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JOURNAL: Veterinary Anaesthesia and Analgesia

PUBLISHER: Elsevier

PUBLICATION DATE: 9 May 2018 (online)

DOI: 10.1016/j.vaa.2018.03.012

USE OF ULTRASONOGRAPHY TO CONFIRM EPIDURAL CATHETER POSITION IN A CAT

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LETTER TO THE EDITOR

Use of ultrasonography to confirm epidural catheter position in a cat

The authors would like to describe the use of ultrasonography for assessing the correct placement of a Tuohy needle into the epidural space and localizing the final position of the tip of an epidural catheter in a cat.

A 2-year 4-month old Domestic Short Hair, male neutered cat was referred to the Queen Mother Hospital of the Royal Veterinary College following a road traffic accident. Radiography confirmed a left caudal iliac wing and acetabular fracture, and a right-sided sacro-iliac luxation. Assessment showed a laceration of the right hock region with lateral tarsal instability. Full clinical examination, haematology, biochemistry analysis revealed mild hyperkalaemia, mild anaemia and azotaemia. No signs of sepsis, hypovolemia, neurological or coagulation abnormalities were found. The animal was anaesthetised for surgery and a trans-sacroiliac screw and an external skeletal fixator were placed on the pelvis and on the tarsus for stabilization.

At the end of the surgery an epidural catheter was placed to manage the postoperative pain. The external fixator crossed the lumbosacral area and it was impossible to use the standard L7-S1 approach. Therefore, a sacrococcygeal approach was chosen with the aim to advance the tip of the catheter to the sixth lumbar vertebra.

The cat was positioned in sternal recumbency and after aseptic skin preparation a surgical drape was placed. Aseptic techniques were used during the procedure. A 0.9 x

50mm Tuohy needle (Perifix One; B BRAUN, Germany) was inserted into the epidural space at the level of the sacrococcygeal area as described by O'Hearn & Wright (2011). Once the tip of the needle was thought to be in the epidural space, a 10-5 MHz linear probe attached to an ultrasound machine (Sonoscape Sv9; Sonomed, China) was positioned in the transverse plane between the spinous apophysis of the L6-L7 vertebrae. After obtaining an optimal transverse view of the vertebral canal, a volume of 0.3 mL of sterile saline was injected rapidly through the epidural needle. The fluid movement was visualized in the epidural space at the level of L6-L7 confirming the correct position of the needle (Appendix A). This technique has been recently described by Otero et al. (2016).

The ultrasound probe was kept at the same level by one anaesthetist, who observed the ultrasound screen, while another anaesthetist advanced the epidural catheter (0.60 x 720 mm 24 gauge, Perifix One; B BRAUN, Germany) cranially through the epidural needle (Fig. 1A). The correct position of the tip of the catheter at the level of sixth lumbar vertebra was confirmed when a small, round, hyperechoic structure was visualized on the floor of the vertebral canal (Fig. 1B). Afterwards, the epidural needle was removed, and the catheter was tunnelled subcutaneously using the epidural needle up to the dorsal area corresponding to lumbar vertebra L6. This facilitated the drug administration and avoided potential faecal contamination. A urinary catheter connected to a closed system was then placed.

A combination of preservative free morphine (0.1 mg kg^{-1}, Morphine Sulphate BP; Martindale Pharmaceutical, UK) and 1.3 mg kg^{-1} ropivacaine 0.2% (Naropin 7.5%;

AstraZeneca, UK) with a total volume of 1 mL was injected into the catheter during the postoperative period. The catheter was kept in place for four days and no complications associated with the epidural catheter were observed.

The use of ultrasonography has gained popularity in veterinary anaesthesia over the last years. Several studies have been published in small animals describing the sonoanatomy of the vertebral canal and the use of ultrasound for assisting different procedures such as collection of cerebrospinal fluid (Etienne et al. 2010), placement of epidural catheter (Viscasillas et al. 2013) and confirmation of epidural/spinal injection (Otero et al. 2016). In this case, the external fixator placed during surgery prevented the possibility of placing the catheter using a lumbosacral approach. Therefore, the authors decided to use the sacrococcygeal approach described by O´Hearn and Wright (2011) for placing the epidural catheter. Due to the potential limitations of the commonly used techniques to confirm correct position of the needle into the epidural space (pop sensation, loss of resistance or hanging drop), the authors decided to use the ultrasonography method described by Otero et al. (2016).

The small, round, hyperechoic structure that appeared at the level of L6-L7 while the catheter was advanced was identified as the epidural catheter (Fig. 1B). The transverse view of the vertebral canal, visualized with ultrasonography, allowed the recognition of the new structure as soon as it appeared on the screen.

As an alternative method, radiology can be used to confirm the epidural catheter position. This technique is easily available but leads to radiation exposure of the animal and potentially the operator. In addition, if the epidural catheter is not radiopaque,

injection of radiographic contrast might be required for its localization and this may lead to complications such as an anaphylactic reaction.

In conclusion, ultrasonography is a non-invasive method that may be useful to confirm the correct needle position in the epidural space and localize of the tip of the epidural catheter when it is advanced inside the vertebral canal. Further studies are needed to confirm our hypothesis.

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Figure Legends

Figure 1 A) A picture of the cat with the epidural catheter inserted in the sacro-

coccygeal space. The ultrasound probe was positioned in a transverse place at the level of L6-L7 spinous apophysis to confirm the epidural catheter correct location.

B) An ultrasound image of the spine obtained with a 10-5 MHz linear probe, was taken with the animal in sternal recumbency, showing the epidural catheter positioning in the epidural space (the arrows indicate some of the different structures visualised in the area: 1: dura mater, 2: floor of the vertebral canal, 3: catheter).

Appendix A Ultrasound videos demonstrating a) fluid movement in the epidural space at the level of L6-L7 confirming the correct position of the needle and b) movement of the epidural catheter.