ISSN: 2377-4630

Tay and Abrahams. Int J Anesthetic Anesthesiol 2017, 4:060
DOI: 10.23937/2377-4630/1410060
Volume 4 | Issue 2
Open Access

International Journal of
Anesthetics and Anesthesiology

CASE REPORT

Timely Detection of Epidural Catheter Migration: Diagnosis and Management: A Case Report

YC Tay[1]* and MJ Abrahams[2]

[1]*Advanced Pain Trainee, Pain Clinic, Addenbrookes Hospital, Cambridge, UK*

[2]*Lead Clinician for Chronic Pain, Department of Anaesthesia, Addenbrookes Hospital, Cambridge, UK*

***Corresponding author:** *Tay Yoong Chuan, MBBS, M.Med (Anaesthesiology), Advanced Pain Trainee, Pain Clinic, Addenbrookes Hospital, Cambridge, United Kingdom, E-mail: tay.yoong.chuan@singhealth.com.sg*

Abstract

Epidural catheters that are commonly placed for anaesthesia or analgesia have a serious complication of migration. Besides intravascular local anaesthetic infusion which could lead to systemic toxicity, a subdural migration is often diagnosed late and presents with life-threatening outcomes noted either at post-mortem or requiring intensive care management. Albeit training and protocols for insertion, administering and management of epidurals have been established, not all complications can be mitigated. We present a case of an epidural catheter migration in a patient with timely detection and management without airway compromise with an analysis of the detection, diagnosis and management. Various methods for diagnosis have been described in the literature as we discuss the pros and cons of bedside and radiological investigations. A high index of suspicion and knowledge of potential problems in the management of patient with in-dwelling epidural catheters prove vital to avoid complications with catheter migration. Adequate training and availability of emergency contact details would expedite management in emergencies.

Introduction

Migration of an epidural catheter is a known complication of the procedure, whether inserted for anaesthesia or analgesia. Migrations can be intravascular, subdural, subarachnoid (intrathecal) or subcutaneous. Epidural test doses of local anaesthetics immediately after catheter insertion have been used to exclude subdural placement. However, subdural migration of the catheter may occur anytime after the insertion due to various factors, including a tear in the arachnoid membrane by the catheter before the intrathecal catheter passed subdurally, or from the catheter tip eroding through the arachnoid membrane until its subdural location [1]. This could potentially be life-threatening from inadvertent administration of epidural drug dosages into the subdural space. We present a case report of a patient who had a timely detection of possible epidural catheter migration into the subdural space while on a local anaesthetic infusion.

Case Report

A 77-year-old lady was admitted for an elective open abdominal hysterectomy and bilateral salpingo-oophorectomy and left radical nephrectomy for complex atypical hyperplasia of her endometrium and left kidney angiomyolipoma. Her other medical problems include hypertension, hypercholesterolaemia and gastro-oesophageal reflux disease. Her previous surgeries include a total knee replacement, tonsillectomy and excision to her breast cyst. Her body mass index was 34.1 kg/m^2 and pre-operative investigations were within acceptable limits for her surgery. Appropriate consent was taken for surgery, regional and general anaesthesia before arrival to theatre.

An epidural was inserted pre-induction under aseptic conditions for post-operative analgesia in the sitting position under monitoring. A midline approach was used at T8/9 interspace with a standard 8 cm 16 G Tuohy needle, under local anesthesia (lignocaine 1%) in two attempts, guided by loss of resistance to saline and air respectively. The needle insertion depth was 7 cm with the catheter anchored at 10 cm at skin. A lignocaine 2% 3 ml epidural test dose was also given before starting the epidural infusion of bupivacaine 0.1% with 2 mcg/ml fentanyl at 10 ml/h. Subsequently, a right internal

Citation: Tay YC, Abrahams MJ (2017) Timely Detection of Epidural Catheter Migration: Diagnosis and Management: A Case Report. Int J Anesthetic Anesthesiol 4:060. doi.org/10.23937/2377-4630/1410060

Received: February 13, 2016: **Accepted:** November 27, 2017: **Published:** November 29, 2017

jugular central line was inserted under ultrasound guidance. Post-induction, an intra-arterial line was also inserted under ultrasound guidance for monitoring. Other than IV Fentanyl 75 mcg given for induction of general anaesthesia, no other opioids were used intraoperatively. A midline incision was made for the operation with an added splenectomy and partial adrenalectomy due to a damaged spleen from the adjacent tumour. Haemodynamics remained stable and there was no intraoperative blood transfusion. She was extubated postoperatively and was comfortable with bilateral T3 dermatome block in recovery. She was pain-free when she was transferred to the ward and was able to move her lower limbs.

On the first post-operative morning, the patient alerted the nurse-in-charge that she was unable to move her legs after sitting up in bed. Her sensory block was checked to be at the T4-6 dermatome, her epidural infusion rate was reduced to 8 ml/h and the Pain Team was alerted of the complete motor block of her lower limbs. Assessment on arrival noted the motor block to have a gradual onset over 30 minutes, with a sensory block of T6-S1 bilaterally, as the patient described the level of block rising steadily from her lower limbs to her torso, feeling uncomfortable. She was able to perform a straight leg raise actively prior to sitting up. Her vital signs revealed an acute decrease in blood pressure 101/56 from 130-150 systolic baseline, pulse 68 beats/minute, 36.4 °C and respiratory rate of 14 breaths/min with SpO_2 100% on room air. Decision was made to stop the epidural infusion. Within 30 minutes, she regained movement of her right foot. After 45 minutes, she could move her left toes. The analgesia plan was switched to a Patient Controlled Analgesia (PCA) oxycodone with her concurrent regular paracetamol. The anaesthetist-in-charge was alerted and decided for the removal of the epidural catheter. Coagulation profile was within the normal range prior to removal.

The epidural catheter aspirate was blood stained fluid and the catheter was removed completely and easily. Instructions were left for an urgent MRI spine should she develop any motor weakness or back pain to exclude a spinal or epidural haematoma which may require surgical intervention. Hourly straight leg raises and vital signs were performed to monitor her neurological function. She was advised to stay hydrated, remain on bed rest with elevation not more than 30 degrees and to alert the ward staff should she develop a headache. There was no headache on change of position from supine to a sitting position, no photophobia, nausea, vomiting or tinnitus. Antibiotics for surgical prophylaxis were continued for 24 hours post-surgery at the surgeon's instruction.

On the second post-operative day review, her motor block had completely resolved and her surgical site pain was well controlled with her PCA. Her vital signs were as follows: Blood pressure 120/51, pulse 73 beats/min, 36.9 °C, and respiratory rate 14 breaths/min with SpO_2 99% on room air. She was sat up and assessed for discomfort. She was able to cooperate with physiotherapy for mobilization. The PCA was stopped on post-operative day 4 and given oral analgesia. She was discharged from the hospital the next day.

Discussion

The diagnosis of a migrated subdural catheter was made clinically by the sudden rapid onset of dense, ascending motor blockade while on a steady epidural infusion. In addition, fluid could be easily aspirated from the epidural catheter, which could be tested for glucose in comparison to blood levels for cerebrospinal fluid verification. The implication of an unrecognised accidental dural puncture would be the potential respiratory failure risk secondary to a high block should a larger dose of local anaesthetic be administered via the catheter in the subarachnoid space [2]. Other reports have proceeded to perform CT myelograms with administration of contrast via the migrated epidural catheter to delineate the location of the catheter tip [1].

However, the concern is the residual local anaesthesia within the catheter which could be delivered as a bolus dose during the administration of the contrast. While Uchino, et al. have evaluated the post-operative in-dwelling epidural catheter position by administering 5 ml of contrast via the catheter, the suspicion of a possible intrathecal location of this patient's catheter with pre-existing evidence of motor blockade obviates the need to place the patient at further risk of neurological deficit and invite litigation, albeit with the estimated 5 ml of 0.1% bupivacaine with 2 mcg/ml of fentanyl distal to a contrast bolus [3].

In a retrospective observational survey over 23 years, acute mechanical respiratory failure requiring tracheal intubation within 10 minutes was noted for test doses of more than 15 mg of 0.375% bupivacaine (4 ml) given via a newly sited epidural catheter [4]. Should contrast be administered for definitive imaging, the optimal contrast volume via the catheter would need to be determined, and balanced with the minimum volume required for diagnosis.

The alternative solution to this by fluid aspiration via the migrated epidural catheter before administrating the contrast may potentially lead to a decrease in intrathecal fluid volume; hence precipitate a post-dural puncture headache. The volume aspirated may not completely clear the potential reservoir of local anaesthetic in the space surrounding the tip from the previous period of infusion, and may also cause an inadvertent local anaesthetic bolus during the administration of contrast. In addition, with the use of a contrast, there is also a risk of contrast hypersensitivity, contrast induced nephropathy and radiation. Also, there could also be a possible

risk of intravascular bolus of infusates had the catheter migrated intravascularly, which has been described to occur with patient posture changes and movements [5]. Hence, we have recommended for the use of an MRI for diagnostic imaging instead, which could delineate location of catheter as well as potential epidural or spinal haematoma. However, if a wire-reinforced epidural catheter were used, then a high-resolution spiral computed tomography scan should be considered, as it has been reported to have successfully identified a wandering epidural catheter [6].

We postulate that the migration, despite having only 3 cm within the space, could be due to a distal obstruction of the catheter from a change in patient position leaking the epidural infusion into a potential rent in the dura from a previous insertion attempt. An obstruction to the local anaesthesia infusion flow from a catheter kink from positional change or tissue covering the lumina are possibilities. Highest incidence of accidental dural puncture occurred during repeated attempts for epidural, either due to difficult anatomy or anxious, uncooperative patients [7].

Regardless of the epidural complication, analgesia should be maintained. In our patient, we switched completely to a PCA and discontinued the epidural infusion; however other options include running a concurrent migrated subdural infusion via the epidural catheter *in situ*, with or without a PCA.

The consideration for the use of intrathecally placed epidural catheter has been reported in obstetric patients and was found to be effective in prophylaxis of Post-Dural Puncture Headache (PDPH) [8]. However, intrathecal infusion for analgesia has issues of infusion starting rate with an unknown pre-existing reservoir of local anaesthesia *in situ*, risk of hypotension and respiratory compromise. In addition, the infusion adjuvants such as fentanyl should be used with caution if systemic opioids are used concurrently. The familiarity of the hospital staff and system to its use would guide this option.

The patient was encouraged hydration and advised to rest in bed and monitored for symptoms of PDPH as accidental or inadvertent dural puncture during epidural anaesthesia results in a high incidence of post-dural puncture headache [7]. This has been quoted to be in the range of 0.4-6% in obstetric epidurals [9].

Conclusion

A high index of suspicion and knowledge of potential problems in the management of patient with in-dwelling epidural catheters are vital to avoid complications with catheter migration. Adequate training and availability of emergency contact details would expedite management in emergencies.

References

1. Sorokin A, Annabi E, Yang WC, Kaplan R (2008) Subdural Intrathecal Catheter Placement: Experience with Two Cases. Pain Physician 11: 677-680.
2. Bromage PR (1978) Epidural Analgesia. (1st edn), Philadelphia, W.B. Saunders Company, 230: 655.
3. Uchino T, Hagiwara S, Iwasaka H, Kudo K, Takatani J, et al. (2010) Use of Imaging Agent to Determine Postoperative Indwelling Epidural Catheter Position. Korean J Pain 23: 247-253.
4. Sprigge JS, Harper SJ (2008) Accidental dural puncture and post dural puncture headache in obstetric anaesthesia: presentation and management: A 23- year survey in a district general hospital. Anaesthesia 63: 36-43.
5. Jeon J, Lee IH, Yoon HJ, Kim MG, Lee PM (2013) Intravascular migration of a previously functioning epidural catheter. Korean J Anesthesiol 64: 556-557.
6. Brookman JC, Sair HI, Benkwitz C, Gulur P (2010) Wandering epidural catheter. Anesthesiology 113: 1198.
7. Jadon A, Chakraborty S, Sinha N, Agrawal R (2009) Intrethecal Catheterization by Epidural Catheter: Management of Accidental Dural Puncture and Prophylaxis of PDPH. Indian J Anaesth 53: 30-34.
8. Kevin CD, Ola PR (1998) Intrathecal catheter insertion during labour reduces risk of post-dural puncture headache. Can J Anaesth 45: 42-45.
9. Berger CW, Crosby ET, Groecki W (1998) North American survey of the management of dural puncture occurring during labour epidural analgesia. Can J Anaesth 45: 110-114.