam.

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Case Report

A 35-year-old female (weight, 65 kg; height, 159 cm) was scheduled to undergo a planned repeat CS. She had undergone a CS under spinal anesthesia 2 years previously. Her medical history revealed no seizures or other neurological disorder during her current or previous pregnancies. Preoperative evaluation revealed no remarkable risk factors such as hypertension or glucose intolerance. Thus, the patient was considered to have an American Society of Anesthesiologists physical status of I during the preoperative consultation, and a combined spinal-epidural anesthesia technique was planned. The patient was not premedicated. Monitoring involved electrocardiography, non-invasive blood pressure, and pulse oximetry. Body temperature was monitored by a thermistor equipped at the top of a urinary catheter.

With the patient fully awake, the epidural catheter was placed at the T12/L1 space, and a spinal tap was performed at the L2/L3 space with a 25-G Quincke needle in the left lateral decubitus position after skin sterilization with 0.5 w/v% chlorhexidine gluconate/ethanol. After backflow of clear cerebrospinal fluid,

12.5 mg of hyperbaric 0.5% bupivacaine without preservatives (AstraZeneca, Osaka, Japan) with 15 µg of fentanyl (Janssen Pharmaceuticals) were injected into the subarachnoid space. The patient was then placed in the supine position. Discernible sensory block to cold sensation was promptly observed. Finally, before the start of the surgical incision, a sensory block to cold to the T3 level with accompanying motor block was obtained. Vasopressors, including 8.0 mg of ephedrine and 0.6 mg of phenylephrine, were administered to maintain systolic blood pressure at >100 mmHg during the operation. In total, 900 ml of a crystalloid and 500 ml of a colloid were administered intravenously.

The surgical procedure proceeded uneventfully, and a live male infant and placenta were delivered 9 and 11 min after skin incision, respectively. All other surgical findings were unremarkable, and routine antibiotics and uterotonic oxytocin were administered. No drugs were administered into the epidural space. Because no hypnotics were used for sedation, the patient was awake during the operation.

The operation was completed 1 h 10 min after the spinal tap. At the time of completion, involuntary movements began (Fig. 1 and Video 1). The movement was observed in both upper extremities, but the movement of the left side was more pronounced (Video 1). No remarkable vital sign changes were observed before or during the movement. The patient's systolic blood pressure, diastolic blood pressure, and heart rate were 105 mmHg, 74 mmHg, and 87 beats/min before the beginning of the movement and 110 mmHg, 69 mmHg, and 93 beats/min immediately after the beginning of the movement, respectively. The sensory block to cold subsided to the T8 level, and sensory and motor functions in her upper extremities were intact. The patient was fully conscious, calm, and responsive. She complained that she could not

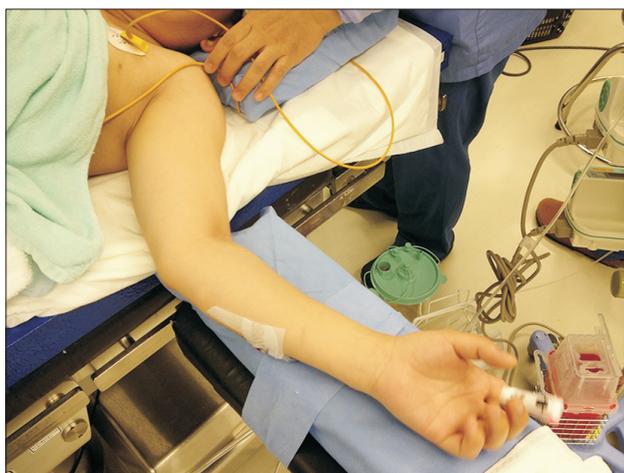


Fig. 1. Left upper extremity of the patient. Myoclonus-like involuntary movement was observed in both upper extremities.

stop the movement. She did not complain that she felt cold. The body temperature at her bladder was 36.8°C, and no coldness of the upper extremities was observed. Because she was alert and in a calm mental state, she was untreated until examination by a neurologist. After the examination, 2 mg of midazolam were administered after 33 min of involuntary movement. Three minutes after administration, the involuntary movement stopped (Video 1).

The patient was subsequently transferred to the ward, and the involuntary movement did not recur. Five hours after the surgery, the spinal block had completely subsided. No abnormal sensation or spontaneous pain of the upper or lower extremities was observed. The patient was discharged on foot on postoperative day 3.

Discussion

In this report, we describe a case of involuntary muscle contraction of the upper extremities observed in a pregnant patient undergoing CS under spinal anesthesia with bupivacaine. The involuntary movement immediately subsided after intravenous midazolam administration.

One of the most critical differential diagnoses in this case was eclampsia [1,2]. Eclampsia is one of the most serious complications of pregnancy and is characterized by tonic-clonic seizure. Eclampsia could be excluded because of the progression of the pregnancy and the patient's clear and calm mental state during the contractions. The other differential diagnosis was shivering [3,4]. However, this diagnosis was ruled out by subjective and objective evidence provided by the patient and the obvious laterality of the contractions. Thus, the involuntary contractions observed here were diagnosed as spinal myoclonus subsequent to subarachnoid block by bupivacaine.

Myoclonus is an involuntary contraction of a muscle or group of muscles [5,6]. Spinal myoclonus is identified as myoclonus originating in the spinal cord and includes segmental and propriospinal myoclonus [7]. It is often excitation-induced without triggering by external events and can be induced in patients without specific neurological diseases. The specific mechanisms underlying myoclonus are not yet completely understood. The pathophysiology of spinal myoclonus seems to involve abnormal hyperactivity of the local interneurons of the dorsal horn with loss or impairment of inhibition of suprasegmental descending pathways [5,6]. Furthermore, several case reports of spinal myoclonus subsequent to neuraxial anesthesia have been published [8-12]. According to these previous reports, the onset, duration, and recurrence of spinal myoclonus are not predictable and are not related to dose or baricity of local anesthetics or concomitant drugs used in spinal anesthesia. One report described myoclonus caused by an epidural block [11]. The myoclonus devel-

oped at several time points after spinal block: immediately and again at 3 min, 7 h, and 1 day after the beginning of the block. In the present case, the involuntary muscle contraction began 40 min after the spinal block. In addition to local anesthetics, analgesics and contrast media administered into the intrathecal and epidural spaces can induce myoclonus. In the present case, 15 µg of fentanyl were administered concomitantly with bupivacaine. Several previous reports have identified opioid-induced neuroexcitation by mechanisms that remain unknown [13].

Another feature of this case is that the affected location was the upper extremities. Previous reports describe myoclonus of the lower extremities. In addition, the left extremity was dominantly affected. However, the mechanism of the phenomenon is largely unknown.

Treatment for sudden-onset myoclonus has not been established [14,15]. Anticonvulsants such as sodium valproate, clonazepam, levetiracetam, and piracetam have been used. In addition, barbiturates can be utilized to stop the movement [14]. Benzodiazepines also can be used to treat myoclonus of the type presented herein. In a previous report, midazolam and diazepam were only partially effective [10]. In this case, however, administration of 2 mg of midazolam resulted in prompt and complete remission of the involuntary contractions. The involuntary movement may be psychogenic from the striking effect of midazolam.

This patient underwent CS under spinal anesthesia 2 years

before the present surgery, and the involuntary movement did not occur at that time. However, one report described a case in which recurrent spinal myoclonus under spinal anesthesia occurred twice at a 1-year interval [10]. If the patient has a chance of undergoing CS or other surgical treatment with spinal anesthesia, the anesthesiologists should consider the possibility of recurrence of this involuntary movement.

The diagnosis of spinal myoclonus may be difficult for several reasons. Myoclonus or myoclonus-like involuntary movement can have various causes, such as epileptic, drug-induced, biochemical, infectious, metabolic, and focal neurologic pathologies. Even physiologic (e.g., anxiety) or essential myoclonus is possible. Therefore, basic ancillary testing for myoclonus should be performed, including electrolyte level determination, glucose level determination, renal function testing, hepatic function testing, paraneoplastic antibody detection, drug and toxin screening, electromyography, magnetic resonance imaging of the spine and brain, and magnetoencephalography. In this case, no marked abnormalities of the laboratory data were seen. However, electromyography and magnetic resonance imaging results were not available.

In summary, we have described a case of spinal myoclonus under spinal anesthesia during repeat CS that promptly subsided after intravenous administration of midazolam.

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