

# Spinal anesthetic management for discectomy in a patient with amyotrophic lateral sclerosis

## -A case report-

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Amyotrophic lateral sclerosis (ALS), also referred to as Lou Gehrig's disease, is a degenerative disorder of motor neuron system of the spinal cord and the cortical neuron. Patients with ALS present a unique challenge to the anesthesiologist. Respiratory muscle weakness, for instance, can result in trouble with proper breathing after general anesthesia. We report a case of spinal anesthesia for discectomy in a patient with ALS. (Korean J Anesthesiol 2012; 63: 547-549)

**Key Words:** Amyotrophic lateral sclerosis, Discectomy, Spinal anesthesia.

Amyotrophic lateral sclerosis (ALS) is a progressive neurodegenerative disease that affects the upper and the lower motor neurons. The clinical features can be considered in relation to neurological regions or levels. Physical signs of this disorder encompass both, the upper and the lower motor neuron findings. Atrophy and weakness of respiratory muscles eventually lead to respiratory failure and death. General anesthesia may cause fatal respiratory depression because the response to muscle relaxants is sensitive in ALS patients. Lumbar epidural anesthesia was done safely for low abdominal surgery in a patient with ALS [1]. But neuroaxial anesthesia may exacerbate pre-existing neurologic disease [2]. We report a case of spinal anesthesia for discectomy in a patient with ALS.

## Case Report

A 64-year-old man, 165 cm in height and 70 kg in weight, visited the department of neurosurgery due to severe pain on the left lateral leg. On physical examination, left ankle dorsiflexion was impaired. Magnetic resonance imaging (MRI) of lumbosacral vertebral column showed a left paramedian disc extrusion, between lumbar 4 and 5 vertebrae. The patient was scheduled for discectomy. In premedical history, the patient complained of dysarthria, dysphagia and weakness in both legs, while walking 3 years ago. He also complained of dyspnea, although, there were no abnormalities on the blood gas analysis. On the physical findings by a neurologist, deep tendon

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reflex was exacerbated and babinski test was positive. The electromyogram (EMG) suggested that the patient had a motor neuron disease and he was diagnosed with ALS. Pulmonary function test was not performed before the operation, due to the undergoing emergency operation for resolution of severe pain on the left leg.

Spinal anesthesia for discectomy was chosen to avoid respiratory complication, which is associated with general anesthesia. No preanesthetic medication was given. Spinal anesthesia was done between lumbar 3 and 4, via a midline approach in the left lateral position and was injected with 10 mg of 0.5% hyperbaric bupivacaine, plus fentanyl 20 µg using a 25 gauge Quinke spinal needle. Immediately after the injection of local anesthetic agent and opioid, the patient was placed back to the supine position. The level of the spinal anesthesia was T10, after 15 minutes and then we changed the patient's position from supine to prone position. Propofol at a rate of 0.5–1.0 mg/kg/hr was infused for sedation with O<sub>2</sub> 5 L/min via nasal cannula. Intraoperatively, vital signs were as follows: blood pressure of 122 to 139/81 to 95 mmHg; heart rate between 75 and 97 beats/min; and oxygen saturation of 100%. There were no complications for one and a half hour of the surgery. The patient was monitored for one hour, in postoperative anesthetic care units (PACU), and then was discharged from PACU. The patient was fully recovered at 5 hours, after the spinal anesthesia and no exacerbation of neurologic signs or symptoms were revealed. The patient was discharged two days after surgery and at the 3 months follow-up, there were no neurologic complications due to spinal anesthesia.

## Discussion

ALS is a fatal neurodegenerative disease. Patients with ALS become progressively paralyzed, while remaining fully alert mentally, due to degeneration of the upper and the lower motor neurons in the brain and spinal cord. Brain stem involvement produces dysarthria (slurred speech), dysphagia, and aspiration [3]. Respiratory insufficiency is one of the most critical issues for the majority of patients with ALS, and thus, there has been a great concern regarding the effects of anesthetic management on respiratory function. General anesthesia may cause aspiration and/or ventilatory depression, due to abnormal responses to muscle relaxants [4]. In general anesthesia, dose of non-depolarizing muscle relaxant should be reduced [5] or avoided [6] because of the possible occurrence of ventilatory depression because of abnormal responses to muscle relaxants. Therefore, regional anesthesia can be considered a safer modality than that of general anesthesia, on the respiration system, in low extremity or abdominal operation. Recently, there was the case that combines epidural and spinal anesthesia was undergone

for the operation of femur fracture of a patient with ALS, without complication [7]. But it was reported that neuroaxial anesthesia could exacerbate pre-existing neurologic disease [8]. Because of demyelination, which is associated with motor neuron diseases, the spinal cord is more susceptible to the potential neurotoxic effects of local anesthetics [2]. However, Hebl et al. [9] investigated the frequency of new or progressive neurologic complications in 139 patients with a confirmed, preexisting CNS disorder that underwent neuroaxial anesthesia or analgesia. They suggested that the risks that are commonly associated with neuroaxial anesthesia and analgesia in patients, with preexisting central nerve system (CNS) disorders, may not be as frequent as once thought (95% confidence interval, 0.0–0.3%). Further, neuroaxial blockade should not be considered absolute contraindication within this population of patients.

Silver et al. [10] reported 576 cases of operations on the herniated lumbar disc under the spinal anesthesia. They concluded that proper administration of spinal anesthesia for the herniated lumbar disc is a safe procedure.

Patients with ALS have characteristic abnormalities in pulmonary function, including reduced vital capacity (VC) [11]. Level of block in regional anesthesia affects respiratory function. For example, in epidural anesthesia, sensory block above T6 reduces the expiratory reserve volume (ERV) and it may depress respiration [12]. High level of block can result in the inability to cough effectively, which leads to a reduced clearance of secretions from the airway. Hara et al. [13] reported that epidural anesthesia temporarily decreased VC, in the immediate postoperative period, without any neurologic exacerbation.

Body position also exerts a strong effect on the pulmonary function. Knee chest position and prone position are mostly used for lumbar discectomy. Yilmaz et al. [14] found that forced expiratory volume in 1 second (FEV1), peak expiratory Flow (PEF) and forced expiratory flow 25 (FEF25), significantly decreased in the knee-chest group, compared with that of the prone group. The knee-chest position could cause a restrictive effect. Propofol does not have any effects on neuromuscular junction. In addition, propofol has a high clearance rate, which contributes to a relatively rapid recovery after continuous infusion [15]. Therefore, we selected propofol for the sedation of this patient.

In conclusion, in this case, no neurologic deteriorations were observed, after spinal anesthesia for discectomy in a patient with ALS. Therefore, we suggested that spinal anesthesia can be an alternative option for discectomy in a patient with ALS.

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