CORRESPONDENCE

A safe and effective technique for application of a multi-level cervical epidural blood patch

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To the Editor,

An epidural blood patch is an effective treatment modality for reversing spontaneous intracranial hypotension (SIH) due to cerebrospinal fluid (CSF) leakage.¹ Autologous blood injected near the suspected leak site results in alleviation of symptoms by increasing CSF pressure in the short term and later by sealing the leak with fibrin. We herein report the successful treatment of SIH with a neurostimulation-guided cervical epidural blood patch using the electrical epidural stimulation Tsui test.²

A 48-yr-old woman presented to our neurosurgery department with a five-month history of a left occipital headache and episodes of aphasia. Magnetic resonance imaging (MRI) showed a 13-mm frontoparietal subdural hematoma with evidence of subacute-on-chronic hemorrhage and dural enhancement throughout (Figure A). This, coupled with a computed tomography image of the cervicothoracic spine showing extradural CSF collections at the C1-C2 and C5 levels, leading to the diagnosis of SIH. She was referred for treatment with a cervical epidural blood patch.

Figure (A) Contrast-enhanced magnetic resonance imaging (MRI) shows a left subdural hematoma (arrow). (B) Fluoroscopy image of the epidural catheter, with the tip located at the level of the fifth cervical vertebrae. (C) Fluoroscopy image shows spread of the

autologous blood and lopamidol combination injectate. (D) Follow-up contrast-enhanced MRI shows a decrease in the size of the prior subdural hematoma

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Apart from the technical challenge of interlaminar cervical epidural access, anatomical studies show that the spinal cord is thickest at the cervicothoracic and thoracolumbar junctions, which causes significant reduction in the epidural space³ and increases the potential for cord injury. Hence, we opted for a thoracic approach to the cervical epidural space for greater safety. After titrated intravenous sedation, and with the patient in the sitting position, T3-T4 epidural space was identified at 3-cm depth using ultrasound (M-Turbo, Curvilinear probe). A 50-mm Pajunk stimulating nerve block set was initially selected for the procedure as the needle and catheter were equipped with, and could provide, neurostimulation. Using the 18G Tuohy needle, the midline epidural space was located using a “loss of resistance to saline” technique. The catheter could not be advanced beyond the tip of the needle, however, so the kit was abandoned in favour of an Arrow® 17G Tuohy needle and 19G FlexTip Plus® Epidural Catheter (Teleflex Medical Canada Inc., Markham, ON, Canada) along with a SnapLock™ Catheter/Syringe from an Arrow® StimuCath® set. The catheter was successfully advanced aided by electrical stimulation (Pajunk MultiStim SENSOR; Geisingen, Germany) with a 6-mA current that demonstrated progression of the motor response from chest to thumb as the catheter was advanced. Prior to advancing the catheter, 20 mL dextrose 5% in aliquots was used to generate potential space to aid advancement of the catheter without kinking while maintaining the ability to stimulate.

The catheter was secured at the C5 level after a motor response was noted only on the left side and no further cephalad motor progression with continued catheter threading was seen. Biplanar rotational fluoroscopy using approximately 5 mL of injected Isovue® (Iopamidol, Bracco Imaging, Anjou, QC, Canada) contrast material was performed in the neuroradiology suite to confirm catheter placement. It showed the tip of the catheter on the left side of C5 (Figure B). Sterile autologous blood (13 mL) was injected through the catheter until the patient complained of pressure in the back of the neck. Spread of the contrast material was seen extending from the skull base to the C6 level (Figure C). The patient described immediate alleviation of the headache. Transient numbness in the

left index finger and thumb was noted but resolved within an hour. The patient was discharged home two days following the procedure and had complete resolution of symptoms. A follow-up MRI at one month (Figure D) showed reductions in the dural enhancement, subdural hematoma size, and amount of extradural CSF around the cervical spinal cord area.

Although electrical stimulation was previously used to administer a thoracic epidural blood patch,² this is the first report utilizing neurostimulation to localize the catheter tip in the cervical position using two widely available, inexpensive epidural kits. The initial attempt with the Pajunk stimulating catheter may have failed because of the relative stiffness of its stylet.⁴ The Arrow Flexitip epidural catheter was subsequently used because it produced the least trauma⁵ and could provide neurostimulation due to its metal reinforcing coil.

Using a thoracic approach to the cervical epidural space may offer a safety advantage as well as being less cumbersome to perform. Further studies are needed to compare the correlation between fluoroscopy- and neurostimulation-guided epidural catheter positioning.

Conflicts of interest None declared.

Editorial responsibility This submission was handled by Dr. Hilary P. Grocott, Editor-in-Chief, *Canadian Journal of Anesthesia*.

References

1. Berroir S, Loisel B, Ducros A, et al. Early epidural blood patch in spontaneous intracranial hypotension. *Neurology* 2004; 63: 1950-1.
2. Morley-Forster PK, Abotaiban A, Ganapathy S, Moulin DE, Leung A, Tsui B. Targeted thoracic epidural blood patch placed under electrical stimulation guidance (Tsui test). *Can J Anesth* 2006; 53: 375-9.
3. Hogan QH. Epidural anatomy examined by cryomicrotome section: influence of age, vertebral level, and disease. *Reg Anesth* 1996; 21: 395-406.
4. Tsui BC. Keys to minimizing the risk of spinal cord trauma during a lumbar approach to thoracic epidural. *Can J Anesth* 2014; 61: 289-94.
5. Banwell BR, Morley-Forster P, Krause R. Decreased incidence of complications in parturients with the arrow (FlexTip Plus) epidural catheter. *Can J Anaesth* 1998; 45: 370-2.