SYRINGOMYELIA AND CHIARI MALFORMATION IN CAVALIER KING CHARLES SPANIELS - MAGNETIC RESONANCE IMAGING, PHARMACOLOGICAL AND SURGICAL TREATMENT

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Abstract

Nine dogs with Chiari malformation and syringomyelia, which were subjected to low-field magnetic resonance imaging (MRI) test, were described. The results of MRI examinations were presented. The outcomes of pharmacological therapy involving two dogs and surgical treatment of one dog were also described. The applied treatments produced positive short-term outcomes, and they eliminated the clinical symptoms of the disease.

Key words: dogs, Chiari malformation, syringomyelia, magnetic resonance imaging.

The achievements in medical imaging technology support diagnosis of diseases of the central nervous system, which could not be identified before the introduction of magnetic resonance imaging (MRI) methods. This group of diseases includes Chiari malformation and syringomyelia. Chiari malformation is a malformation of the skull, cerebellum, and the foramen magnum, in particular in brachycephalic dogs. Syringomyelia is a disorder, which results from pathological conditions induced by Chiari malformation, and it is caused by the accumulation of cerebrospinal fluid in the central canal of the spinal cord (4).

The aim of the study was to describe images of syringomyelia and Chiari malformation in Cavalier King Charles Spaniels, produced by low field magnetic resonance sequences, and to discuss the results of pharmacological and surgical treatment performed in dogs with the disease.

Material and Methods

The experiment was performed on nine Cavalier King Charles Spaniels aged from 2 to 5 years, including seven females and two males. Three dogs from the studied group were subjected to MRI examinations to diagnose clinical and neurological symptoms reported by the owners, including intense scratching on one side of the ear and neck area, aggressive response to patting on the head and neck as a sign of hyperesthesia, and sleeping in a head down position. Two of the dogs had previously undergone the treatment for inner ear infections without a positive outcome. One of the patients demonstrated signs of thoracic limb paresis. Upon the owners’ request, the remaining six animals were subjected to MRI examinations to diagnose or rule out Chiari malformation.

The patients were examined by a low-field MRI scanner with magnetic field intensity of 0.25 Tesla (Vet Grande, Esaote) under general anaesthesia. Images of the midbrain from approximately the level of the thalamus/corpus callosum to C5 of the cervical spine were obtained in accordance with the protocol developed by Pomianowski and Adamiak (3). Magnetic resonance images were produced in the sagittal and transverse plane using T1-weighed and T2-weighed sequences, as well as FSE T2 (T2-weighed fast spin echo), SE T1 (T1-weighed spin echo), FLAIR (fluid attenuated inversion recovery), and GE (gradient echo) sequences.

Based on the results of MRI examinations performed on dogs with neurological symptoms, two owners decided to subject their animals to pharmacological therapy, and one owner opted for the surgical treatment. The following protocol was applied in the pharmacological treatment of two dogs: Furosemide at a dose of 1 mg/kg (b.w.) every 12 h, Carprofen at 4 mg/kg (b.w.) every 24 h, and Gabapentin at 20 mg/kg b.w. every 8 h. The proposed model was recommended for four weeks of treatment. During follow-up treatment, the choice of drug and dose was determined by the patients’ individual response to therapy. One dog was referred for a surgical treatment, and the applied surgical method was foramen magnum decompression performed under general anaesthesia. The aim of the surgical procedure was to decompress the foramen magnum by removing the supraoccipital bone.
The surgery was performed in line with the protocol described by Rusbridge et al. (5). Midline skin incision was done from the tuber parietale to C4 of the cervical spine. After temporalis muscle dissection, supraoccipital bone was removed using neurosurgical drill and rongeur. Soft tissue and skin were closed routinely.

Results

MRI examinations revealed morphological changes in the area of the foramen magnum and the central canal of the spinal cord in all dogs. Caudal cerebellar herniation and medullary kinking were observed in all patients (Fig. 1).

Fig. 1. Magnetic resonance image in T2-weighed fast spin echo showing herniation of the caudal part of the cerebellum and dilation of the central canal

Fig. 2. T2-weighed fast spin echo image with dilated central canal between C3 and C5
Changes characteristic of syringomyelia were reported in seven dogs. Magnetic resonance images of cervical vertebrae revealed a dilatation of the central canal ranging from 2.3 to 4.6 mm (Fig. 2) and the accumulation of cerebrospinal fluid.

In the group of animals subjected to pharmacological treatment, the observation period was four months in one dog and seven months in the second patient. Clinical symptoms subsided during that time, pain and aggressive responses to patting on the head and neck were not observed, and scratching of the ear area was sporadically noted. The patient subjected to surgical treatment was observed for eight months. According to the owner, the symptoms of the disease subsided after the surgery, and the dog entirely recovered.

Discussion

The results of the study and published data indicate that magnetic resonance imaging is essential for diagnosing Chiari-like malformations and syringomyelia. Caudal cerebellar herniation was observed in all cases, including the patients examined upon the owners' request to obtain a certificate for breeding purposes. In this group of dogs, herniation was found in all patients, but none of the owners reported any neurological disorders. In current practice, Chiari malformations and syringomyelia are additionally identified with the involvement of electrodiagnostic methods such as brainstem auditory evoked response (BAER) and somatosensory evoked potentials (SSEP) tests (2, 6). In the group of three dogs with neurological symptoms, two owners decided to subject their animals to pharmacological treatment, and one owner opted for surgery. In pharmacologically treated dogs, clinical symptoms subsided during the observation period.

According to the owner of the surgically treated dog, the symptoms of the disease subsided after treatment and the dog fully recovered. The results of MRI examinations performed in the study are consistent with the findings reported in literature (1, 4). The results delivered by both treatment models seem to be promising, albeit in a short-term perspective. The owners of the studied animals broke off contacts with the clinics performing the treatment, thus shortened the clinical observation period.

References