Lumbosacral Myelography in Dogs -A Safer Technique

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ABSTRACT. In search of a safer myelographic technique, we performed myelography via the lumbosacral intervertebral space. Eight dogs, in which the backflow of cerebrospinal fluid was observed, received contrast media via the lumbosacral intervertebral space. The subarachnoid contrast columns were successfully observed in 6 dogs. During and after examination, no physiological changes or neurological signs were observed. We recommend that the lumbosacral intervertebral space be selected first before implementing the conventional lumbar myelography.

KEY WORDS: canine, myelography, spinal cord.

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Myelography, with intrathecal injection of contrast media, is a radiographic diagnostic tool for spinal cord disorders. There are two puncture sites in the current myelographic technique, one being the cisterna magna, and the other the lumbar (L5-6) intervertebral space [7]. Even though, lumbar puncture is considered safer than cisterna magna puncture, 5% of dogs that receive lumbar punctures have seizures [2]. This is often considered a technical error as it is thought to be difficult to puncture the narrow interarcuate space among spinous process, cranial articular process and caudal articular process. It is, therefore, not an associated disorder. A possible explanation is physical trauma resulting from contrast medium injection into the spinal cord due to the spinal cord terminating caudal to L5-6 in some dogs [5, 6]. Therefore such seizures stem from a cord injury due to subarachnoid space puncture by the spinal needle resulting from anatomical extension of the spinal cord [8], or toxicity of the contrast medium injected into the subarachnoid space [2]. Adverse effects associated with myelography that have been reported include worsening of neurologic status, aseptic meningitis [2], and hydromyelia [4]. Since a safer myelographic technique is needed, we set up a hypothesis for a safer lumbosacral myelography. Our focus was on 3 factors regarding lumbosacral intervertebral space. Firstly, although spinal cord terminates at caudal lumbar, 85% of normal dogs have the dural end-sac extended caudal to the lumbosacral junction [5]. Secondly, our experience indicates that cerebrospinal fluid (CSF) is often observed at the lumbosacral part on magnetic resonance imaging studies. Thirdly, when the epidural needle for epidural analgesia punctures the lumbosacral intervertebral, CSF often flows backward as a result of accidental subarachnoid puncture [3]. Thus lumbosacral myelography has the possibility of less risk of spinal cord injury than conventional lumbar puncture. Therefore, lumbosacral myelography was performed on 13 clinically normal beagles (Table

1).

Each dog was anesthetized, the lumbosacral intervertebral space was palpated, and a 23 gauge spinal needle was used to puncture the lumbosacral intervertebral space. After confirmation of the backflow of CSF, 0.45 ml/kg of 240 mgI/ml iohexol (Omnipaque® 240, Daiichi Pharmaceutical, Tokyo, Japan) was injected into the subarachnoid space. Where no CSF backflow was observed, the contrast media injection was not performed.

The results of images for each dog are shown in Table 1. In 8 dogs, the backflow of CSF was observed, and contrast media was administered via the lumbosacral intervertebral space. Among these, the subarachnoid contrast columns were successfully observed in 6 dogs. A typical image is shown in the Fig. 1. In 2 of the 8 dogs with confirmed CSF backflow, epidural leaking in the contrast columns was observed. Even though dogs usually twitch as the needle passes through the spinal cord during lumbar puncture [1], jerking of the limb and tail were not observed in lumbosacral myelography. In addition, an increase in heart rate and respiration rate during contrast media injection, which often occurs in lumbar puncture myelography cases, were not observed in any of the dogs in this experiment. Furthermore, recovery from anesthesia was within 30 min and no neurological signs, including seizures, were observed after myelography. From these results, it is suggested that the lumbosacral myelographic technique did not puncture the spinal cord, and contrast medium did not affect the spinal cord.

A lack of CSF backflow (5 dogs, Table 1) means an unsuccessful myelography. So, for dogs with a shorter dural sac, the suggested alternative lumbar puncture site was L6-7, and then the L5-6 intervertebral space. In this case, it is thought that the spinal cord had been terminated cranial to L6-7 or L5-6, so that there is not much risk of the needle piercing the cord parenchyma by lumbar puncture. In human medicine, myelography is performed at the L3-4 or L4-5 puncture site but the needle does not puncture the spinal cord because the cord terminates at L2 in people. The

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Table 1. Data for 13 beagle dogs including sex, age, weight, presence of CSF backflow and quality

Animal No.	Sex	Age (year-old)	Weight (kg)	Presence of CSF backflow	Quality of images
1	♀	2	7.20	○	Excellent
2	♀	2	9.35	○	Excellent
3	♂	9	13.25	×	ND
4	♀	2	8.85	○	Excellent
5	♂	4	8.75	○	Excellent
6	♀	5	8.65	×	ND
7	♂	4	9.20	×	ND
8	♂	2	10.55	○	Excellent
9	♂	1	9.70	×	ND
10	♂	4	10.05	○	Epidural leaking
11	♂	2	10.15	○	Epidural leaking
12	♂	2	9.95	○	Excellent
13	♂	1	12.55	×	ND

Quality of images: Excellent means sufficient myelogram. ND means no data.

Fig. 1. Myelogram punctured via the lumbosacral intervertebral space.

myelographic technique in veterinary medicine is similar, but the anatomical differences make myelography in dogs a potentially higher risk. Myelography in dogs would be a safe diagnostic tool, as it is in humans, if the risk of spinal cord puncture could be eliminated.

The lumbosacral myelography technique proposed in this study can even be implemented in obese dogs whose landmark dorsal spinous process cannot be palpated. This is an advantage over lumbar myelography, because the lumbosacral intervertebral space is larger than the lumbar intervertebral space and palpable, so it is easy enough to perform a blind puncture. However, since narrowing of the intervertebral space from osteophyte due to degenerative changes may cause myelography failure, lumbosacral myelography is less difficult because of this large space. It is concluded that lumbosacral myelography has only minimal risk for cord injury, and the puncture site is palpable. We recommend that the lumbosacral intervertebral space be selected first before implementing the conventional lumbar myelography.

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