LUMBAR ATYPICAL MENINGIOMA IN A DOG

Lumbaal atypisch meningioma bij een hond

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ABSTRACT

A 7-year-old Jack Russell Terrier was presented with a history of inability to jump, inability to wag its tail and pain in the back for the past 8 months. Myelography revealed an intradural lumbar mass, which was histologically determined to be an atypical meningioma. The most frequent topography of this neoplasm is intracranial.

SAMENVATTING

Een 7 jaar oude Jack Russell Terrier werd aangeboden omdat hij reeds acht maanden niet meer kon springen, niet kon kwispelen met de staart en pijn had in de rug. Op myelografie werd een lumbale intradurale massa vastgesteld die histologisch als een atypisch meningioma werd gedetermineerd. Dergelijke neoplasie komt meestal intracraniaal voor.

INTRODUCTION

Meningiomas are the most common primary nervous system tumor in the dog (McGrath 1962; Yeomans, 2000) and demonstrate an increasing prevalence with age (Patnaik *et al.*, 1986). Most meningiomas occur in dogs over 7 years of age. Canine meningiomas occur as solitary, well-demarcated neoplasms that grow either by compression or, less commonly, by infiltration of the adjacent brain. About 82 percent of all canine meningiomas are intracranial, 15 percent intraspinal and 3 percent retrobulbar (McGrath, 1962). In the spinal cord, intradural meningiomas are most common in the cervical segments (Yeomans, 2000; Koestner and Higgins, 2002), often with secondary entrapment of spinal nerve roots or spinal cord and extradural infiltration (Zaki *et al.*, 1975; Fingeroth *et al.*, 1987). However, in the present case a lumbar meningioma is described.

CASE HISTORY

A 7-year-old male Jack Russell Terrier was presented with a clinical history of pain in the back for the past 8 months. The dog could no longer jump or wag its tail. Radiographs were taken of the thoracic and lumbar vertebrae by the referring veterinarian. No abnormalities were seen. The dog was treated with prednisolone 1 mg/kg/day with a gradual tapering of the dose over a month. Improvement was seen but the dog relapsed after cessation of therapy. Prednisolone was started again in combination with vitamin B. Again there was improvement of clinical signs. One week before presentation, the dog also developed urinary incontinence. He could still urinate but in smaller amounts than before, and there was continuous leakage of urine. Defecation was still normal.

A complete general physical and neurological examination was performed. General physical examina-

tion revealed a swollen preputium and a lick granuloma on the right lateral hock. On neurological examination, slightly exaggerated patellar reflexes were seen. In the lumbar area, there was a panniculus cut off and back pain could be elicited. The rest of the neurological examination was normal. The anatomic diagnosis of a lumbar spinal cord lesion was postulated.

ANESTHESIA

Preanesthetic examination was impeccable and the patient was premedicated with the neuroleptanalgesic combination acepromazine maleate 0.01mg/kg (Placivet, Codifar, Belgium) and methadone 0.1 mg/kg (Mephenon, Denolin, Belgium) intravenously. After placement of a 20 G intravenous catheter in the accessory cephalic vein, induction of anesthesia was performed using intravenous thiopental (Pentothal, Abbott, England) (15mg/kg) until endotracheal intubation (Rush, Germany) was established. Anesthesia was maintained with isoflurane (Forene, Abbott, England) in oxygen and nitrous oxide using a commercial circle system (Drager, Narcose Spiromat 656, Germany). Monitoring included capnography (Datex capnomac ultima, Finland), pulsoximetry (Nellcor Puritan Bennett 190, USA), ECG (Lifescope, Nihon, Japan) and non-invasive blood pressure measurement (Dinamap 847, AMR, USA).

Intra-operative analgesia was established with a fentanyl (Fentanyl, Janssen-Cilag, Belgium) continuous infusion 5 µg/kg/h and post-operative analgesia was supplied with buprenorphine (Temgesic, Schering Plough, Belgium) 10 µg/kg intravenously.

RADIOLOGY

Survey radiographs were unremarkable. A myelographic examination was performed by injection of 240 mgI/kg of contrast medium (iohexol, Omnipaque, Nycomed) at the L4-L5 level. On the lateral projection, there was widening of the ventral subarachnoid space at the level of the 4th lumbar vertebra with the presence of a large filling defect (10 x 4 mm). There was pooling of contrast medium cranially and caudally to this filling defect ("golf tee" sign). The dorsal subarachnoid space was deviated dorsally and narrowed. On the ventrodorsal projection, the filling defect was visible into the right subarachnoid space. The spinal cord was enlarged and the subarachnoid space narrower. These features corresponded to an extramedullary intradural mass.

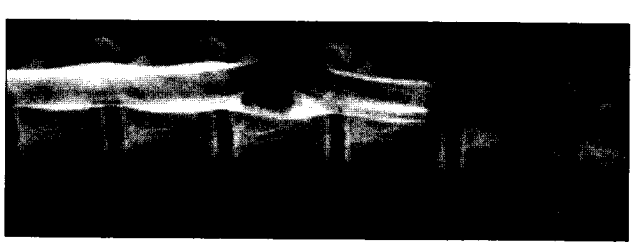

Figure 1. Myelography, lateral projection: there was widening of the ventral subarachnoid space at the level of the 4th lumbar vertebra with the presence of a large filling defect. There was pooling of contrast medium cranially and caudally to this filling defect ("golf tee" sign). The dorsal subarachnoid space was deviated dorsally and narrowed.

Cerebrospinal fluid analysis revealed a normal cell count (0 cells/µl) and a high protein concentration (650.9 mg/dl, normal < 27.5 mg/dl). The final diagnosis was an intradural extramedullary mass.

SURGICAL PROCEDURE

Hemilaminectomy

After the dog was anesthetized and prepared for sterile surgical procedure, he was put on the operation table in ventral recumbency, slightly tilted toward the left side. The skin incision extended from the spinous processes of L_2 to L_6. The subcutis was bluntly dissected and the dorsal fascia incised along the spinous processes on the right side. Using a periosteal elevator and Mayo scissors, the epaxial muscles were elevated from their attachments on the lateral aspect of the dorsal spinous processes, laminae, articular facets, and pedicles to the level of the accessory processes, beginning from caudal to the cranial aspect. Two Gelpi retractors were used to maintain muscle retraction. Bleeding vessels were cauterized. As the mass was located on the L_4 vertebral body, the articular processes L_3-L_4 and L_4-L_5 were cut off with a bone cutter. Using an air drill, a hole was drilled through the outer cortex, medulla and inner cortex, extending from mid-L_3 to mid-L_5, and from the lateral aspect of the spinous process base laterally to the ventral level of the spinal canal. The surgical site was frequently irrigated with physiological saline solution at room temperature to cool the bone, to keep the muscles humid and to dislodge any loose bone fragments. Hemorrhage from the bone was controlled with lyostypt (Braun-Aesculap AG Et Co., KG, Germany), a collagenous material. The spinal canal was entered using dental spatula, and the fine inner cortex was cut off using Kerrison and Lempert rongeurs to expose a distended spinal cord.

Durotomy

As the mass was located ventrally, the 3-cm-long durotomy incision was made on the dorsolateral aspect using a 22-gauge needle and iris scissors. A whitish mass was seen ventral to the medulla and spinal nerves. It was extracted using a curved nerve retractor and an Adson-Brown tissue forceps. Although the mass was ventral to the medulla, its pedicle base was fixed more laterally. The dural incision was sutured using 6/0 vicryl suture material (Ethicon, Johnson and Johnson co., Belgium). A fat graft, harvested from the subcutis, was placed over the hemilaminectomy site to protect the spinal cord. The fascia dorsalis, the subcutis and the skin were closed routinely.

The mass was less than 2 cm in diameter and soft, with a whitish appearance.

Because the dog was very aggressive, he was discharged from the clinic the day after the surgery. Post-operative care included antibiotics for five days and prednisolone for nine days.

HISTOPATHOLOGY

Hematoxylin-eosin (HE) stained paraffin sections of the mass showed a 1 cm, nodular, cell rich, unencapsulated, expansive growing neoplasm. The cells were growing in a closely-packed solid pattern with small neoplastic islets and papillary projections at the periphery of the slide. The tumoros cells were connected with a fine fibrovascular stroma. The neoplastic cells were 15 to 20 µm large, round to ovoid, with indistinct cell borders. There was a scant to moderate amount of homogenous eosinophylic cytoplasm, and the nucleus was round to oval, with a central location, finely stippled chromatin and a well demarcated nucleolus. There was anisokaryosis and anisocytosis, bizarre mitotic figures, multiple small hemorrhages and multiple areas of necrosis. There was a mild infiltration of macrophages and lymphocytes scattered throughout the slide. The neoplastic mass was diagnosed as an atypical meningioma.

FOLLOW-UP

No improvement was noted after surgery. Back pain and urinary and fecal incontinence persisted, so the dog was euthanized 2 months after surgery. Unfortunately no autopsy was performed to check regrowth of the neoplasm.

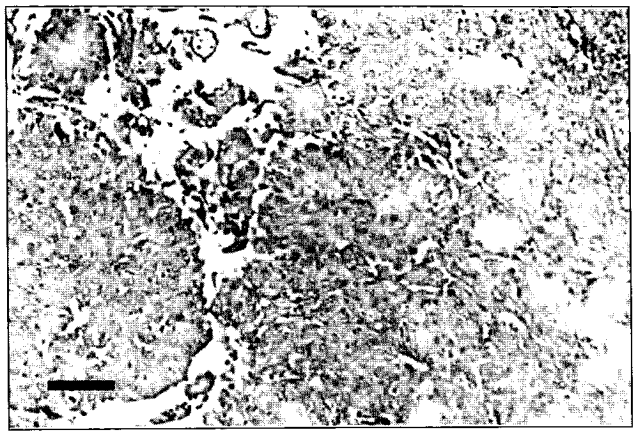

Figure 2. Microphotograph of the mass. The cells were growing in a closely packed solid pattern. The neoplastic cells have indistinct cell borders, a scant to moderate amount of homogenous eosinophylic cytoplasm, and a round to oval central nucleus.
HE stain – Bar = 1000 µm

DISCUSSION

Spinal meningiomas in the dog and man are most frequently observed around the nerve roots, where the arachnoid villi arise at the junction of the arachnoid and the dura of the nerve root sheath (Prata, 1977; Harkey and Crockard, 1991). Because of this proximity to the dorsal rootlets or roots, radicular pain is often an initial clinical sign (Prata, 1977). In the present case, this could explain the pain in the back. Spinal meningiomas usually form solitary, well-defined, firm, thinly encapsulated white masses. The cut surface may be lobulated or fibrillar, and some tumors form secondary attachments to the dura. As the expansive growth is restricted by the vertebral canal, the tumors may embed in an atrophic depression in the spinal cord (Cordy, 1990), as was observed at the 4th lumbar vertebra in the present case.

Meningiomas are histologically diverse, with most tumors exhibiting areas of more than one histological subtype (Koestner and Higgins, 2002). The different types are meningothelial, fibrous, transitional, psammomatous, angiomatous, papillary, granular cell, myxoid and anaplastic or atypical (Summers *et al.*, 1995; Koestner *et al.*, 1999 ; Koestner and Higgins, 2002). All types show similar biological behavior, except the anaplastic or atypical meningioma, which is characterized as aggressive and invasive (malignant).

It can be concluded that spinal meningiomas may arise anywhere along the entire length of the spinal cord. This conclusion is supported by the lumbar meningioma described in the present case, as well as by

the particular cervical localization already reported in the literature.

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