Massive Spinal Block with Hemicranial Palsy after a "Test Dose" for Extradural Analgesia

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The range of averages of inadvertent dural puncture during lumbar extradural analgesia has been reported as 0.5 to 3 per cent.[1,2] In 3,132 cases, lumbar puncture occurred in 72 patients (2.3 per cent) and was caused by the needle in 47 patients (65 per cent), by the catheter in 18 (25 per cent) and by both in seven (10 per cent).[2] The authors emphasized that aspiration for spinal fluid may not be diagnostic because meninges or nerve roots may block the small opening of the catheter. Injection of a test dose through the catheter was considered to be the most important diagnostic measure; the only total spinal anesthesia in that series occurred when the test dose through the catheter was omitted and the total anesthetic dose administered.

However, even a test dose through the catheter does not constitute an absolute safeguard and, as described in the following case report, may lead not only to massive spinal blockade but also to the unusual complication of unilateral cranial palsy.

REPORT OF A CASE

A 16-year-old primigravida, 155 cm tall, weighing 58 kg, was admitted in active labor to the obstetric suite. Prenatal course, results of physical examination, and laboratory data were unremarkable. Intravenous hydration with lactated Ringer's solution with 5 per cent dextrose was begun, and one dose of meperidine, 50 mg, administered iv. When cervical dilation was 8 cm, lumbar extradural analgesia was initiated. With the patient on her left side, a 17-gauge Tuohy needle was introduced at the L3–4 interspace and the extradural space identified by loss of resistance. After negative aspiration for spinal fluid, a 2-ml test dose of 2 per cent 2-chloroprocaine hydrochloride (Nesacaine) was injected without untoward effect and followed, three minutes later, by an additional 5 ml of the drug. A styletted Teflon catheter was then inserted, but met resistance at the needle tip, necessitating withdrawal of needle and catheter. Using the same technique, the needle was reinserted at the L2–3 interspace and a catheter threaded in a cephalad direction without difficulty approximately 1.5 cm beyond the needle tip. Turned to the supine position, the patient soon developed adequate pain relief (sensory level T10–L2) and progressed rapidly to full dilation of the cervix. About 35 minutes after initiation of the extradural block, she was taken to the delivery room. To achieve perineal anesthesia with the aid of gravity,[3] she was placed in a semi-sitting position and, after a negative aspiration test for spinal fluid, 2.5 ml of 2 per cent chloroprocaine were injected slowly through the catheter after a uterine contraction. About 30 seconds later, the patient complained, in a whisper, of difficulty in breathing. She was immediately replaced in the supine position. Sensory response to pinprick was absent from the neck down. General flaccidity, respiratory arrest, and loss of consciousness followed in rapid succession. Ventilation with 100 per cent oxygen by way of an orotracheal tube was immediately instituted. Blood pressure and heart rate remained unchanged. (800 ml of the balanced electrolyte solution had been administered during the previous hour), and there was no evidence of wheezing, urticaria, or angioneurotic edema.

The infant, delivered by outlet forceps, had Apgar scores of 9 at one minute and 10 at five minutes. Shortly thereafter, the patient's right pupil was noted to be dilated and fixed, with no corneal or light reflexes. In addition, the corner of her mouth was drawn to the left, and the tongue deviated to the right, indicating right facial and hypoglossal palsy. Approximately 20 minutes after the chloroprocaine injection, spontaneous respiratory efforts returned, and ten minutes later, the patient regained consciousness and was able to respond to verbal commands. At this time, it became obvious that she was unable to close the right eye, turn the right eye outward or wrinkle the right half of her forehead. After a further 15 minutes, she became communicative, and all cranially innervated functions became normal. Sensory and motor blockade wore off in another 20 minutes. The catheter was removed slowly with continuous suction by syringe, but no fluid was obtained.

Neurologic consultation on two occasions, in the recovery room and 12 hours later, revealed no sequelae. The patient had no recall for the event. On the second postpartum day, she had a moderately severe characteristic postspinal headache, which responded to forced oral fluid intake and bed rest.

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Discussion

As to the cause of the total spinal block with unilateral cranial nerve involvement following the test dose of 50 mg chloroprocaine in our patient, the only rational explanation appeared to be hypobaricity of the drug. The specific gravity of 2 per cent chloroprocaine was therefore determined and found to be 1.0100 at room temperature and 1.0044 at body temperature (37 C)‡ Since a small volume of drug injected at room temperature approaches body temperature within seconds,[4] one may assume that the specific gravity of chloroprocaine in our patient was at the lower value. The specific gravity of cerebrospinal fluid in pregnant women at term does not differ significantly from that of nonpregnant women. In 30 normal parturients, specific gravities of cerebrospinal fluid ranged from 1.0009 to 1.0063, with a mean of 1.0049 ± 0.0013.[5] However, the specific gravity of cerebrospinal fluid is greatly increased by an increased glucose content, and induced hyperglycemia increases the cerebrospinal fluid glucose level within 15 minutes, with a peak effect at 30–45 minutes.[6] As our patient had received 40 g glucose during the hour prior to the reaction, the specific gravity of her cerebrospinal fluid is likely to have been in the upper range. Hypobaricity of the drug was also suggested by the development of only right-sided cranial nerve involvement; our delivery tables are usually tilted left-side down to displace the uterus to the left. Likewise, Crawford[7] reported a unilateral spinal block following injection of 0.25 per cent bupivacaine through an "extradural" catheter in an obstetric patient.[7]

Once a local anesthetic reaches the cisterna magna during spinal block, it is more likely to spread into the cerebral subarachnoid space and depress areas rich in synapses such as the reticular activating system. This is postulated to be an explanation for the loss of consciousness in man following intracisternal injection of procaine.[8]

In summary, a case of total spinal block with hemicranial palsy following injection of 2.5 ml 2 per cent chloroprocaine through a cephaladthreaded extradural catheter with the patient in a head-up position has drawn our attention to the fact that most local anesthetic drugs used for extradural analgesia have specific gravities of less than 1.0100 at body temperature (table 1) and are potentially hypobaric when injected into the intrathecal space. Therefore, test doses through the catheter should not be administered with the patient in a head-up position.

‡ Personal communication, Pennwalt Prescription Products, Rochester, N.Y.

TABLE 1. Specific Gravities of Local Anesthetics at Room or Body Temperature

Substance	25 C	37 C	Reference
Water	0.99707	0.99336	8
Bupivacaine			
0.25 per cent		1.0058	*
0.5 per cent		1.0059	
0.75 per cent		1.0063	
Lidocaine			
1 per cent	1.0064		*
1.5 per cent	1.0064		
2 per cent	1.0067		
Lidocaine with epinephrine, 1:100,000			
1 per cent	1.0066		
2 per cent	1.0075		
Mepivacaine			
1 per cent	1.006		†
1.5 per cent	1.006		
2 per cent	1.006		
Chloroprocaine CE			
2 per cent	1.0100	1.0044	‡
3 per cent		1.0104	
Prilocaine			
1 per cent	1.0055		†
2 per cent	1.0071		
3 per cent	1.0085		

* Personal communication, Winthrop Laboratories, New York, N.Y.

† Personal communication, Astra Pharmaceutical Products, Worcester, Mass.

‡ Personal communication, Pennwalt Prescription Products, Rochester, N.Y.

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An Improved Regional Anesthetic Technique for Peroral Endoscopy

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Local anesthesia, incorporating a combination of topical anesthesia and intraoral field blocks, has been in use for a number of years to provide anesthesia for tonsillectomy. Recently, Barton and Williams[1] described the use of bilateral intraoral glossopharyngeal blocks to facilitate tonsillectomy; because this obliterates the gag reflex, they proposed using these blocks to produce anesthesia for peroral endoscopy.[1]

During the past two years, 70 patients at our institution have undergone bronchoscopy using a combination of bilateral glossopharyngeal blocks, bilateral superior laryngeal blocks, and a transglottic spray of local anesthetic. A number of tracheal intubations of patients requiring general anesthesia with full stomachs were performed with these nerve blocks.

MATERIALS AND METHODS

Patients who underwent bronchoscopy were generally premedicated with a narcotic or neuroleptic, and an anticholinergic. Drugs of choice were Innovar, 0.005 ml/kg, and glycopyrrolate (Robinul), 0.001 ml/kg, mixed in the same syringe and administered im 45 minutes prior to anesthesia.

The materials used for the nerve blocks and spray are shown in figure 1. The Pilling sprayer (*A* in fig. 1) was used to deliver a spray of 4 per cent cocaine to the tongue and pharynx prior to the glossopharyngeal blocks. Following topical anesthesia, bilateral superior laryngeal nerve blocks (fig. 2) were administered with 3 ml of a 1 per cent lidocaine (Xylocaine) solution with 1:100,000 epinephrine. The method employed was that described by Gaskill and Gillies,[2] in which the internal branch of the superior laryngeal nerve is anesthetized (as it pierces the thyrohyoid membrane) by inserting a 22-gauge needle at the intersection of a line drawn 1 cm anterior to the superior corner of the thyroid cartilage and a line drawn midway between the hyoid bone and thyroid cartilage. Proper depth of the injection is determined by advancing the needle until penetration of the thyrohyoid membrane is felt or by entering the airway and then withdrawing and injecting at a point where aspiration no longer yields air. Accidental carotid-artery injection can be prevented by using the index finger to depress the carotid artery laterally and posteriorly.

The bilateral glossopharyngeal blocks were administered by using the angled tonsillar needle (*D* in fig. 1), and 3 ml of 1 per cent lidocaine solution were used for each injection. Substitution of 0.75 per cent bupivacaine (Marcaine) extends block duration to three hours. The tonsillar needle was advanced through the

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