

The Advantage of Magnetic Resonance Imaging in Diagnosis of Cauda Equina Syndrome in Dogs

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ABSTRACT. Three dogs were evaluated in our study using magnetic resonance imaging (MRI) to reveal the anatomical deformity and the degree of the lesion of cauda equina. In all dogs, MRI revealed soft tissue, such as cauda equina, epidural fat, and intervertebral disc, at the lumbosacral region clearly without contrast medium. Our results suggest that MRI has some advantages in evaluating cauda equina syndrome in dogs. — **KEY WORDS:** canine, cauda equina syndrome, magnetic resonance imaging (MRI).

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Cauda equina syndrome causes compression, displacement, and disorder of nerve roots in lumbosacral region [6, 10, 12]. Until now several examinations are used to confirm a diagnosis of cauda equina syndrome [1–4, 6, 11]. However, it is difficult to make a definite diagnosis. Recently, MRI as a diagnostic tool has come into wide use in veterinary practice [5, 7–9, 13]. Because of high resolution of MRI, it is possible to get clear images of cauda equina [2, 4]. The purpose of present study was to survey anatomical change of cauda equina lesion in three dogs of different breeds and to evaluate the advantage of MRI in cauda equina syndrome.

The MRI unit used in the present study was a HITACHI MRP-20 with a 0.2 Tesla. T1-weighted and T2-weighted sagittal projections were obtained with a repetition time of 700 msec and 2,000 msec, and echo time of 38 msec and 90 msec, respectively. The slice thickness of the sagittal projection was 5 mm. Before MRI examination, all dogs were premedicated with atropine sulfate (0.05 mg/kg, iv), sedated with midazolam (0.3 mg/kg, im) and medetomidine (0.02 mg/kg, im), anesthetized with pentobarbital sodium (to effect, iv). During MRI, endotracheal tube was used to keep the airways of patient. After examination, atipamezole (0.1 mg/kg, im) was immediately injected for recovery from anesthesia. All dogs are summarized in Table 1.

Dog 1: The clinical signs in this dog were difficulty in rising and back pain when this dog was about 1-year-old. These signs recurred at several-months intervals. *Brucella canis* antibody titer was increased in the serum and the result of urine culture and lumbosacral lesion tissue culture was positive for *Brucella canis*. Complete blood count and biochemical profile was normal. The sagittal T1-weighted image (Fig. 1a) showed that L7-S1 intervertebral disc, caudal L7 and cranial S1 vertebral body was hypointense. Vertebral canal height was decreased and epidural fat could not be clearly seen at the level of L7-S1 lesion. Ventral

Table 1. The summary of three dogs

Dog no.	Breed	Sex	Age(months)	BW(kg)
1	Mixed	male	21	17.7
2	German shepherd	male	84	28.5
3	Golden retriever	male	9	33.5

side of the L7-S1 disc space was appeared to encapsulate. The sagittal T2-weighted image (Fig. 1b) showed that the cauda equina at the lesion of L7-S1 was strongly compressed and the L7-S1 intervertebral disc was hypointense. We diagnosed this dog as discospondylitis which caused by *B. canis* at L7-S1 intervertebral disc space.

Dog 2: This dog had a decreased tail tone, weakness of the hind limbs and excreted soft feces. Survey radiographs revealed that the ventral canal height was decreased at the level of L7-S1 lesion and the density of both L7 caudal and S1 cranial end-plates were increased (Fig. 2a). The sagittal T1-weighted image (Fig. 2b) showed that the loss of epidural fat and the L7-S1 intervertebral disc was hypointense. The cauda equina was compressed and elevated at the level of sacral region. We diagnosed this dog as lumbosacral stenosis at L7-S1 lesion.

Dog 3: The clinical sign in this dog was decreased tail tone and weakness of the hind limbs, especially left side. The sagittal T1-weighted image (Fig. 3) showed that L7 vertebral body was destroyed and the L7-S1 intervertebral disc was hypointense and the osteophyte at ventral side of the L7 vertebral body was slightly hypointense. We diagnosed that the cauda equina was compressed by means of the destroyed L7 vertebral body and osteophyte.

Hathcock *et al.* [3] showed that it was difficult to diagnose the cauda equina syndrome, because survey radiography or myelography has not been able to reveal the cauda equina lesion. In epidulography or discography [11], the result was sometimes false as the contrast medium leaked to arachnoid space and after examination, some animals rarely showed back pain. The advantage of MRI was that it was able to show, without the use of contrast medium, the

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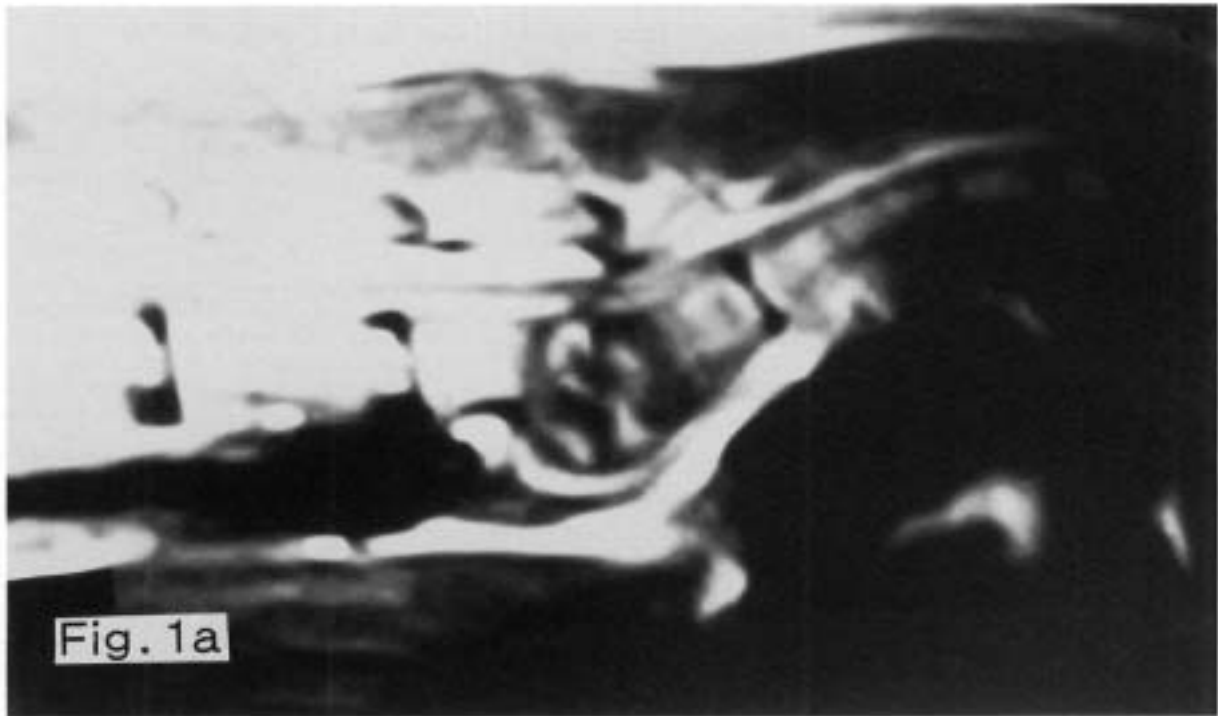


Fig. 1a. Dog 1. Sagittal T1-weighted MR imaging. Cauda equina was compressed not only from ventral side but from dorsal side. Furthermore, there was osteophyte at the level of L7-S1.

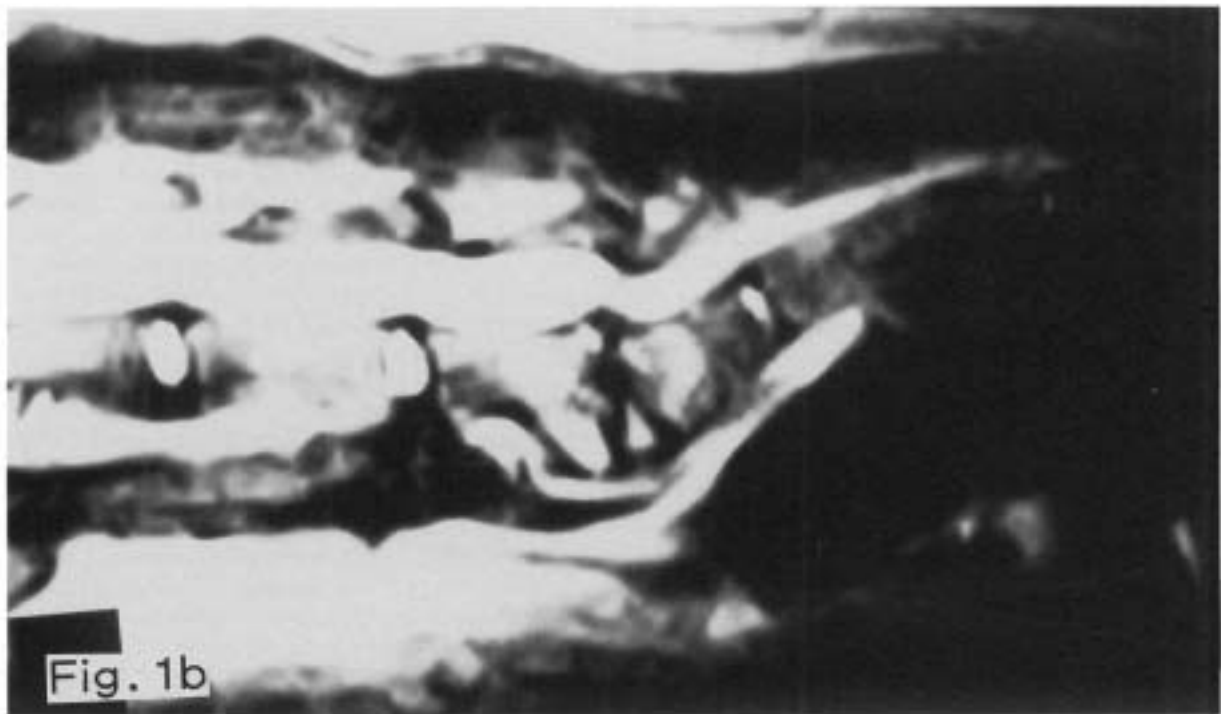


Fig. 1b. Dog 1. Sagittal T2-weighted MR imaging. The L7-S1 intervertebral disc exhibited hypointense.

cauda equina and soft tissue at the level of L7-S1 (Fig. 2b), especially epidural fat which survey radiography (Fig. a) or

myelography (image not shown) couldn't reveal. Furthermore MRI was able to show the protrusion or



Fig. 2a. Dog 2. Survey radiograph. There was lumbosacral stenosis at S1 vertebral body.

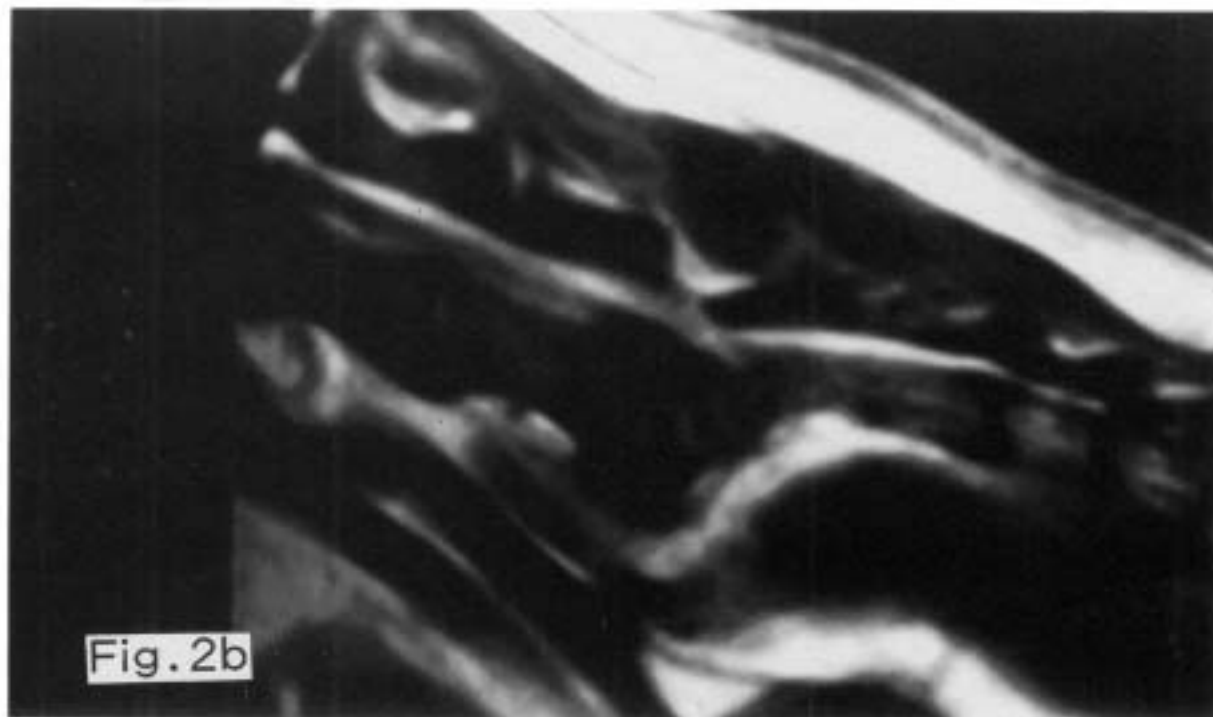


Fig. 2b. Dog 2. Sagittal T1-weighted MR imaging. Around the L7-S1 intervertebral disc was hypointense.

degeneration of intervertebral disc (Fig. 1a, Fig. 1b), the degree of compression, and the osteophyte at the level of L7-S1 (Fig. 1a, Fig. 3).

Our results suggested that MRI had advantage for the diagnosis of the patient dog of cauda equina syndrome.

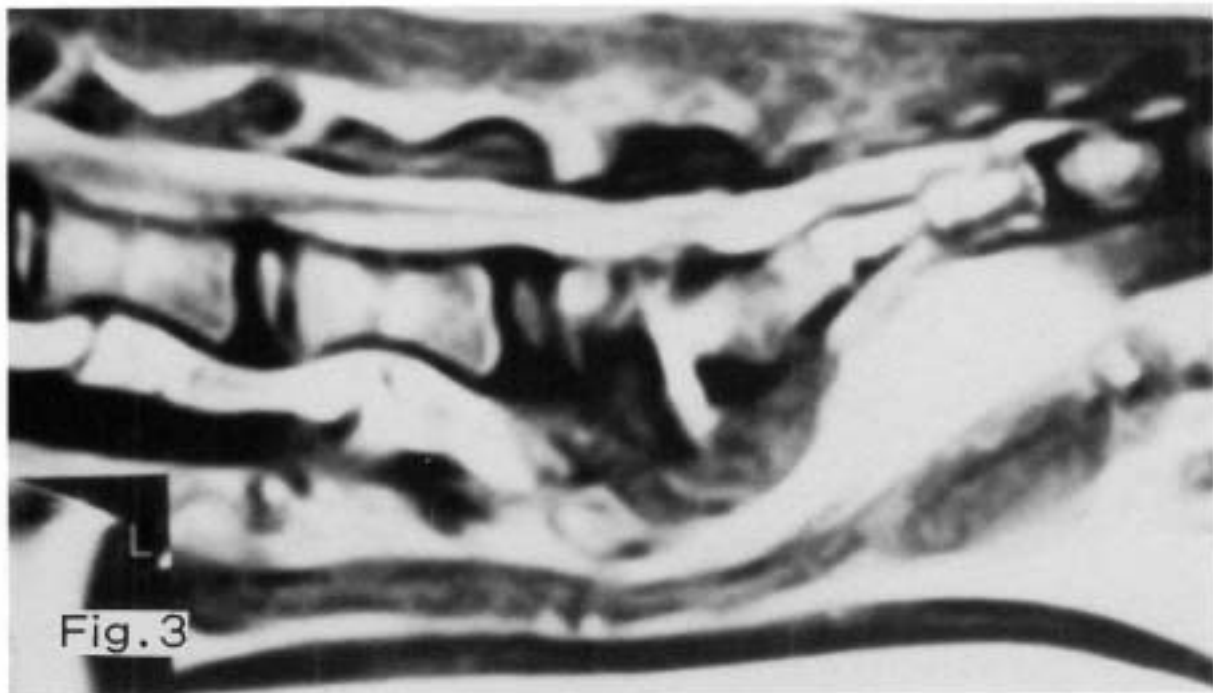


Fig. 3. Dog 3. Sagittal T1-weighted MR imaging. There was osteophyte at the L7 vertebral body and around it. The L7-S1 intervertebral disc had slightly hypointense than L5-L6 or L6-L7.

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