Complete recovery of consciousness in a patient with decorticate rigidity following cardiac arrest after thoracic epidural injection

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A 46-yr-old man with dysaesthesia (burning sensation) following herpes zoster in the left upper chest region was treated with a single thoracic (T2/T3) epidural injection (1.0% lidocaine 3 ml+0.125% bupivacaine 3 ml) as an outpatient. Twenty minutes after the injection, a nurse noticed the patient to be unconscious with dilated pupils, apnoea and cardiac arrest. Following immediate cardiopulmonary resuscitation, the patient was treated with an i.v. infusion of thiamylal sodium 2–4 mg kg⁻¹ h⁻¹ and his lungs were mechanically ventilated. When the patient developed a characteristic decorticate posture, mild hypothermia (oesophageal temperature, 33–34°C) was induced. On the 17th day of this treatment, after rewarming (35.5°C) and discontinuation of the barbiturate, the patient responded to command. Weaning from the ventilator was successful on the 18th day. About 4 months after the incident, the patient was discharged with no apparent mental or motor disturbances. We suggest that mild hypothermia with barbiturate therapy may have contributed to the successful outcome in this case. Br J Anaesth 2000; 85: 632–4

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Cervical, thoracic and lumbar epidural injections are common out-patient procedures in pain clinics.1,2 Unintentional dural puncture, and if unnoticed, total spinal block is a recognized complication of these techniques. Prompt respiratory and circulatory support lead to complete recovery.3 We report a case of unsuspected total spinal block presenting with cardiac arrest following thoracic epidural block in our out-patient pain clinic. The outcome was good even though there was evidence of severe neurological damage following cardiopulmonary resuscitation.

Case report

A 46-yr-old man with pain (burning sensation) in the T2–T3 dermatomes following herpes zoster was receiving single thoracic epidural injections (1% lidocaine 3 ml+0.125% bupivacaine 3 ml) three times a week in our out-patient clinic. Previous treatment had included a 1-month course of regular local anaesthetic injection through an indwelling epidural catheter as in in-patient. A trial of epidural spinal cord stimulation at the T2–3 level with a catheter electrode was unsuccessful. About 20 min after an apparently uncomplicated epidural block at the level of T2/T3 in the out-patient clinic, a nurse found the patient to be unconscious with widely dilated pupils, apnoea and cardiac arrest. Immediate cardio-pulmonary resuscitation was performed including intracardiac injection of epinephrine 1 mg. The patient was resuscitated and within 5 min of being found had an arterial pressure of 120/90 mm Hg and heart rate of 90 beats min⁻¹, but remained unconscious.

The patient was admitted to our intensive care unit (ICU) ~30 min following resuscitation and his lungs were mechanically ventilated with PEEP (5 cm H₂O). Blood gas analysis showed pH 7.462, 𝑃_{\text{aCO}} 33.8 mm Hg, 𝑃_{\text{ao}} 128 mm Hg, base excess -1.4 mMol litre⁻¹ at 𝑊_{\text{ao}} 4.4. An i.v. infusion of thiamylal sodium 2–4 mg kg⁻¹ h⁻¹ was started. Muscle rigidity continued to develop despite the barbiturate therapy, and eventually a characteristic decorticate posture developed. The tendon reflexes of all limbs were highly accentuated. The pupillary light reflexes, tested 2–3 h after transiently stopping the infusion of thiamylal, were absent. The EEG showed no electrical activity, although auditory brainstem responses were present with normal interpeak latencies and delayed peak latencies. Some small respiratory movements were observed and the cerebral circulatory index (CCI, cerebral blood flow divided
by cerebral metabolic rate of oxygen which is the inverse of the arterovenous oxygen content difference) was 16 at an oesophageal temperature of 37.2°C.

Computed tomography (CT) on the second day after ICU admission demonstrated an oedematous area in the brain, mainly in the occipital cortex and air in the ventricles which was thought to have been introduced during the epidural injection (Fig. 1). Glycerol (100 mg) and dexamethasone (0.5 mg) were infused i.v. over 2 h, before mild hypothermia (oesophageal temperature 33–34°C) was induced by surface cooling. Within 3 days of this treatment, a repeat CT scan showed that the air bubbles in the cerebral ventricles had disappeared and the oedematous shadow was smaller (Fig. 1). On the sixth day after admission to ICU, the decorticate rigidity had decreased but hyperreflexia persisted. The pupils responded to light, and θ band waves in the EEG were observed at this time. On the 17th day after ICU admission, the infusion of the thiamylal was tapered and rewarming of the body was started. When the oesophageal temperature was 35.5°C, the patient nodded in response to command. Weaning from the ventilator was successful after several trials on the 18th day after ICU admission.

After endotracheal extubation, the patient opened his eyes and was able to weakly grip a hand, although he still showed accentuated tendon reflexes, retrograde amnesia, disorientation and difficulty in walking. After the patient was transferred to the general ward, these neurological signs resolved gradually. Cerebral blood flow scintigram (123I-IMP brain SPECT) showed low perfusion areas in the frontal cortex, left temporal cortex, bilateral basal ganglia and hippocampus. Rehabilitation therapy for the weakness and rigidity of the upper and lower limbs resulted, 4 months after his admission to our hospital, in the patient being discharged without recognizable mental or motor disturbance except for a slight dysaesthesia on his toes.

**Discussion**

We think that this patient developed a total spinal block caused by an accidental dural puncture during epidural injection of local anaesthetic. This occurred despite the operator following the correct procedures, a negative aspiration test and no apparent untoward effects in the few minutes after the epidural injection. Adhesions of the dura mater and/or narrowing of the epidural space produced by the previous epidural interventions might have contributed to the dural puncture. The air bubbles present in the third ventricle are likely to have been injected with the local anaesthetic into the intrathecal space rather than during the intracardiac injection of epinephrine. Alternatively, a high thoracic epidural block, by blocking cardiac accelerator sympathetic fibres, might have caused the cardiac arrest, although baroreflex blockade by high epidural block has been questioned.

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Fig 1 Computed tomography of the patient on the second (A) and fifth (B) days after ICU admission. Note diffuse oedema particularly in the occipital area in (A) and a slight atrophic picture in (B). An arrow indicates air bubbles in the third ventricle.
There have been previous case reports of the accidental total spinal block and recovery with various neurological disabilities after resuscitation. However, there have been no reports of adult patients who had decorticate rigidity for several days after cardiac arrest and recovered, except in an elderly patient with accidental hypothermia. As our patient had decorticate rigidity and diffuse brain oedema, the clinical outcome seemed desperate at first. However, the CCI was 16–18, suggesting a matching of cerebral blood flow and metabolism even though there was EEG silence.

This case might suggest that intensive treatment with the combined use of mild hypothermia and barbiturate therapy should be tried when there is a decorticate rigidity with profound suppression of brainstem reflexes following cardiopulmonary resuscitation. We used thiamylal instead of thiopental in this case, as thiamylal, which has similar pharmacokinetics to thiopental, was found to be more effective in attenuating the increase in intracellular calcium concentration produced by NMDA receptor activation than thiopental.

This case also demonstrates that patients must be continuously monitored by close observation of respiratory, circulatory as well as neurological signs and symptoms for at least 20 min following epidural injection.

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