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CERVICAL SYRINGOMYELIA SECONDARY TO SINGLE SPACE-OCCUPYING INTRACRANIAL LESIONS IN DOGS: MAGNETIC RESONANCE IMAGING FINDINGS AND RISK FACTORS

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INTRODUCTION

Syringomyelia (SM) is a condition that results in fluid-containing cavities within the parenchyma of the spinal cord mainly as a consequence of altered cerebrospinal fluid (CSF) dynamics. In dogs, SM can be caused by different conditions; most frequently SM is associated with Chiari-like malformations (CM), a congenital abnormality of the caudal fossa. Conversely, cervical SM (CSM) secondary to acquired intracranial diseases is rarely reported in veterinary medicine. This condition was formerly considered to be rare in small animals; however, the likelihood of its diagnosis has increased in recent years due to the availability of MRI. In these cases, detection of CSM often indicates an underlying pathologic process, and a primary cause should be detected.

AIM OF THE STUDY

The purpose of this study is to investigate potential risk factors for the development of secondary CSM (SCSM) in dogs affected by single intracranial space-occupying lesions.

MATERIALS AND METHODS

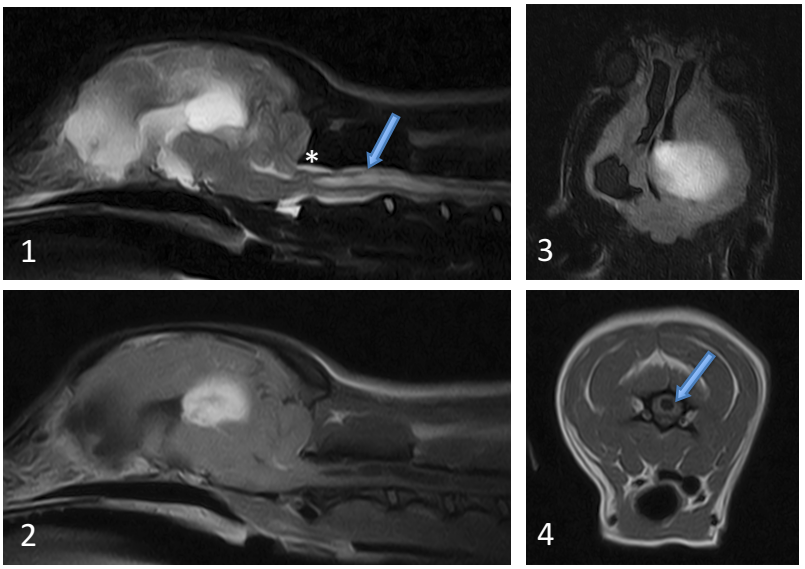
This is a retrospective single-cohort study. The database of two referral hospitals was searched for dogs undergoing brain and cervical spinal cord MRI for investigation of intracranial neurological signs. Dogs diagnosed with a single intracranial space-occupying lesion were included and divided in two groups based on the presence or absence of SCSM. Breed, age at the time of MRI, and cranial morphology (brachicephalic, mesocephalic or dolicocephalic dogs) were compared between the two groups. The MR studies of both groups where reviewed by a single operator, and the following parameters were assessed and compared: mass localisation (cranial vs caudal cranial fossa) and volume, perilesional edema volume, mass effect, ventriculomegaly, and presence and severity of cerebellar herniation. Mass and perilesional oedema volumes were calculated via manual tracing of the inner borders of those structures on transverse T1-weighted post-contrast sequences. Volumes were calculated multiplying the sum of the areas of each lesion by the slice thickness. Additionally, brain volume was calculated for each dog. Volumes were then reported as a percentages relative to brain volume (relative volumes) allowing objective comparison between dogs of different breeds. Mass effect was then calculated as the sum of relative mass lesion and perilesional oedema volumes.

RESULTS

Ninety-seven dogs were included in the study (55 with SCSM and 42 without SCSM). Four significant risk factors for development of SCSM were identified: presence and severity of **cerebellar herniation**, **ventriculomegaly**, **relative lesion volume**, and **mass effect** (Table1). Additionally, dogs affected by intracranial lesions having a relative volume higher than 0.028 were 2.01 more likely to develop SCSM. Dogs presenting with ventriculomegaly and/or foramen magnum cerebellar herniation were 2.43 more likely to develop SCSM than dogs not presenting ventricular and cerebellar changes.

VARIABLE	P value
Sex	0.787
Cranial morphology	0.627
Lesion localisation	0.186
Cerebellar herniation	**<0.0001**
Ventriculomegaly	**<0.0001**
Relative lesion volume	**<0.0001**
Relative perilesional volume	0.586
Mass effect	**0.031**

TABLE1: Variables evaluated as potential risk factors for SCSM. P value < 0.05 identified statistically significant risk factors.



Images of a dog in the SCSM group. **Figg. 1, 2**: Midsagital T1WI and T2WI brain and cranial cervical spinal cord. A mass in the right parieto-occipital lobe with severe mass effect compresses and caudally displaces the cerebellum, which appears indented and impacked into the foramen magnum (asterisk). At the level of the spinal cord, SCSM is evident (arrow). **Fig. 3**: FLAIR dorsal image of the mass compressing the right lateral ventricle. Note the severe mass effect, the midline shift, and dilation of the left lateral and third ventricles. **Fig. 4**: Tranverse T1WI of the spinal cord at the level of C3. SCSM is at its widest level (arrow).

DISCUSSION

This study has identified risk factors for the development of SCSM in dogs with a single space-occupying intracranial lesion. When one or more of these risk factors are identified, it is advisable to extend the MRI study to the cervical spine, to investigate the presence of SCSM. Conversely, in dogs with SCSM and no concurrent cervical or congenital caudal fossa disease, the MRI study should be extended to the brain to investigate for a potential mass lesion.

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