Clinical Reports

Accidental total spinal block: a complication of an epidural test dose

Neelkanth V. Palkar MD FFARCS,
Randall C. Boudreaux MD, Aparna V. Mankad MD

A case is presented of a 36-yr-old parturient who developed a total spinal block after an epidural test dose. After placement of an epidural catheter and confirming negative aspiration for blood or CSF, 3 ml lidocaine 1.5% (45 mg), with 1:200,000 epinephrine (15 μg) was injected via the catheter over 30 sec. Within two minutes the patient developed hypotension and extensive sensory and motor block including respiratory paralysis and aphonia. She remained fully conscious and alert and spontaneous respiration recommenced in five minutes. A live healthy infant was delivered by emergency Caesarean section shortly afterwards under general anaesthesia and the mother recovered completely without any untoward sequelae.

On présente ici l'observation d'une parturiente de 36 ans qui subit un bloc rachidien total après une dose-test épidurale. Après l'insertion du cathéter épidural et la confirmation de son positionnement par un test négatif d'aspiration de sang et de LCR, 3 ml de lidocaïne 1,5%, (45 mg) avec épinéphrine 1:200,000 (15 μg) sont injectés par le cathéter sur une période de 30 secondes. En moins de deux minutes, la patiente développe de l'hypotension associée à un bloc sensitif et moteur étendu avec paralysie respiratoire et aphonie. Elle demeure pleinement consciente et sa respiration reprend en cinq minutes. Un enfant en bonne santé naît par césarienne d'urgence sous anesthésie générale et la mère récupère complètement sans séquelles.

Key words

ANAESTHETIC TECHNIQUES: regional, epidural;
ANAESTHESIA: obstetric;
COMPLICATIONS: total spinal.

From the Department of Anesthesiology, University of South Alabama Medical Center, Mobile, Alabama 36617, U.S.A.

Address correspondence to: Dr. N.V. Palkar, Department of Anesthesiology, University of South Alabama Medical Center, 2451 Fillingim Street, Mobile, Alabama 36617, U.S.A.

Accepted for publication 1st August, 1992.

Epidural block is now an essential part of obstetric anaesthetic practice. It has proved to be a safe, reliable technique for maternal pain relief from labour and operative deliveries. Unexpected extensive blocks in the course of conduction anaesthesia in obstetrics, though rare, can have devastating consequences for the mother as well as her infant. Cases have been reported of cardiovascular collapse or total spinal block in obstetrics following therapeutic doses of lidocaine or bupivacaine[14] but a total spinal block following a test dose is rare.[5,6] The authors are not aware of any other case report of a total spinal block following a test dose of 45 mg lidocaine.

Case report

A 36-yr-old woman (gravida 3, para 2) was admitted to the labour unit in labour at term. Her previous delivery had been by Caesarean section, and the patient requested a repeat Caesarean section be performed for this delivery. The previous operation was performed under continuous lumbar epidural anaesthesia without any complications and the patient was agreeable to this type of anaesthesia for her repeat Caesarean section.

Preoperative evaluation revealed an anxious, obese woman, 153 cm tall, weighing 92 kg. History was remarkable only for a previous gastroplasty in 1985 under general anaesthesia without complication. Her blood pressure (BP) was 110/68 mmHg and heart rate (HR) was 82 bpm and her haematological and biochemical test results were within normal limits.

After obtaining informed consent, the patient received one litre Ringer's lactate *iv* and her vital signs were recorded. The patient was placed in the sitting position for the placement of the epidural catheter. Because of her obesity, the landmarks were not readily palpable and the insertion of #18g Tuohy needle proved difficult. It was attempted first at the L_{3-4} and next at the L_{2-3} lumbar interspace but during attempts at threading the catheter there blood returned from the catheter and therefore the attempt was aborted. A third attempt at L_{2-3} interspace was successful and the epidural space was identified with loss of resistance to injection of saline at a depth of 7 cm and

the catheter was threaded into the epidural space for 3.5 cm without difficulty. A total of 2 ml lidocaine (plain) 1% was used for skin infiltration in both the spaces. After negative aspiration for blood or cerebrospinal fluid (CSF), a test dose of 3 ml of 1.5% lidocaine (45 mg) with 1:200,000 epinephrine (15 μg) was injected through the catheter over 30 sec between uterine contractions with no immediate increase in HR or BP.

Within one minute, the patient began to feel very weak and "light-headed" and her BP had decreased to 80/50 mmHg and the HR increased to 112 bpm. Ephedrine 10 mg *iv* was administered and the *iv* fluid administration rate was increased to "wide-open" and she was assisted into the left lateral recumbent position from her sitting position. Shortly thereafter, the patient began to feel that her arms were getting numb and about two minutes after the test dose she began to experience difficulty in breathing; her voice became weaker and progressed to aphonia about 2½ min after the injection. She had lack of pin-prick sensation from the neck down including the sacral area. The upper level of loss of pin-prick sensation was C_2. Although unable to move or breathe, she was conscious and was able to make facial expressions. Her pupils were normal in size and reacted to light. There was no evidence of wheezing, urticaria or angioneurotic oedema.

Pulse oximetric oxygen saturation ($SpaO_2$) had decreased to 90% and the lungs were ventilated with oxygen with a bag and mask, and cricoid pressure was applied. After about five minutes, the patient was able to breathe spontaneously and to answer questions. The BP was now 90/50 mmHg and stable, $SpaO_2$ 96%, and HR 90 bpm.

Decelerations were noted on the fetal heart monitor at this time (fetal heart rate decreased to $60 \cdot min^{-1}$ with late decelerations from a baseline heart rate of $130–140 \cdot min^{-1}$ and the patient was transferred to the operating room for urgent Caesarean section. As the patient was awake and apprehensive, the conduction block was already regressing, and it was uncertain if the block with 45 mg lidocaine would last long enough to perform the surgery, it was decided to provide general anaesthesia for the mother. Thiopentone 300 mg and succinylcholine 100 mg were administered *iv* after preoxygenation and tracheal intubation was performed with cricoid pressure.

A live female infant with Apgar score of 8 and 9 at one and five minutes respectively was delivered uneventfully. The patient's vital signs remained stable and satisfactory throughout the procedure. A non-depolarizing muscle relaxant was required for closure of the abdomen, approximately 45 min after the epidural test dose. A total of 40 mg of atracurium was used in increments for the surgical procedure lasting 85 min. The trachea was extubated after reversing the neuromuscular block about one hour and 45 min after the epidural test dose. She was awake and alert and could move all her extremities well. All modalitities of sensation had returned in the blocked area. The epidural catheter, unfortunately, became dislodged during the procedure and we could not confirm radiologically the position of the catheter tip placement.

Postoperatively, she was appropriately inquisitive as to why she could not breathe after the epidural was placed and all her questions were answered. She did not develop any post-spinal headaches and had no residual neurological deficit. Both the mother and her baby were discharged home with no known sequelae attributable to the event.

Discussion

The epidural test dose is designed to avoid two potentially lethal complications of epidural blockade: total spinal block and accidental intravascular injection of local anaesthetic. There is considerable controversy over the volume and composition of the actual test dose.[7–10] The ideal test dose should rapidly and reliably indicate if the needle or catheter through which it is injected is not in the epidural space, but has, instead, entered a blood vessel or the subarachnoid space. Thus, intravenous injection should consistently result in mild and transient systemic effects, while a low spinal block should rapidly follow intrathecal injection. It has now been clearly established that epinephrine 15 μg must be added to the test solutions if intravascular placement is to be recognized rapidly and consistently.[11] Intravascular injection is diagnosed when a 20% increase in HR occurs within 40 sec of injection.[9] Lidocaine seems to be an ideal agent for detection of accidental intrathecal placement. Preservative-free isobaric lidocaine 1.5% gives rapid and consistent block with a dose which is unlikely to produce harm if given intravenously or to produce any effect if injected epidurally.[9]

Non-epidural obstetric anaesthesia already meets high safety standards with less than one maternal death in 5000 general anaesthetics and virtually no deaths resulting from inhalational or intravenous analgesia for labour.[12] The incidence of total spinal block and accidental intravenous injection in obstetric practice is reported to be 3–10 per 10,000 epidurals.[2] To minimize these potentially fatal complications from epidural analgesia, a two-stage safety check is recommended: careful aspiration of the catheter to detect blood or CSF *and* a test dose injection of a local anaesthetic. The use of both tests is more effective than either alone.[13]

A pregnant woman with increased oxygen requirements cannot withstand hypoxia or hypotension for long before sustaining damage to herself or her infant. Even if rare, unexpected extensive blocks during the course of conduction analgesia can produce devastating consequences. Moreover, cardiopulmonary resuscitation in a parturient

has special problems of aortocaval compression.[15,15] An epidural test dose is designed to avoid this disaster.

In the patient described, an unexpectedly high level of block occurred following a 45 mg lidocaine test dose within two minutes of its administration. This occurred despite a negative aspiration test. The dose of the drug used was well within the safe limits for a test dose. The catheter tip may have been placed in the subdural space, which explains the negative aspiration test, and the test dose given through the catheter caused the arachnoid mater to tear, allowing the test dose to be deposited in the subarachnoid space as described by Reynolds and Speedy.[16] However, this patient, did not develop a post-spinal headache which would be expected with a frank arachnoid mater tear.

The entire dose may have stayed in the subdural space. However, the usual description of a subdural block includes a delayed onset, an unexpectedly high sensory block but with sparing of autonomic and motor function. Sacral sensation usually remains intact.[4,16] Our patient developed rapid onset sensory and motor block accompanied by hypotension and loss of sacral sensation making a subdural block unlikely.

The patient did not lose consciousness or develop fixed dilated pupils as is commonly seen in total spinal block. We hypothesize that, since only a small quantity of the drug was used (less than for therapeutic spinal anaesthesia), the rostral spread of the drug would not have produced an adequate concentration in the CSF to produce brain-stem effects. This would also explain why the block regressed so rapidly.

In summary, we describe a patient who developed manifestations of subarachnoid placement of an epidural test dose and who developed an unexpectedly high block from an innocuous amount of the drug. Timely intervention and proper management resulted in a successful outcome.

References

1 *Alderson JD.* Cardiovascular collapse following epidural anaesthesia for cesarean section in a patient with aortic incompetence. Anaesthesia 1987; 42: 643–5.

2 *Crawford JS.* Some maternal complications of epidural analgesia for labor. Anaesthesia 1985; 40: 1219–25.

3 *Russell IF.* Inadvertent total spinal for Cesarean section. Anaesthesia 1985; 40: 199–200.

4 *Morgan B.* Unexpectedly extensive conduction blocks in obstetric epidural analgesia. Anaesthesia 1990; 45: 148–52.

5 *Fine PG, Wong KC.* Cranial nerve block after test dose through an epidural catheter in a pre-eclamptic parturient. Can Anaesth Soc J 1984; 31: 565–7.

6 *Kim YI, Mazza NM, Marx GF.* Massive spinal block with hemicranial palsy after a "test dose" for extradural analgesia. Anesthesiology 1975; 43: 370–2.

7 *Casey WF.* Epidural test doses in obstetrics. Anaesthesia 1985; 40: 597.

8 *Shah JL.* Epidural test doses in obstetrics. Anaesthesia 1985; 40: 1131.

9 *Prince G, McGregor D.* Obstetric epidural test doses: a reappraisal. Anaesthesia 1986; 41: 1240–50.

10 *Cartwright PD.* Obstetric epidural test doses. Anaesthesia 1987; 42: 556.

11 *Moore DC, Batra MS.* The components of an effective test lose prior to epidural block. Anesthesiology 1981; 55: 693–6.

12 *Rosen M.* Editorial. Anaesthesia 1981; 36:145–6.

13 *Soni V, Peeters C, Covino B.* Value and limitations of test dose prior to epidural anaesthesia. Reg Anesth 1981; 6: 23–5.

14 *Lindsay SL, Hanson GC.* Cardiac arrest in near-term pregnancy. Anaesthesia 1987; 42: 1074–7.

15 *Rees GAD, Willis BA.* Resuscitation in late pregnancy. Anaesthesia 1988; 43: 347–9.

16 *Reynolds F, Speely HM.* The subdural space: the third place to go astray. Anaesthesia 1990; 45: 120–3.