

Accidental subdural catheterization suspected on administration of a test dose of lidocaine and successfully managed by a small dose of dibucaine

YUSHI ADACHI, YOSHITAKA UCHIHASHI, KAZUHIKO WATANABE, and TETSUO SATOH

Department of Anesthesiology, National Defense Medical College, 3-2 Namiki, Tokorozawa 359-8513, Japan

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Introduction

Subdural extraarachnoid injection is well known as a rare complication of epidural analgesia [1]. From an anatomical viewpoint, an aspiration test cannot be expected to detect all cases of accidental subdural catheterization. In previous case reports, subdural injections of local anesthetics were recognized after applying relatively large doses of anesthetics because of slow onset [2–14]. We report a case in which the anesthetist was alerted to the possibility of accidental subdural catheterization by the injection of 3 ml of 1% lidocaine as a test dose without inducing significant adverse cardiovascular responses. In this case, we could not rule out the possibility of subarachnoid block during surgery, but postoperative radiographic imaging did reveal inadvertent subdural extraarachnoid catheterization.

Case report

A 31-year-old woman, 51 kg in weight and 156 cm in height, was scheduled to have surgical removal of uterine myoma under lumbar epidural analgesia and general anesthesia. Epidural puncture was performed at a right lateral position. The paramedian approach to the L2–3 interspace was attempted using a 17-gauge disposable Tuohy needle by the technique of loss of resistance to saline, and the epidural space was easily identified. A

triple-end-hole, nylon epidural catheter was passed through the needle without difficulty and the needle eased backwards over the catheter leaving 4 cm in the space.

After confirming a negative response to an aspiration test, 3 ml of 1% lidocaine was administered as a test dose. Immediately after this injection, the patient complained of a warm feeling around her right femur on inquiry by the anesthetist. Turning her to the supine position, we examined the level of analgesia. Five minutes after the injection, the cold sensation elicited by a small brush wetted with ethanol disappeared bilaterally at dermatomes from S3 to Th10. A pinprick test showed the same level of analgesia in the dermatomes. An aspiration test was performed repeatedly, but nothing was aspirated. No motor blockade was observed at that time.

Blood pressure and heart rate showed no marked change after the test dose. Thus, as scheduled, general anesthesia was induced with propofol and vecuronium, and her trachea was intubated. General anesthesia was maintained with 0.6% sevoflurane and 66% nitrous oxide. Since inadvertent subarachnoid catheterization was strongly suspected, we tried to block the nerve by applying a small dose, 2 ml, of 0.3% dibucaine. When an incision was made on her abdominal skin, no change in heart rate or blood pressure occurred (being approximately 80 beats·min⁻¹ and 120/65 mmHg, respectively), confirming satisfactory analgesia with administration of 2 ml of 0.3% dibucaine. Since heart rate and blood pressure began to increase slowly 1 h later up to 95 beats·min⁻¹ and 130/80 mmHg, respectively, 2 ml of 0.3% dibucaine was administered through the catheter.

After the operation, a radiographic examination was performed to confirm the catheter position. A water-soluble contrast medium (Isobist, Schering, Berlin Germany, 170 mgI·ml⁻¹) was injected through the catheter with the patient being in the supine position. Initially, 2 ml of the contrast medium was gently injected and its entry into the subdural space was observed (Fig. 1). The

Address correspondence to: Y. Adachi

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Fig. 1. Frontal view of the lumbar region after the injection of 2 ml of contrast medium

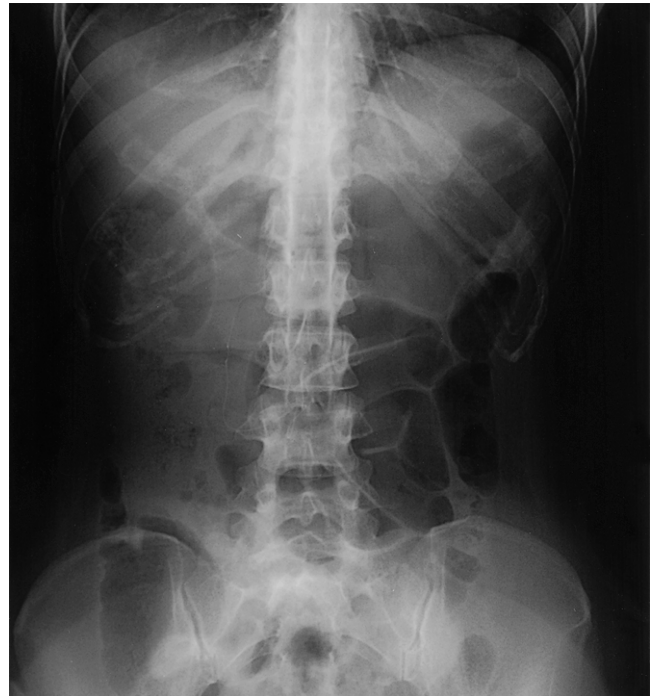


Fig. 2. Frontal view of the lumbar region after the injection of 7 ml of contrast medium. Extended spread is shown

medium was slowly injected up to a total volume of 7 ml, and the final state was photographed to clearly rule out the possibility of subarachnoid injection.

Figures 2 and 3 show that the contrast medium was in the subdural space and extending in the cephalad direction. Accidental subdural catheterization was thus confirmed. We then removed the catheter, because we did not have any data guiding the management of postoperative pain by means of continuous subdural block. After the patient emerged from general anesthesia, she was returned to the ward and was discharged on postoperative day 10 without any complications such as wound pain or neurological symptoms.

Discussion

This case report demonstrates that anesthetists can be warned of abnormal migration of an epidural catheter by injecting a test dose, 3 ml of 1% lidocaine, and can successfully avoid extensive adverse nerve blockade by reducing the local anesthetic to a dose lower than usual. The current patient complained of a warm feeling around her right femur at first, but she showed no motor blockade at that time. After confirming a loss of cold sensation and analgesia from dermatomes from S3 to Th10, we noted no coordination disturbance in her legs. This sensory block occurred on test dose injection, sug-



Fig. 3. Lateral view of the lumbar region after the injection of 7 ml of contrast medium, showing its extension to the ventral part of the spinal canal

gesting that the onset of subdural block may be as fast as that of subarachnoid block.

A case of subdural block was first reported by Boys and Norman in 1975 as a complication of the epidural block induced by accidental injection of a local anesthetic. Since then, a number of reports have been published on subdural block [2–14], and a variety of courses and mechanisms have been discussed. In almost all of these reported cases, subdural anesthesia was recognized by the appearance of unexpectedly extensive blockade after administration of the usual dose of a local anesthetic suitable for epidural block. Subdural block has never been detected by test dose administration alone. Collier [15] proposed the following indices for diagnosis of subdural block: (1) Moderate hypotension such as systolic pressure around 80mmHg, (2) symptoms appear slowly after 15 to 20min, (3) slow progression of respiratory depression and unco-ordination, and (4) complete recovery requiring 2h or more. In addition to the major criteria of a negative aspiration test and unexpectedly widespread sensory block after epidural injection, Lubenow et al. [16] also diagnosed subdural block when one of the following three minor criteria was also fulfilled: (1) A delayed onset of sensory or motor nerve block after 10min or more, (2) the use of a small dose of bupivacaine induces a variety of motor blockades, and (3) the onset of sympatholysis is not proportional to the dose of local anesthetic administered.

It seems to be very difficult to detect accidental subdural catheterization from the onset time after test dosing only. However, the above criteria were not necessarily fulfilled in some cases reported later, even when subdural administration was confirmed by injection of a contrast medium [4,5,9,10]. Subdural block is thought to cause various symptoms depending on the location of the tip of the migrated catheter and on the condition of the subdural space to which the anesthetic penetrates. The onset of subdural block is rapid, as in this case. However, when the patient's vital signs are stable or changing slowly, as is typical, there is a possibility that anesthetists may overlook an unexpected abnormality in nerve block. Careful observation of the patient is needed to avoid an adverse outcome.

Radiographic imaging is the only examination for accurately establishing the diagnosis of subdural injection of a local anesthetic [17,18]. In the current patient, the distribution of contrast medium was seen in the ventral section of the subdural space, and this finding was not consistent with the clinical finding of the lack of motor blockade. The spread of a small volume of contrast medium was extensive, and this finding supported the effectiveness of application of 2ml of 0.3% dibucaine. However, we have no clear explanation for the contradiction between the clinical and radiographic findings in

this case. One possible explanation is that we performed radiographic imaging with the patient in the supine position, whereas epidural catheterization was performed in the right lateral position. Another possibility is that the diluted local anesthetic used as a test dose just produced analgesia without motor block.

In conclusion, we report here a case of accidental subdural insertion of a lumbar epidural catheter in a scheduled surgical patient. Abnormal sensory block was immediately recognized after injecting a test dose without causing a significant decrease in blood pressure. Injection of 3ml of 1% lidocaine as a test dose under careful observation of the patient allows the possibility of avoiding extensive nerve block caused by inadvertent subdural injection of a local anesthetic.

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