

Case Report:

Post-operative epidural catheter migration into subarachnoid space resulting in near total collapse of patient

M. Madhusudan, M. Hanumantha Rao, K. Mohsin, S.R.A. Nagabhushanam,
K. Brinda, B. Aparna

Department of Anaesthesiology and Critical care, Sri Venkateswara Institute of Medical Sciences, Tirupati

ABSTRACT

Epidural anaesthesia is being regularly practised in many clinical settings and there are many documented complications. Here we report the successful management of accidental migration of epidural catheter into the subarachnoid space causing near collapse in a patient.

Key words: *Epidural anaesthesia, Catheter migration, Subarachnoid space*

Madhusudan M, Rao MH, Mohsin K, Nagabhushanam SRA, Brinda K, Aparna B. Post-operative epidural catheter migration into subarachnoid space resulting in near total collapse of patient. J Clin Sci Res 2016;5: 242-5. DOI: <http://dx.doi.org/10.15380/2277-5706.JCSR.15.061>.

INTRODUCTION

Epidural catheter (EC) migration is a well-documented entity in literature. We wanted to reemphasize the fact that despite all the precautionary measures, the possibility of EC migration does exist. However, most of these reports are consistent with introduction of Tuohy needle, either partially or completely, into intravascular, subdural or subarachnoid spaces prior to the placement of catheter. We report a delayed migration of epidural catheter into the subdural or subarachnoid space after apparently normal needle placement and negative test dose.

CASE REPORT

A 33-year-old male belonging to American society of anesthesiologists (ASA) physical status^I, diagnosed to have carcinoma stomach, was posted for distal gastrectomy. After thorough preoperative clinical and laboratory evaluation, patient was considered for surgery under general anaesthesia. Our plan was to administer general anaesthesia (GA)

supplemented with epidural analgesia for pain management. After obtaining written informed consent, the patient was shifted to the theatre. Patient was monitored with electrocardiogram (ECG), non-invasive blood pressure (NIBP), oxygen saturation by pulse oximetry (SPO₂), end-tidal carbon dioxide (ETCO₂), temperature and urine output. An 18G intravenous (IV) line was secured to the dorsum of hand. Under strict aseptic precautions, after infiltration of 2% lignocaine, a 18G Tuohy epidural needle (Rumson's EPI KIT^R-SFT) was inserted in to the T7/T8 interspace through the midline approach with patient in the left lateral position. Epidural space was identified by the loss of resistance with saline technique at about 5 cm depth. The EC was anchored to the skin at 9 cm with 4 cm of the catheter inside the epidural space. Epidural test dose was given with 3 mL of 2% lignocaine with 15 µg of adrenaline after negative aspiration for cerebrospinal fluid (CSF) and blood and there were no adverse events for a period of 5 minutes. General anaesthesia was induced by using slow IV

Received: October 02, 2015; Revised manuscript received: April 15, 2016; Accepted: April 21, 2016.

Corresponding author: Dr M. Madhusudan, Assistant Professor, Department of Anaesthesiology and Critical care, Sri Venkateswara Institute of Medical Sciences, Tirupati, India.

e-mail: drmadhu37@gmail.com



Online access

http://svimstpt.ap.nic.in/jcsr/oct-dec16_files/3cr.15.061.pdf
DOI: <http://dx.doi.org/10.15380/2277-5706.JCSR.15.061>

injection of midazolam 2 mg, propofol 100 µg and fentanyl 100 µg and intubated with the injection vecuronium 8 mg IV. Anaesthesia was maintained with oxygen, air, isoflurane and intermittent vecuronium (1mg) bolus dose. Later 10 mL of 0.2% bupivacaine with 50 µg of fentanyl was given in aliquot doses after negative aspiration before each aliquot dose followed by epidural infusion with 0.125% bupivacaine + 2 µg/mL fentanyl at 3-5 mL/hour. Patient had stable haemodynamics throughout the surgery except two episodes of hypotension (systolic blood pressure <80mm of Hg) after epidural bolus dose, which was treated with fluid bolus and phenylephrine bolus of 50 µg. The surgical procedure lasted for three hours. At the conclusion of surgery, residual neuromuscular blockade was reversed and extubated after attaining protective airway reflexes. Immediately after extubation, patient was obeying simple commands, moving all the limbs and was stable haemodynamically. Then patient was transferred to post-operative recovery room and same epidural infusion was continued at 5mL/hour. After about 2 hours, patient was found to be unconscious not responding to verbal commands and deep painful stimuli, but was stable haemodynamically except for slow and shallow respirations. We considered the differential diagnosis of residual neuromuscular blockade, hypoglycaemia, dyselectrolytemia, cerebrovascular accident (CVA) and epidural catheter migration.

In view of poor Glasgow coma score (GCS), we intubated the patient immediately and connected to mechanical ventilatory support. We collected the femoral arterial blood for blood gas analysis (ABG), blood glucose levels and for electrolytes (sodium, potassium and magnesium) status after patient was initiated on mechanical ventilatory support. We ruled out hypoglycaemia (random blood glucose 192 mg/dL) and dyselectrolytemia (serum sodium 140 mEq/L, potassium 3.8 mEq/L and

magnesium 1.7 mEq/L) after checking the blood sample. His arterial blood gas analysis (ABG) revealed respiratory acidosis with compensatory metabolic alkalosis. His ventilatory parameters were adjusted to reduce the arterial carbon dioxide tension (PaCO_2). Meanwhile we ruled out the possibility of CVA clinically, by symmetrical pupillary size (2 mm on both sides) and reacting to light with no gaze deviation, no focal neurological deficits and bilateral plantar flexor response and confirmed with the normal CT brain later. We also excluded the possibility of the residual neuromuscular blockade by examination with peripheral nerve stimulator which showed the train of four (TOF) ratio greater than 0.9. Finally we thought that could be due to epidural catheter migration into subarachnoid space. We stopped the epidural infusion and we aspirated 5 mL of clear fluid from the catheter without any air column in the catheter. We mixed the 2 mL of aspirated fluid with 2 mL of 2.5% thiopentone which got precipitated. Again we aspirated the another 2 mL of clear fluid and mixed with 2 mL of 2.5% thiopentone which was not precipitated and we also checked the sugar levels from the aspirated fluid which showed a sugar level of 125 mg/dL. Hence we thought that catheter was migrated in to intrathecal space and we removed the epidural catheter. After 3 hours of controlled ventilation, patient regained consciousness and was well oriented and was extubated. We observed the patient in the recovery room for the next 24 hours and had uneventful recovery after that.

DISCUSSION

The usage of epidural anaesthesia is more now days for intra-operative and post-operative use. We need to be more vigilant so as to guard our patients against possible hazards or complications arising out of its usage. We often experience migration of an EC into an undesirable space. Migration of EC into intravascular or intrathecal spaces is a common

clinical occurrence with incidence showing wide variation between 21% - 43%.^{2,4} It is considered clinically significant if movement is more than 1 cm into the space.^{3,4} Intravascular and intrathecal migration can have catastrophic consequences, whereas many failures have been attributed to outward migration.^{2,4,5} An appropriate fixation technique such as subcutaneous tunnelling,³ suturing,⁶ adhesive devices and Lockit EC clamp^{4,7} have been used to reduce its incidence. In our case we anchored the EC at 9 cm to the skin with sterile adhesive plaster without subcutaneous tunneling or suturing the EC to the back of skin

Routine test dose does not always ensure correct placement, each dose should be considered as a test dose given in increments.⁸ In our case we observed that after initial test dose and immediately after extubation patient was completely normal and had no features suggestive of intrathecal injection. In our case probably the EC had migrated in to intrathecal space due to sub-atmospheric pressure^{9,10} in epidural space which is exaggerated by movement/respiration during shifting the patient from surgical theatre to the surgical recovery room. We observed that EC had migrated inward by almost 1 cm. At the time of removal of it we found that it was anchored at 10 cm level from the skin.

Clear fluid appearing in the catheter during aspiration may be either CSF or injected drugs mixed with the saline.¹¹ CSF usually flows briskly and can be aspirated easily but this was not observed in our case. A catheter accurately positioned in the epidural space does not necessarily remain there; it can migrate through the dura, so that subsequent injections are intrathecal rather than epidural as in our case. We aspirated 5 mL of clear fluid without air column from the EC which had precipitated with thiopentone sodium (pH=10.5) due to the acidic nature of the aspirated fluid containing bupivacaine (pH=5-6) and fentanyl citrate

(pH=4-7) in it. We aspirated again 2 mL of clear fluid which was not precipitated with thiopentone sodium this time and we checked glucose levels in that fluid showed 125 mg/dL which confirmed the aspirated fluid was CSF (pH=7.28-7.32).

Contrary to the earlier recommendations¹² in our case we have used a multiorificed catheter. Indeed it may be that single hole epidural catheters should be preferred to multihole catheters because of the inherent dangers associated with the latter. The effect of epidural doses can vary depending on the pressure of injection¹³ especially if the catheter had been partially through the dura. The need for careful monitoring of each dose administered through an epidural catheter is clear, as the extent and character of block could change depending on the precise position of the catheter and the pressure of each injection. In our case EC was inserted and fixed at 9 cm mark with 4 cm catheter left in epidural space in contrast to standard technique¹⁴ of insertion. It has been observed that (i) a negative aspiration test cannot always rule out subdural or subarachnoid migration of an epidural catheter; (ii) if no air column is observed while aspiration, catheter migration should be suspected; (iii) test dose should always be first given before administering the bolus dose and a careful observation for signs and symptoms of spinal blockade; (iv) always top-ups are administered in small aliquots; and undue pressure should never be used while injecting the drug through epidural catheter.¹⁵

Later an electrode tipped¹⁶ epidural catheter has been devised. This method has a high success rate of 99% of midline placement of epidural catheter at required spinal segment and can be used for checking correct placement of an epidural catheter tip.

We recommend using a test dose rather than a negative aspiration test to rule out the intrathecal migration of EC. In addition we also

suggest administering top-up doses in small aliquots without exerting undue pressure and to have a high degree of suspicion if a continuous fluid column is seen while aspirating a EC. We also suggest the use of commercially available epidural clamp to prevent EC migration.

ACKNOWLEDGEMENTS

The authors are thankful to the Departments of Biochemistry, Radiology and Surgical Oncology for their support in managing this case.

REFERENCES

1. Dripps RD. New classification of physical status. *Anesthesiol* 1963;24:111.
2. Michael Jaeger, Melissa L Modsen. Delayed subarachnoid migration of an epidural arrow flexes tip plus catheter. *Anesthesiology* 1997;87:719-20.
3. Tripathi M, Pandey M. Epidural catheter fixation: subcutaneous tunneling with a loop to prevent displacement. *Anaesthesia* 2000;55:1106-26.
4. Clarke MX, O'Hare K, Gorringe J, Oh T. The effect of the Lockit epidural catheter clamp on epidural migration: a controlled trial. *Anaesthesia* 2001;56:865-70.
5. Barnes RK. Delayed subarchnoid migration of an epidural catheter. *Anaesth Intens Care* 1990;18:564-6.
6. Poulton B, Young P. A Novel method for catheter fixation. *Anesthesia* 2000; 55: 1141-2.
7. Coupe M, Al-Shaikh B. Evaluation of a new epidural fixation device. *Anesthesia* 1999;54:98-9.
8. Gomar C, Fernandez C. Epidural analgesia-anaesthesia in obstetrics. *Eur J Anaesthesiol* 2000;17:542-58.
9. Mourisse J, Gielen MJM, Hasenbos MAWM, Haystraten FMJ. Migration of thoracic epidural catheters. Three methods for evaluation of catheter position in thoracic epidural space. *Anaesthesia* 1989;44:574-7.
10. Phillips DC, MacDonald R. Epidural catheter migration during labour. *Anaesthesia* 1987; 42:661-3.
11. Armitage EN, Lumbar and thoracic epidural anaesthesia. In: Wildsmith JAW, Armitage EN, editors. *Principles and practice of regional anaesthesia*. Edinburgh: Churchill Livingstone; 1987;87.p.98.
12. Beck H, Brassow F, Doehn M, Dziadzka A, Schulte A, Esch J. Epidural catheters of the multi-orifice type: dangers and complications. *Acta Anaesthesiologica Scand* 1986;30:549-55.
13. Power I, Thorburn J. Differential flow from multihole epidural catheters. *Anaesthesia* 1988;43:876-8.
14. Werster SG. Migration of epidural catheters. *Anaesthesia* 1987;42:654.
15. Dubey SR, Pranali Shah, Wadhwani RD, Khare P, Patel HJ. Accidental placement of an epidural catheter into subarachnoid space and timely detection of it after test dose. *Indian J Anaesth* 2003;47:214-7.
16. Hayatsu K, Tomita M, Fujihara H, Baba H, Yamakura T, Kichiro T, *et al*. The placement of the epidural catheter at the predicted site by electrical stimulation test. *Anesth Analg* 2001;93:1035-9.