Cranial nerve block after test dose through an epidural catheter in a pre-eclamptic parturient

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A case of unintentional high spinal anaesthesia is reported, in a 40-year-old obese patient at 38 weeks gestation, complicated by pre-eclampsia. In spite of careful technique in placement of an epidural catheter, the test dose of 3 ml bupivacaine 0.5 per cent produced an unusual block which ascended to include sensory blockade of the fifth cranial nerve, but the motor components of the cervical and thoracic segments were spared. This case suggests that a smaller epidural test dose of bupivacaine might be appropriate, especially in an obese and pre-eclamptic parturient.

Key words

ANAESTHETIC TECHNIQUES: epidural; ANAESTHETICS: local, bupivacaine; COMPLICATIONS: total spinal anaesthetic.

Total spinal anaesthesia is a well known complication of an unintentional overdose of a local anaesthetic in the subarachnoid space.^{1,2} The use of a test dose through an epidural catheter is intended to prevent such an untoward complication.³ This report describes an unusual case of high spinal anaesthesia involving the cranial nerves from a test dose of local anaesthetic injected into the epidural catheter in a pre-eclamptic parturient.

Case report

A forty-four-year-old, 104 kg, 5'2" woman at 38

weeks gestation was admitted for induction of labour because of persistently elevated blood pressures, 1⁺ proteinuria and mild generalized oedema of one week duration, despite bed rest. She was receiving no medical treatment, although she had a history of chronic hypertension with resting blood pressures in the range of 130–150/80–90 mmHg and this had been treated with oral hydralazine prior to this pregnancy. No discernable labour pattern developed after a 48-hour trial of oxytocin infusion, thus Caesarean-section was scheduled.

Review of systems was negative for visual disturbance, headache, abdominal pain, or dyspnoea. Physical exam revealed an obese female not in active labour and in no distress. Blood pressures during her 48-hour hospital stay were in the 170–180/90–104 mmHg range; pulse 90 and regular; respiration 20 and unlaboured. Heart and lung examinations were unremarkable. There was mild generalized oedema and deep tendon reflexes were within normal limits.

A peripheral venous catheter was established, with maintenance IV fluids given; urine output was approximately 100 ml per hour. Laboratory findings: sodium 139 mEq/L, potassium 4.1 mEq/L, chloride 108 mEq/L, CO₂ 19 mEq/L; glucose 99 mg/dl, BUN 8 mg/dl, albumin 3.9 g per cent, fibrinogen 620 mg/dl, haematocrit 35.5 per cent, platelets 235,000, creatinine 1.0 mg/dl; urinalysis revealed a specific gravity of 1.022 with a trace of protein, total urine protein 250 mg per liter per 24 hours.

In preparation for lumbar epidural anaesthesia, a central venous catheter was inserted via an antecubital vein and a radial artery catheter was placed for continuous pressure monitoring. Arterial blood pressure was 180/105 mm Hg and CVP was 0 cm

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H₂O as measured on a column manometer demonstrating appropriate respiratory variation. CVP rose to 5 cm H₂O after a fluid bolus consisting of 500 ml lactated Ringers solution and 300 ml Hetastarch (Hespan).

With the patient in the left lateral decubitus position the L2–3 epidural space was entered with an 18 gauge Crawford needle using a paramedian approach and the loss of resistance technique. There was no evidence of CSF flowing from the needle. A 20 gauge Deseret epidural catheter was passed 3 cm beyond the needle tip. The catheter was secured in place. Following a negative aspiration for CSF or blood, 3 ml of 0.5 per cent bupivacaine (Abbott®) with freshly added 15 µg epinephrine (final concentration 1/200,000) was injected over 15 seconds. During this time the patient denied paresthesias and did not cough or strain. Ninety seconds after injection, routine questioning regarding possible effects of the test dose elicited a response of numbness of her tongue and around her mouth. Using a needle, the patient felt no pin prick of her shoulders, neck, chin, cheeks, or forehead but her grasp was normal in the upper extremities bilaterally. Blood pressure dropped precipitously to 80/40 mmHg. Lactated Ringers solution 500 ml and several intravenous doses of ephedrine (total 50 mg) were given over the next 15 minutes resulting in blood pressures of 100–110/60–80 mmHg and heart rates of 90–100 beats/minute. The patient received 100 per cent oxygen via mask immediately and remained completely responsive to verbal commands, denying dyspnoea throughout the entire episode, although her voice became very soft and hoarse after 3–5 minutes. Left uterine displacement was maintained, with the legs elevated 15°. Central venous pressure was in the 0–2 cm H₂O range at this time. Foetal monitoring revealed a slight tachycardia. The patient was transported to the operating room for Caesarean-section. Sensory exam again revealed absence of sensation to pin-prick to the level of all three sensory distributions of the trigeminal nerve. There was motor block of the lower extremities but voluntary respiration and grip strength were apparently intact.

The operation was performed without additional anaesthetic, while the patient remained comfortable throughout the procedure breathing 100 per cent oxygen spontaneously until delivery of the foetus, at which time O₂ was discontinued. Apgar scores at

one and five minutes were six and nine, respectively.

The patient's blood pressure returned to pre-anaesthetic levels approximately 60 minutes after the onset of the block and this was coincident with the receding of the sensory level to the T6 dermatome. She regained full motor and sensory function approximately 2½ hours after initiation of the block. Aspiration of the catheter with a syringe prior to removal revealed clear spinal fluid.

Mother and infant did well with no further complications or sequelae. The patient was subsequently placed on oral antihypertensive medication for blood pressure control.

Discussion

Two unusual problems observed in this case are noteworthy. First was the development of a high sensory level of anaesthesia (cranial nerve V) without the usual findings of total spinal anaesthesia (restlessness, respiratory failure, loss of consciousness) as described in the literature,^{4–7} despite significant hypotension. Secondly, the test dose of local anaesthetic, bupivacaine 15 mg, given in this case is what most authors consider to be a safe subarachnoid dose^{8,9} and has not, to our knowledge, been reported to achieve this high a level of spinal cord blockade. Perhaps the *combined* effects of an elderly parturient, obesity, and superimposed pre-eclampsia add further to the already long list of controllable and uncontrollable factors influencing spinal anaesthesia?^{10–14} It is of concern when, as in this case, a relatively low dose causes precisely what one is trying to avoid.

Following an usual spinal block, a higher level of sensory than motor blockade of two segments is expected. However, this case report illustrates that a much wider differential of sensory vs motor blockade is possible. Careful evaluation of the patient, even under the most stressful situation should help to avoid iatrogenic complications. This patient might have been intubated unnecessarily because it is "proper" to protect the airway of the patient who has an unintentional total spinal. The definition of a "total spinal" may have to be modified in light of the present experience since there was sensory block to the fifth cranial nerve, but the cervical and perhaps also the thoracic segments were spared.

Epidural anaesthesia/analgesia has been shown

to be a safe technique in patients with moderate to severe toxemia of pregnancy and we favour this technique in our institution.^{9,15-17} However, with the experience of this case in mind, we are approaching the test dose more cautiously. Since 7.5 mg of bupivacaine in a hyperbaric solution has been demonstrated to produce a distinguishable block,¹⁸ a 10 mg bupivacaine dose (0.5 per cent, 2 ml) with 15 µg epinephrine may be an appropriate epidural test dose to detect an inadvertent subarachnoid or intravascular injection. We randomly sampled 10 ampules of 0.5 per cent bupivacaine (Abbott®) and found a specific gravity of 1.002 at 25° C (isobaric relative to "normal" CSF).

This report reinforces the doctrine that parturients require a smaller dose of local anaesthetic to block the spinal segments and further cautions the handling of the obese and hypertensive parturient. Furthermore, the question is raised as to whether there may be different physical characteristics of CSF in this patient population as compared to normal parturients.

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Résumé

Nous rapportons un cas de rachianesthésie haute accidentelle chez une patiente de 40 ans, obèse, enceinte de 38 semaines et en état de pré-éclampsie.

Malgré la mise en place du cathéter épidural de façon apparemment très soignée, la dose-test de bupivacaine 0.5 pour cent dans 3 ml a produit des effets inattendus en bloquant la composante sensitive du cinquième nerf crânien tout en épargnant les parties motrices des segments cervicaux et thoraciques. Un tel cas suggère que les doses-test de bupivacaine devraient être réduites spécialement chez les patientes obèses et pré-éclampsiques.