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Obstetric Anesthesia for a Patient with Malignant Hyperthermia Susceptibility

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This is a follow-up on a case report previously published in Anesthesiology concerning a patient with a family history of hyperthermia. The same patient has subsequently had spinal anesthesia for vaginal delivery. Creatine phosphokinase (CPK) levels in her plasma rose from 1,605 IU before labor to 2,390 IU during spinal anesthesia, an alarming increase in a few hours' time. Most of the family members were investigated for creatine phosphokinase levels.

REPORT OF A CASE

A 35-year-old gravida 4, para 1, well-developed and well-nourished Caucasian woman, with a known history of susceptibility to malignant hyperthermia, was admitted electively for induction of labor. Labor was induced with pitocin at 8:00 A.M., until onset of labor at 10:00 A.M., at which time the membranes were ruptured. Large quantities of ice and ice-cold physiologic saline solution were stored in the labor room. The patient was placed on a cooling blanket, but it was not utilized. The temperature, EKG, blood pressure, pulse, and respirations were monitored prior to pitocin induction and then every 5 minutes thereafter until the patient was discharged from the recovery room. An arterial line was placed in the radial artery for monitoring blood gases. During pitocin induction, but before the onset of labor, a complete blood count, chemistry and enzyme levels and urinalysis were obtained. All laboratory results were essentially within normal limits except for marked increases in serum enzymes. The most significant findings were elevations of CPK to 1,605 IU, serum X-hydroxybutyric dehydrogenase (HBD) to 987 IU, serum lactic dehydrogenase (LDH-L) to 696 IU, and serum glutamic oxalacetate transaminase (SGOT) to 79 IU.† Onset of the second stage started at 1:15 P.M., and the patient was sent to the delivery room. At 1:20 P.M. hyperbaric spinal anesthesia with 7.5 mg tetracaine was administered. The patient was given oxygen at 5 l/min via face mask and monitored for arrhythmias and changes in temperature and vital signs. Blood chemistries and serum enzyme levels were obtained during spinal anesthesia. A healthy female baby weighing 3,330 g was born at 1:28 P.M. Apgar scores were 9 at 1 min and 10 at 5 min. Labor and delivery were uneventful.

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FIG. 1. Family tree.

DISCUSSION

Several reports confirm the familial occurrence of malignant hyperpyrexia. This patient and her family confirm this finding (see fig. 1). Three members of this family have died of malignant hyperthermia during surgical procedures or in the recovery room. The possibility of malignant hyperthermia occurring during labor and delivery has been raised by Crawford. Such an event has not been reported. A relative of the patient reported here developed muscle rigidity during labor and delivery in 1943. She apparently received "twilight sleep" for her anesthesia. Both mother and fetus died. It must be assumed that malignant hyperthermia was the cause, but unfortunately supportive data are lacking. Another relative of the patient died of malignant hyperthermia in 1962 while being operated on for osteochondroma. In laboratory studies of the patient's family, CPK levels of four of eight family members were found to be elevated. Our patient, whose nonpregnant CPK level was 486 IU, had a dramatic increase during vaginal delivery and spinal
anesthesia from 1,605 to 2,390 IU. A control level of 1,199 IU was obtained 18 months after delivery.

HBD, LDH-L, and SGOT also increased during spinal anesthesia, to 1,245, 846, and 109 IU, respectively. Control levels after 18 months were LDH-L 456 IU and SGOT 56 IU (HBD was not determined).

Kalow suggested that malignant hyperthermia is a syndrome resulting from more than one mechanism and thus the etiologic and triggering mechanism may vary from person to person. Regional anesthetic techniques have been recommended as the best choice, if possible, for surgical procedures. The increase in CPK in our patient during spinal anesthesia, and the decrease in CPK during her earlier parotidectomy operation with ketamine anesthesia, clearly demonstrate different responses, and carry a warning to be aware and careful when such a patient is subjected to a regional technique. To my knowledge no-one has reported a case of malignant hyperthermia resulting from regional anesthesia; however, I feel that regional techniques may be safer, but they are not foolproof. The increases in CPK and other serum enzymes during labor could have been due to uterine contractions or to increased muscle activity resulting from pain and hormonal changes or altered hepatobiliary functions associated with pregnancy.

In considering which anesthetic would be best for our patient we took into account that her relative had died during “twilight sleep” for vaginal delivery. Based on the possibility that this might occur with our patient, it was decided that no narcotic would be given during the first stage of labor. The patient refused a continuous regional technique during the first stage of labor. The findings in this case suggest that elevation of CPK and other enzymes might provide good screening tests for malignant hyperthermia. Britt and colleagues studied 56 families afflicted with malignant hyperthermia and found that CPK concentrations were higher in affected individuals and in close relatives than in non-related volunteers. However, in 20 per cent of families, all members, including those who had had episodes of malignant hyperthermia, had normal CPK values. The incidence of musculoskeletal abnormalities was greater in affected individuals and close relatives. Thus, where facilities are available, the patient should be subjected to muscle biopsies and electromyographic studies for confirmation of susceptibility.

Our patient was monitored closely during induction and delivery for vital signs, cardiac arrhythmias, temperature, arterial blood gases, electrolytes and serum enzymes but no significant change except the elevated enzymes was observed. It is mandatory to ask every patient about family history of malignant hyperthermia during preoperative visits. Once the positive history is obtained, elevated CPK levels might help as a warning signal to be extra careful. Every effort should be made to avoid the known triggering agents.

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REFERENCES