Letter to the Editor

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Labor analgesia and anesthetic management during emergency cesarean section of parturient with spinal cord injury (SCI)

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The number of patients with spinal cord injury (SCI) has increased recently due to the development of medical management and rehabilitation. As the survival rates of females with SCI are increasing, the number of parturient females with SCI is also rising [1]. Autonomic dysreflexia (ADR) is the most serious complication in parturient females with SCI above the T10 level, because uterine contractions and labor pain cannot be detected by the patients themselves. Early fetal and uterine monitoring with adequate labor analgesia is essential to prevent ADR [2]. Parturient females with SCI should be assessed by a multidisciplinary team that includes an obstetric anesthesiologist, obstetrician, and neurologist, and an intrapartum care plan should be established early to avoid labor-induced ADR [3]. We herein present a case of a parturient female with SCI at the level of T6 who was admitted for early labor analgesia but in whom normal delivery failed; an emergency cesarean section was successfully performed under epidural anesthesia.

A 36-year-old, 148 cm, 49 kg, primigravida and primipara parturient female was admitted at 34 + 2 weeks' gestation for delivery. She had been paraplegic with muscular atrophy due to T6 damage after suffering from poliomyelitis when she was 5 years old. Partial sensation remained below T10. She reported no previous experience of ADR. Uterine contraction and labor pain are known to potentially induce ADR; in addition, her uterine contractions were thought to be insufficient for vaginal delivery. Thus, she was admitted for careful observation of her uterine contractions and for induction of labor.

No blood test abnormalities were noted at the time of admission, but cardiomegaly was evident on a chest X-ray. Pulmonary function testing showed a moderate restrictive pattern (FVC, 55%; FEV1, 63%; FEV1/FVC, 90%), but the results of her arterial blood gas analysis were within the normal range. A sinus rhythm was present on the electrocardiogram (ECG), and mild mitral/atrial regurgitation with normal systolic function (ejection fraction, 68%) and a graft valve was observed on echocardiography. The cardiologist stated that according to her cardiac function, she might be at low risk for delivery, and if a hypertensive event occurred due to ADR, it could be controlled with nitroglycerine, nicardipine, and nitroprusside.

At the time of admission, her vital signs were stable (blood pressure, 90–106/50–65 mmHg; heart rate, 77–88 /min; respiratory rate, 20 /min; body temperature, 35.8°C). Upon admission, her cervical dilatation was 3 to 4 cm and effacement was 50%. A continuous fetal heart rate and labor monitoring were maintained, but there was no progression for 6 days after admission. On the seventh day after admission, the amniotic membrane ruptured and the uterus contracted for 5 to 6 min cycles. Epidural labor analgesia was planned, and an epidural catheter was inserted through the L4–5 interspace upon feeling a loss of resistance. An injection of 0.75% ropivacaine (10 ml, 75 mg), fentanyl (200 μg), and normal saline (87 ml) (total amount, 100 ml) was administered as a bolus dose after a test dose, and a patient-controlled analgesia pump for continuous infusion was connected with the remainder (90 ml) of the mixture at a flow rate of 10 ml/h. A radial arterial catheter was placed, and continuous monitoring of her blood pressure, ECG, and pulse oximetry was performed. About 2 h later, an oxytocin infusion was started to induce labor. Her cervix was fully effaced 4 h after the

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oxytocin infusion was begun, and her blood pressure and heart rate became elevated slightly to 154/104 mmHg and 82 /min, respectively. ADR was suspected, and a continuous infusion of nitroglycerine was started from 0.4 μg/kg/min and tapered for 2 h. About 3 h after full cervical effacement, failure of descent was diagnosed and an emergent cesarean section was planned.

The patient was transferred to the operating room without premedication, and standard monitoring was begun, including ECG, pulse oximetry, and continuous invasive blood pressure measurement. A facial mask with a reserve bag was fitted to the patient with a fresh gas flow of 6 L/min of 100% oxygen. Seven milliliters of 0.75% (52.5 mg) ropivacaine was injected via an epidural catheter, and her level of sensory block was determined at T6 using an alcohol swab and pinprick test. During the emergency cesarean section, the vital signs of the patient were stable (blood pressure, 127/84 mmHg; heart rate, 100 /min; oxygen saturation, 100%). After placental extraction, 30 IU of oxytocin was administered and titrated according to her blood pressure and uterine contractions. Her level of sensory block was determined to be at T6 using an alcohol swab after the surgery, and there were no hemodynamic abnormalities during the cesarean section. Hemodynamic monitoring was continued in the recovery room, and the epidural catheter was removed 1 h after the surgery. Postoperative pain control was achieved using an intravenous NSAID.

ADR is initiated by noxious stimuli below the lesion. Such noxious stimuli may include bowel or bladder distension, pelvic examination, uterine contraction, or pain [2]. The impulse is then transmitted to the spinothalamic tract and posterior columns. Sympathetic spinal reflexes are propagated, and the inhibitory outflow from the hypothalamus increases. However, the inhibitory outflow cannot be transmitted in patients with SCI, and this unregulated sympathetic activity leads to severe hypertension [3]. It is important to avoid trigger factors, especially during pregnancy. For example, urinary catheterization or pelvic examination using a speculum should be performed under topical anesthesia, and a proper bowel regimen should be applied if the patient complains of constipation or bowel distension [1].

Hypertension is also a sign of pre-eclampsia; therefore, distinguishing ADR from preeclampsia is important for appropriate treatment. In cases of ADR, hypertension and other symptoms are synchronous with uterine contraction, but the symptoms in patients with pre-eclampsia are independent of uterine contractions. In addition, an elevated LFT may be seen in patients with pre-eclampsia, in contrast to the normal LFT of patients with ADR [1].

Epidural catheterization should be established early in labor and maintained during the postoperative period for adequate pain control. Achievement of a T10 sensory level or higher should be attempted [2]. Despite the lack of sensation, epidural catheterization for continuous analgesia is considered to be the most effective method of preventing ADR during labor [4]. In the present patient, the epidural catheter was removed in the recovery room to prevent catheter infection because decubitus ulcers were present near the insertion site of the epidural catheter, and methicillin-resistant *Staphylococcus aureus* was cultured from the sore.

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