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Case Report

A case of accidental intrathecal injection of a large dose of ropivacaine during cesarean section

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Abstract: Continuous spinal anesthesia may provide excellent labor analgesia. The incidence of accidental intrathecal injection of megadose of ropivacaine, as one of the possible complications during cesarean section, is very rare. Present case report provides reference to clinical practice.

Keywords: Total spinal anesthesia, ropivacaine, continuous spinal analgesia, labor analgesic

Introduction

Continuous spinal anesthesia can provide excellent labor analgesia with microcatheters. Total spinal anesthesia, one of the possible complications, was rarely reported before.

Case report

A 29-year-old parturient (G1P0) was admitted to the delivery ward while in labor. The patient was diagnosed as having had a premature membrane rupture for 8 h and was suspected of intrauterine infection. She was 162 cm tall, weighed 75 kg, had a reassuring airway, and had nothing else of significance in her medical history. She insisted on a natural childbirth and requested a labor analgesic. After obtaining informed consent, the patient received Ringer's lactate by I.V. and her vital signs were recorded. The patient's basic blood pressure (BP) was 122/72 mmHg, her heart rate (HR) was 90 bpm, and her respiration rate (RR) was 19/min. Her hematological and biochemical test results were all within normal limits. The patient was scheduled for continuous spinal analgesia. The patient was positioned on her right side for placement of a subarachnoid catheter (29G Spinocath R-B. Braun Melsungen, Germany) at the L3 - 4 lumbar interspace using the paramedian approach. After subarachnoid administration of sufentanil 2 μg and 0.5% ropivacaine 2 mg, the catheter was threaded 4 cm into the intrathecal (IT) space and attached with iodine tape. After 5 min, the patient had no discomfort, and uterine contraction pain was successfully relieved. We connected the analgesia pump (50 ml saline containing 50 mg of ropivacaine) at a continuous infusion rate of 2 ml/h.

After 8 h in labor, the patient was scheduled for emergency cesarean delivery due to failure to progress and suspected fetal distress. At this moment, the patient's body temperature was 38.5°C, BP was 110/70 mmHg, HR was 81 bpm, and RR was 16/min. In addition, the event occurred at 17:45, the start of the night shift for the anesthesiologists. As time was pressing, the night shift anesthesiologist quickly replaced the anesthesiologist from the previous shift. The newly arrived anesthesiologist mistakenly believed that the catheter was located in the epidural space. A pinprick at T10 was elicited at the time. After negative aspiration for blood and cerebrospinal fluid (CSF), 8 ml of 0.5% ropivacaine was injected through the catheter over a 30 sec period, but there was no immediate change in HR or BP. After the patient was placed in a supine position with left uterine displacement, the patient inspired oxygen from a mask at a rate of 4 L/min. At 17:50, the patient began

to feel very weak and had breathing difficulty and nausea. The pinprick level was at T4, BP was decreased to 69/40 mmHg, HR was 100 bpm, RR was 20/min, and SpO_2 was 100%. A bolus of 100 μg phenylephrine was administered, and 500 ml of Voluven was immediately infused. The patient's BP increased to 115/80 mmHg and HR decreased to 70 bpm. A live female infant with an Apgar score of 9, 9 and 9 at one, five and ten minutes, respectively, was delivered uneventfully at 17:52. Immediately afterward, the patient's BP again decreased to 60/40 mmHg, so phenylephrine infusion was started at a rate of 100 μg/min to maintain BP over 90/50 mmHg. The suspicion of subarachnoid injection of the anesthetic was confirmed by telephone. At 18:10, the patient began to feel that her arms were becoming numb and lethargic. She was breathing spontaneously with a tidal volume of only 90 ml through a face mask at a rate of 22/min. The upper level of loss of pin-prick sensation was C2. Although she felt drowsiness, she was able to make facial expressions. The entire time, the patient's SpO_2 was above 95% by assisted ventilation through a mask. Airway pressure was controlled below 15 cm H_2O, and cricoid pressure was applied. At the same time, a senior doctor made drugs and equipment for general anesthesia ready.

At 18:20, the patient was shivering significantly. Her pupils were normal in size and reacted to light. She was breathing spontaneously, with a tidal volume of 110 ml and RR of 18/min. At this moment, 0.3 mg ramosetron and 50 mg tramadol were administered by i.v; 10 min later, the tidal volume had improved to 250 ml/min.

At 18:40, the patient's BP was 128/68, and her vital signs were stable. Phenylephrine infusion was stopped. At the end of the surgery, at 19:20, the patient was able to move her neck smoothly and respond to questions clearly. Her BP was 98/58 mmHg, and HR was 104 bpm with no vasopressors. Her VT was restored to 500 ml/min. The upper level of loss of pin-prick sensation was T2.

The patient was then transferred to the postanesthetic recovery unit for observation and monitoring. One hour later, her block plane had retreated to T10, at which point she was discharged from the recovery room without any discomfort. The intrathecal catheter was removed 24 hr after placement.

The patient was discharged from the hospital 3 days after the surgery without motor or sensitive deficits.

Discussion

When a local anesthetic is injected multiple times into the subarachnoid space, it can lead to an extensive block, termed total spinal anesthesia (TSA). The most common cause is an accidental dural injection during an epidural anesthesia [1].

High neuraxial block is a common cause of anesthesia-related maternal death. Two-thirds of high blocks were caused by accidental intrathecal injection through a presumed epidural catheter [2].

Typical features of TSA include fall in blood pressure, cessation of respiration, loss of consciousness and even cardiac arrest, which can occur within minutes of injecting a spinal drug [3]. Sometimes symptoms are atypical and difficult to identify [4]. Our case was not entirely typical in that apnea was delayed for 25 minutes after injection and the pupils did not dilate.

The duration and severity of TSA is related to the type and dose of local anesthetic; for example, 0.75% bupivacaine was shown to have a mean duration of action of 1.5 h ~ 3 h [5].

Kim S. Khaw et al. [6] determined the ED50 (95% confidence interval) of spinal ropivacaine for cesarean section to be 16.7 (14.1 - 18.8) mg and the ED95 (95% confidence interval) to be 26.8 (23.6 - 34.1) mg. Duration of sensory and motor block and degree of motor block, but not onset of anesthesia, were positively related to dose [7].

In this case, the parturient was administered a 40 mg bolus of ropivacaine in addition to the initial dose. The resulting cumulative dose may not be sufficient to induce pupil dilation and unconsciousness.

Continuous spinal anesthesia (CSA) is one of the most useful, versatile, and reliable techniques available for providing analgesia and anesthesia in both obstetric and non-obstetric populations. This technology has been applied in the obstetric population for almost 7 decades [8]. The incidence of possible complications including postdural puncture headache or neurological impairment are very rare [9].

Compared with a single-shot spinal, CSA dosing facilitates slow the titration of local anesthetic solutions and allows maintenance of maternal cardiovascular stability. CSA provides the option for additional intraoperative dosing to maintain dense surgical anesthesia during prolonged procedures [10].

Compared with continuous epidural anesthesia, CSA is not only quicker and better in terms of inducing an analgesic effect but also minimizes the risk of total spinal analgesia and local anesthetic intoxication [11].

In our case, the first error was the belief that the catheter was located in the epidural space. We should ensure a subarachnoid catheter location. Although the CSA technique is appropriate and valid for both labor analgesia and cesarean section, it requires careful management and drug use.

The second error was that a test dose was not administered before the full amount of local anesthetic was given. The test dose should not be more than 3 - 5 ml, and if the position is changed, another test dose should be reinjected. If no signs of accidental intravascular or intrathecal injection is noted in the earliest tests on epidural anesthesia within 5 - 10 min, then a sufficient amount of local anesthetic could be carefully injected into the epidural space [12, 13]. Although Caliskan E et al. [14] reported a parturient who experienced a total spinal block after a 4 mL test dose of 1% lidocaine for epidural anesthesia, a test dose is still worthy of recommendation.

Disclosure of conflict of interest

None.

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