NOTE Internal Medicine

Acquired Cervical Syringomyelia Secondary to a Brainstem Meningioma in a Maltese Dog

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ABSTRACT. A 15-year-old female maltese was referred to us because of a 3-month history of ataxia, circling, and acute blindness. A mass was noted in the brainstem on brain magnetic resonance images. A cerebellar herniation was also detected on T1-weighted sagittal images. The lateral, third and fourth ventricles and central canal of the cervical spinal cord were enlarged. Based on diagnostic imaging findings, cervical syringomyelia secondary to a brainstem tumor was suspected. The clinical signs were controlled well by lomustine and the dog survived for 8 months after the initial diagnosis. The mass was diagnosed as a meningioma based on histopathological findings. This report describes the clinical findings and imaging characteristics of an acquired syringomyelia resulting from a brainstem meningioma.

KEY WORDS: canine, meningioma, syringomyelia.

Syringomyelia is condition in which fluid filled cavities develop within the spinal cord. It used to be regarded as a rare condition in veterinary medicine. However, it is now considered a common neurological presentation. Although syringomyelia is considered to be associated with congenital diseases, improved imaging techniques have revealed that it can also develop as an acquired disorder. Thus, diagnosis of syringomyelia in an adult dog indicates a need to search for an underlying disease condition. Acquired syringomyelia can be the result of tumors in the caudal fossa, especially meningiomas; cerebellar herniation is fundamental for its formation and progression [2, 4, 5, 17, 19].

A 15-year-old intact female maltese dog with a body weight of 3.6 kg was presented to the Veterinary Medical Teaching Hospital of Konkuk University due to a 3-month history of ataxia, counterclockwise circling, and acute blindness. Three months prior to this evaluation, clinical signs were first noted and then began to worsen progressively. On neurological examination, mildly delayed postural reactions of the left side limbs with ataxia were observed. There was mild cervical rigidity; however, cervical pain was not detected. Cranial nerve deficits included bilaterally decreased menace response and pupillary light reflex. Based on the neurological examination, the clinical signs were likely due to an intracranial lesion.

The results of a complete blood count and the serum chemistry profiles were within the reference ranges. Thus, we performed a brain magnetic resonance imaging (MRI) scan using a 0.2 T unit (E-scan®; ESAOTE, Genova, Italy). T1- and T2-weighted images and postcontrast T1-weighted images were obtained. Evaluation of the images revealed a mass on the floor of the brainstem, mainly on the right side, that extended from the midbrain to the medulla (Fig. 1). The mass appeared isointense on T1-weighted images and hyperintense on T2-weighted images. This lesion was enhanced after intravenous administration of gadolinium-diethylene-triamine pentaaetic acid (Omniscan®; Nycomed, Inc., Princeton, NJ, U.S.A.; 0.1 mmol/kg

Fig. 1. MR images of the present case. A: Sagittal T1-weighted image. A: cerebellar herniation (arrow), dilatations of the central canal (arrowhead) and the third and fourth ventricles (fine arrows) were detected. B: Postcontrast sagittal T1-weighted image. A brainstem mass was observed in the pons-medullary area (arrow). C: On a transverse T2-weighted image, a well-defined hyperintense lesion was observed (arrow). Dilatations of the lateral ventricles were detected (fine arrow). D: Postcontrast transverse T1-weighted image at the same level as panel C. A mass was present on the right side (arrow). A mildly nonenhanced central area was observed in the center of the mass.
body weight, intravenously [IV]). The width of the mass was 13.5 mm, and its length was 13.0 mm (Fig. 1). The brainstem lesion detected via MRI was highly suggestive of a neoplastic process. A cerebellar herniation was detected on T1-weighted sagittal images, and the lateral, third, and fourth ventricles were enlarged (Fig. 1). These ventriculomegaly suggested hydrocephalus. On the T1-weighted sagittal images, a linear hypointense area was detected in the cervical spinal cord segment (Fig. 1). This lesion was suggestive of a syrinx formation.

These MRI findings suggested a diagnosis of cervical syringomyelia secondary to a brainstem tumor.

One week after prednisolone (Prednisolone; Korea Pharma Co., Ltd., Korea; 1 mg/kg body weight, per os [PO], q 12 hr) administration, circling and ataxia disappeared. However, the patient showed severe vomiting after prednisolone administration and melena was observed for two weeks after prednisolone therapy. Therefore, we discontinued prednisolone administration and the clinical signs relapsed.

Lomustine (Medac Gmbh, Hamburg, Germany; 60 mg/m², PO, q 6 weeks) was then administered and the clinical symptoms were controlled well without severe complications. Every five or six weeks after chemotherapy, clinical signs including ataxia and hemiparesis relapsed. However, these clinical signs improved rapidly after lomustine administration.

Eight months after administration of lomustine, the patient was euthanized due to worsening neurologic dysfunction including tetraparesis and cranial nerve deficits.

On necropsy, a well-defined mass was located in the right pons-medullary area and dilatation of central canal was observed (Fig. 3). Histopathologically, this tumor was diagnosed as a psammomatous-type intracranial meningioma and the dilatation of the central canal was diagnosed as a syringomyelia (Fig. 4).

Syringomyelia is characterized by a longitudinal cavity within the spinal cord that extends over several vertebral segments. Typically, the syrinx contains fluid that is highly similar in composition to the cerebrospinal fluid (CSF) and extracellular fluid [1, 20]. On histologic examination, the cavity may be a dilatation of the central canal and may be lined with ependymal cells (hydromyelia), or it may lie within the parenchymal substance and may be lined with glial cells (syringomyelia) [20]. It has subsequently been shown that this distinction is often blurred, that hydromyelia may burst into spinal canal substance to form a syringohydromyelia partially lined by ependyma, and that cysts may rupture into the central canal. The term syringomyelia is now generally acceptable for all clinical conditions with spinal cord cavitation containing fluid identical to or closely resembling CSF [1, 4, 20]. In this case, dilatation of the central canal and lining with ependymal cells were observed on histopathologic examination. Furthermore, the neurons of the spinal cord were degenerated because of the acquired dilatation of the central canal. These results suggested hydromyelia, and this change supported syringomyelia secondary to brainstem mass.

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tumor was detected on an initial MRI scan and that syrinx was not detected on an MRI scan after radiation therapy. It is logical to assume that the brainstem mass caused the cerebellar herniation, resulting in syrinx formation, and that its resolution was associated with shrinkage of the tumor and return of the cerebellum to a normal position. Unfortunately, resolution of syringomyelia after chemotherapy was not evaluated in our case. However, the current case had no history of trauma to the cervical portion of the vertebral column or of any other neurological signs until presented to our hospital. Therefore, we can conclude that the brainstem mass may have been associated with cervical syringomyelia in this case.

The prognosis for treatment of canine meningioma is guarded. Canine meningioma patients that received only symptomatic therapy with corticosteroids and/or anticonvulsants have a mean survival time ranging from 59 to 81 days [25]. In a recent report [24] of canine intracranial meningioma, the median post-operative survival time was 7 months. Radiation therapy for canine meningioma as the sole therapy resulted in a median survival time between 5 and 9 months, and dogs that underwent tumor resection followed by radiation therapy had a median survival time of 16.5 months (range: 3 to 58 months) [24].

Surgical removal was not performed in this case due to the size and location of the mass. Radiation therapy was not performed because the client declined this treatment. Thus, we initiated chemotherapy. There are limited reports of chemotherapeutic attempts to treat meningiomas in dogs. Hydroxyurea has been shown to be an effective chemotherapeutic agent against meningioma in both human and veterinary medicine [8, 21, 22]. Recently, long-term survival after chemotherapy with lomustine for an intracranial meningioma in a dog was reported [10]. In that report [10], the patient with the intracranial meningioma survived for 13 months with only a combination chemotherapy of lomustine and prednisolone. Thus, we selected a lomustine chemotherapeutic agent in this case, and the response was good.

In conclusion, this case report describes the clinical findings, imaging characteristics, and pathologic features of a brainstem meningioma with acquired cervical syringomyelia and long-term survival after lomustine therapy. Furthermore, this report demonstrates that syringomyelia is a possible complication of brainstem masses.

REFERENCES