Usefulness of Computed Tomography after Myelography for Surgery on Dogs with Cervical Intervertebral Disc Protrusion

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ABSTRACT. Computed tomography after myelography (CTM) was performed pre- and postoperatively on four dogs diagnosed as having cervical intervertebral disc protrusion. The surgery was performed by ventral slot technique in all the cases. The direction of the ventral slot was precisely adjusted according to the location of the protruded discs as seen on CTM. Postoperative values for the transversal area of the spinal cord were greater than those measured preoperatively, suggesting effective decompression of the cord. The prognosis for these patients was excellent. In view of these results, it was considered that preoperative confirmation of the positional relationship between the spinal cord and the protruded disc by CTM was quite useful in planning the surgical technique for disc disease in the dog.—Key words: canine, computed tomography, intervertebral disc protrusion.


The diagnosis of cervical intervertebral disc protrusion in the dog has been achieved by neurological examination and radiographic examination including survey radiography, myelography, and discography [1, 4, 10, 13]. Recently, in the field of human medicine, imaging devices such as magnetic resonance imaging (MRI) and computed tomography (CT) have been applied to the diagnosis of various types of spinal diseases [3, 6, 12]. However, there have been few reports on the usefulness of CT in diagnosing intervertebral disc protrusion in dogs [2, 5]. We have performed computed tomography after myelography (CTM) pre- and postoperatively on 4 dogs diagnosed as cervical intervertebral disc protrusion. This paper describes the usefulness of CTM in cervical disc disease in dogs.

Four dogs were admitted to the Animal Hospital of Nippon Veterinary and Animal Science University with a diagnosis of cervical intervertebral disc protrusion. Their preoperative clinical details, including histories and neurological deficits, are summarized in Table 1. The diagnosis was established on the basis of their history, neurological examination, survey radiography and myelography.

CTM was conducted under general anesthesia with isoflurane. CTM scanning procedures were as follows [8]. After myelography via the cisterna magna with iohexol at a dose of 0.3 ml/kg (240 mg/ml, 520 mOsm/kg, Daiichi, Japan), each dog was restrained in a prone position on the table. The optimal gantry angulation was so made as to become vertical to the base of the cervical vertebral canal in the lateral Scout-view image. Scanning was carried out with a CT scanner (Image Max II, Yokogawa Medical) at about 1 hr after the injection of the contrast medium. Technical factors included 2-mm section thickness of the affected intervertebral region, 20 mA, 125 kVp, and 5-sec scan time. Scanning factors included a field of view 25 cm in diameter, and imaging representation on the display with the enlargement 3.60 to 5.25 times. On these images, the transversal area of the spinal cord, which was defined as the spinal region excluding the subarachnoid space filled with contrast medium, was measured. In all 4 dogs, surgery was performed by the ventral slot technique [7, 11]. Ventral slot surgery was applied to only one intervertebral region where the disc protruded, and the defect was

<table>
<thead>
<tr>
<th>No.</th>
<th>Breeds</th>
<th>Ages (years)</th>
<th>Sex</th>
<th>Body weight (kg)</th>
<th>Neurological abnormalities</th>
<th>Duration from onset (days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>German Shepherd</td>
<td>4</td>
<td>Male</td>
<td>40.0</td>
<td>Quadriparalysis with UMN^a signs of fore- and hindlimbs.</td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td>Beagle</td>
<td>8</td>
<td>Male</td>
<td>11.0</td>
<td>Intermittent cervical pain without sensory or motor deficits.</td>
<td>33</td>
</tr>
<tr>
<td>3</td>
<td>Beagle</td>
<td>9</td>
<td>Male</td>
<td>12.6</td>
<td>Cervical pain and unilateral paresis of the left forelimb.</td>
<td>36</td>
</tr>
<tr>
<td>4</td>
<td>Shih Tzu</td>
<td>7</td>
<td>Female</td>
<td>7.8</td>
<td>Cervical pain and hemiparesis (left side).</td>
<td>30</td>
</tr>
</tbody>
</table>

a) Upper motor neuron.

It was confirmed that deep pain sensibility was retained in all the legs of all the dogs.
not repaired by bone grafting.

The pre- and postoperative CTM images of these cases are shown in Fig. 1. In addition, pre- and postoperative transversal areas of the spinal cord measured on the images are shown in Fig. 2. In all the cases, it was confirmed that the postoperative transversal area values were greater than the preoperative values, suggesting effective decompression of the spinal cord. As for the prognosis for these dogs, neurological abnormalities disappeared from 1 to 10 days after surgery (Table 2).

The postoperative prognosis of cervical intervertebral
disc protrusion in the dog may be considerably influenced by the intensity of injury involving protrusion of the intervertebral disc, the duration from the onset of spinal cord compression to decompression, and the degree of decompression at surgery. Among them, the degree of decompression depends greatly on the surgical technique employed. A variety of imaging techniques have been used for the diagnosis of canine intervertebral disc diseases [4, 10, 13]. Though these conventional methods are useful for localizing or estimating the affected intervertebral disc space, it is not easy to obtain images which distinctly delineate the positional relation between the spinal cord and protruding disc. CTM permits distinct delineation of their positional relation. Though the reflection of the disc material in the vertebral canal on the preoperative CTM images differs from case to case, it is presumed to be attributable to the difference in the degree of calcification of the disc material. Positional information and quantitative data on disc material protrusion into the vertebral canal are considered to be quite important in planning the surgical technique. The ventral-slot technique was performed on all the 4 dogs, since the nucleus pulposus mainly protruded into the vertebral canal from the ventral direction. The protrusion in cases 1, 2, and 4 occurred at almost the center of the vertebral canal. A slot was therefore directed toward the center. On the other hand, the protrusion occurred at left side of the vertebral canal in case 3, in which a slot was directed toward the left side. As clearly demonstrated in the postoperative CTM images of the 4 cases, the disc material in the vertebral canal could be almost completely removed with successful decompression of the spinal cord. However, in the case in which the protruding nucleus pulposus is displaced largely and extremely to one side or the case with intraforaminal and lateral extrusion, hemilaminectomy and facetectomy may be more appropriate [4, 9].

The results of the present study suggested that when doing surgical treatment for cervical intervertebral disc protrusion in the dog, it is useful to confirm, prior to planning the surgical procedure in detail, the positional relation between the spinal cord and the protruding disc by means of transverse CTM images.

REFERENCES

874–997.