Case Report

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Obstetric anesthesia considerations in Kearns-Sayre syndrome -a case report-

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Kearns-Sayre syndrome (KSS) is a rare mitochondrial myopathy that usually develops before 20 years of age. It demonstrates multisystemic involvement with a triad of cardinal features: progressive ophthalmoplegia, pigmentary retinopathy, and cardiac conduction abnormalities. In addition, patients might have cerebellar ataxia, a high content of protein in the cerebrospinal fluid, proximal myopathy, multiple endocrinopathies, and renal tubular acidosis. We herein report the successful obstetric analgesic and anesthetic management of a 28-year-old parturient patient with KSS who required labor analgesia and proceeded to deliver by cesarean section. We extrapolate that regional analgesia/anesthesia might be beneficial for reducing the metabolic demands associated with the stress and pain of labor in patients with KSS. Efficient postoperative analgesia should be provided to decrease oxygen requirements. (Korean J Anesthesiol 2014; 67: 283-286)

Key Words: Kearns-Sayre syndrome, Mitochondrial Myopathies, Obstetric anesthesia.

Kearns-Sayre syndrome (KSS) is a rare mitochondrial cytopathy. Syndromes that involve deletion of mitochondrial DNA (mtDNA) mainly involve three overlapping phenotypes that are usually simplex (i.e., single occurrence in a family). The three phenotypes are KSS, Pearson syndrome, and progressive external ophthalmoplegia. There is no correlation between the size or location of the mtDNA deletion and the resulting phenotype. These changes are usually not inherited, but occur spontaneously. The disease only ensues when the proportion of mutated to wild-type mtDNA exceeds a tissue-specific threshold in excess of 65% mutated mtDNA. This threshold varies widely between tissues and individuals. Deletions of mtDNA are usually present in all tissues in individuals with KSS [1]. KSS was first described in a case report of two patients in 1958. The syndrome usually presents before the age of 20 years. It has an estimated incidence of 1 to 3 cases per 100,000 populations [2]. KSS has no racial or sex predilection. It is characterized by ophthalmoparesis and pigmentary retinopathy in addition to other manifestations such as cerebellar ataxia, cardiac conduction block, a high content of protein in the cerebrospinal fluid, and proximal myopathy. Multiple endocrinopathies as well as renal tubular acidosis have been described in many cases [3,4].

We herein report the successful obstetric analgesic and anesthetic management of a 28-year-old parturient patient with KSS who went through labor at our university hospital. We extrapolate the obstetric anesthetic implications in parturient patients with this rare disorder.

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Case Report

A 28-year-old pregnant primigravida in her 36th week of gestation was admitted to the labor suite in an early stage of active labor. The patient was diagnosed with KSS at the age of 23 years, which was confirmed by skeletal muscle biopsy. Her medical history included pigmentary retinopathy, diabetes mellitus, hypothyroidism, depression, and paroxysmal supraventricular tachycardia. She described mild proximal muscle weakness during pregnancy. The patient was followed up by the high-risk obstetric clinic, a cardiologist, and an endocrinologist during her pregnancy. On admission, the patient appeared mildly distressed. Although she was afebrile, her vital signs were as follows: blood pressure (BP): 145/95 mmHg, pulse rate: 95–100 beats/min; and respiratory rate: 16–18 breaths/min. Laboratory investigations revealed normal values with the exception of a hemoglobin level of 92 g/L and serum lactate level of 3.2 mmol/L (normal value, 0.5–1.6 mmol/L). Precautions to manage possible dysrhythmias (such as paroxysmal SVT) were taken, including ECG patient monitoring, antiarrhythmic medication preparation, and a standby DC shock defibrillator. The option of epidural analgesia was planned ahead and discussed with the patient, and she agreed. An epidural catheter was uneventfully placed at the L3–4 level. An initial bolus of 15 ml 0.1% ropivacaine with 3 μg/ml fentanyl and 2 μg/ml epinephrine was given, resulting in a bilateral T5–6 sensory level. Then epidural analgesia was maintained by infusion of 0.08% ropivacaine with 2 μg/ml each of fentanyl and epinephrine at a rate of 10 ml/h with a patient-controlled epidural analgesia bolus dose of 5 ml, 10 min delay time, and maximum of 40 ml/h. Oxygen by nasal prongs and IV Ringer's lactate fluid infusion were initiated, and the patient was kept under continuous monitoring of SpO_2, invasive BP and HR as well as fetal monitoring. Four hours after starting the epidural analgesia, the serum lactate was 2.2 mmol/L.

Due to failure of labor progression, the obstetric team decided to deliver the baby by cesarean section. We opted to use the already-inserted epidural catheter to establish anesthesia for the cesarean section. A total of 15 ml 2% lidocaine with 5 μg/ml fentanyl and 2 μg/ml epinephrine was administered into the catheter in divided boluses. A dense sensory block up to the T3–4 level resulted. Cesarean section was performed without complications, and a live baby was delivered with Apgar scores of 8 and 9 at 1 and 5 min, respectively, and a cord blood pH of 7.14. Two milligrams of preservative-free morphine was given epidurally to provide postoperative pain control. Hypothermia was avoided by giving warm IV fluids and providing heat with a forced-air warming blanket. The patient and the baby remained in a stable condition postoperatively and were discharged home on the third postoperative day. All laboratory results, including arterial blood gases and the serum lactate level were normal.

Discussion

KSS is a rare mitochondrial myopathy syndrome characterized by the cardinal features of myopathies (especially of the eye muscles), bilateral pigmentary retinopathy, and cardiac conduction abnormalities. In addition to this triad, other body organs may be affected, resulting in cerebellar ataxia, proximal muscle weakness, deafness, diabetes mellitus, growth hormone deficiency, or other endocrinopathies [1,5]. Obstetric anesthetic management in patients with mitochondrial myopathies has been described in few papers in the literature. Agents that trigger malignant hyperthermia (MH), such as volatile anesthetics and succinylcholine, have been recommended to be avoided in cases of mitochondrial disorders in some studies. There is one case report of MH in a pediatric patient after exposure to succinylcholine [7], while another study [8] described a case of successful general anesthesia (GA) for a patient with KSS who underwent laparoscopic cholecystectomy; sevoflurane was used to safely maintain anesthesia. Kitoh et al. [9] also described a case of exploratory laparotomy under GA in which isoflurane was used, and the patient developed respiratory depression and left bundle-branch block postoperatively. During labor, oxygen consumption increases above its value before pregnancy by 40% in the first stage and 75% in the second stage. The aerobic oxygen requirements of laboring parturient patients surpass oxygen consumption, resulting in a progressive rise in blood lactate [10]. This might be more clinically significant in patients with KSS because it will be added to the already-present liability to develop lactic acidosis; therefore, arterial blood gases must be frequently monitored. Instigation of neuraxial analgesia can alleviate these changes during labor by reducing this increase in oxygen consumption by 25% [6,10]. Increased serum lactate levels can occur with or without lactic acidosis. Unlike hyperlactatemia, the buffering systems in lactic acidosis are deranged and tissue oxygenation is inadequate. In the present patient, the initial laboratory results showed hyperlactatemia without acidosis. However, epidural analgesia helps to decrease the serum lactate level and possibly the development of acidosis that may occur with increased oxygen requirements in the second stage of labor in liable patients [11,12]. Other benefits of epidural anesthesia include avoidance of GA and hence staying away from muscle relaxants, including succinylcholine, and avoidance of volatile anesthetics that might trigger MH or cause postoperative residual muscle blockade in a person with demonstrated muscle weakness [10]. Spinal anesthesia plus intrathecal morphine would have been a suitable alternative to epidural anesthesia for caesarean delivery in our case. An important consideration is to maintain the body temperature and prevent shivering during the perioperative period. In parturient patients with deficiencies of the electron transport chain and increased serum lactate concentrations, it is advised

to best manage their labor with elective caesarean delivery using regional anesthesia [13]. Obstetric anesthetic management of parturient patients with KSS should include a careful assessment of the neurologic, cardiac, muscular, and metabolic status. Neurological examination should ascertain cognitive function, muscular weakness, and neuropathy. Obstacles to regional anesthesia may include significant cognitive impairment, respiratory muscle weakness, or liver dysfunction affecting the coagulation status. Cardiac involvement will require careful preoperative evaluation including cardiology consultation and a baseline ECG and echocardiogram. When GA is required, some considerations must be taken. It is wise to avoid giving succinylcholine because of its possible MH-triggering effect in this group of patients and because of the probable risk of hyperkalemia after its administration. Sensitivity to other neuromuscular blocking agents has also been reported; hence, it is prudent to closely monitor patients for the development of neuromuscular blockade and to use drugs with a shorter duration of action [14]. In addition, a patient may have sensitivity to intravenous (IV) anesthetic agents such as propofol and thiopentone, as has been reported in some studies; this must be kept in mind to avoid the cardiac depressant effects of these medications. It may also be useful to have external or intravenous pacing capabilities and various vasopressors and antiarrhythmic agents available [6]. The use of nitrous oxide and other inhalational anesthetic agents has been described without complications in patients with KSS [8]. An adequate oxygen balance and good gas exchange should be maintained to minimize acidosis. Careful titration of opioids and sedatives is necessary to prevent respiratory failure that can result from a decreased ventilator drive to hypoxia and hypercarbia [15]. Special attention should be paid to postoperative analgesia because it is essential to decrease oxygen consumption and begin early ambulation. IV patient-controlled analgesia with or without a transversus abdominis plane block can be used to control postoperative pain after caesarean section under GA.

In summary, KSS is a rare myopathy syndrome resulting from mtDNA deletions with multisystemic involvement. Successful obstetric analgesic and anesthetic management of parturient patients with KSS will allow them to benefit from epidural analgesia/anesthesia, which might reduce the metabolic demands associated with the stress and pain of labor. Spinal anesthesia may be one option for caesarean delivery in these patients. Precautions should be taken to monitor and manage possible cardiac dysrhythmias. It is also recommended to monitor blood gases and serum lactate levels in these patients and to avoid shivering. In addition, efficient postoperative analgesia will help to decrease oxygen requirements.

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