

# What Is Your Neurologic Diagnosis?

**Signalment:** 12-year-old spayed female Boxer.

**History:** The dog was referred because of a right-sided head tilt and ataxia of 2 months' duration. The ataxia had progressed, and the dog was having difficulty standing. Treatment included anti-inflammatories and antibiotics, with no improvement. The dog had a history of otitis externa during the past year and prior surgical repair of the cranial cruciate ligament of the right hind limb.

**Physical examination:** A mass within the right caudal abdominal mammary gland was palpated, and fine-needle aspiration was performed. A cytologic diagnosis of mammary carcinoma was made.

## Neurologic examination

### Observation

Mental	Alert	Depressed	X	Disoriented		Stupor		Coma	
Posture	Normal	Head tilt	X	Tremor	X	Falling			
Gait	Normal	Ataxia	X	Pelvic limbs		All 4		Circling	
Paresis	Pelvic limbs	Tetra	X	Hemi		Mono			
Other	Broad-based stance with the left forelimb sometimes out of position, a 30° head tilt toward the right, and development of intention tremors.								

### Postural reactions

Key: 4=exaggerated, clonus; 3=exaggerated; 2=normal; 1=diminished; 0=none; NE=not evaluated

	LF	RF	LR	RR
Wheelbarrow	NE	NE		
Hopping	1	1-2	1	1-2
Ext postural thrust			2	2
Proprioceptive pos	0-1	1-2	0-1	1-2
Hemistand/walk	1	1-2	1	1-2
Placing-tactile	NE	NE		
Placing-visual	NE	NE		

### Spinal reflexes

	LF	RF	LR	RR
Quadriceps			2	1-2
Extensor carpi	2	2		
Flexion	2	2	2	2
Crossed extensor	2	2	2	2
Perineal			2	2

### Cranial nerves

	L	R		L	R	Comments CN
II, VII-Vision menace	1-2	2	VIII-Nystagmus, resting	2	2	None.
II, III-Pupils resting	1-2	2	VIII-Nystagmus, change	2	2	
Stim L	1	1	V-Sensation	2	2	
Stim R	1	1	VII-Facial mm	2	2	
II-Fundus	2	2	V, VII-Palpebral flex	2	2	
III, IV, VI-Strabismus, resting	2	2	IX, X-Gag	2	2	
III, IV, VI, VIII-Strabismus, position	2	2	XII-Tongue	2	2	

### Sensation (Locate and describe abnormal)

Hyperesthesia	0	Abnormality not observed.
Superficial pain	0	Abnormality not observed.
Cutaneous reflex	0	Abnormality not observed.
Deep pain	0	Abnormality not observed.

**What is the problem? Where is the lesion? What are the most probable causes of this problem? What is your plan to establish a diagnosis? Please turn the page.**

## Assessment

### Anatomic diagnosis

Problem	Rule out location
Head tilt to right.	Contralateral cerebellum, ipsilateral brainstem, ipsilateral CN VIII, inner ear.
Depressed PRL response.	Retina, CN II, CN III, midbrain.
Depressed left menace.	Retina, CN II, Right forebrain, cerebellum.
Mild asymmetric tetraparesis, more severe on the left. Proprioceptive deficits.	Diffuse forebrain, brainstem, spinal cord.
Intention tremors.	Cerebellum.

### Likely location of one lesion

CNS disease involving the cerebellum and brainstem.

### Etiologic diagnosis

Rule out disease process	Diagnostic plan (in order of priority)
Neoplasia (primary or metastatic; focal or multifocal) Infectious/Inflammatory (otitis media or interna, generalized inflammatory disease, meningitis/encephalitis) Metabolic or systemic disease Cerebral ventriculomegaly	Otoscope examination—To detect underlying otitis media.
	Thoracic radiography—To detect metastatic lesions.
	CSF analysis—To rule out inflammatory or infectious disease.
	Magnetic resonance imaging (MRI)—To detect neoplastic or other space-occupying lesion.
	ECG, CBC, serum biochemical analysis, and urinalysis—As part of pre-anesthetic analysis for MRI.

**Comments:** None.

### Test results:

**Abnormal laboratory data:** The dog had mild hypocalcemia (8.7 mg of calcium/dl) and slightly high serum alanine transaminase (ALT) activity (47 U/L). Urinalysis revealed proteinuria (2+).

**Ancillary diagnostics:** The ECG results revealed a wandering pacemaker associated with sinus arrhythmia. Results of fundoscopic and otoscopic examinations were unremarkable.

**Imaging procedures:** Lateral and ventrodorsal radiographic views of the thorax revealed no abnormalities. The MRI (T1-weighted, T2-weighted, and T1-weighted with gadopentate dimeglumine) revealed a large contrast-enhancing mass within the left side of the cerebellum (Fig 1). The mass appeared completely isolated to the cerebellum and peduncles. Prominent dilatation of the left and right lateral ventricles was observed. The right tympanic bulla contained a large amount of nonenhancing material (Fig 2). Bony changes within the bulla were not observed.

**Presumptive diagnosis:** Unilateral otitis externa or media, cerebellar meningioma, and a solitary mammary adenoma.

**Prognosis with treatment:** Poor.

**Prognosis without treatment:** Poor.

**Therapeutic plan:** None. Because of the size of the intracranial lesion and progressive nature of the neurologic signs, the owner elected to have the dog euthanized.

**Necropsy findings:** The left side of the cerebellum was large with a slight displacement of the right side. The lesion was located in the dorsolateral aspect of the cerebellar cortex and caused extensive loss of the cerebellar folia and deep white matter on the left. Mucopurulent material was found deep in the right external ear canal, and examination of the right tympanic bulla revealed a dark blood-like material adherent to the inner wall. A 1 × 1.5 × 3-cm circumscribed mass was found in the subcutis associated with the right caudal abdominal mammary gland. Histologically, cells within the cerebellar mass were consistent with a meningioma. The mammary mass was described as being consistent with a simple papillary adenoma.

**Comments:** Meningioma is considered to be the most common brain tumor in dogs.<sup>1-3</sup> Our dog had vestibular signs accompanied by a history of otitis externa. However, a diagnosis of peripheral vestibular disease was difficult, because the dog had proprioceptive deficits, abnormal postural reactions, depressed PLR, and an abnormal menace response on the left with normal findings on otoscopic examination. Proprioception was abnormal on the side contralateral to the head tilt. In our dog, the eventual development of intention tremors cemented cerebellar involvement.

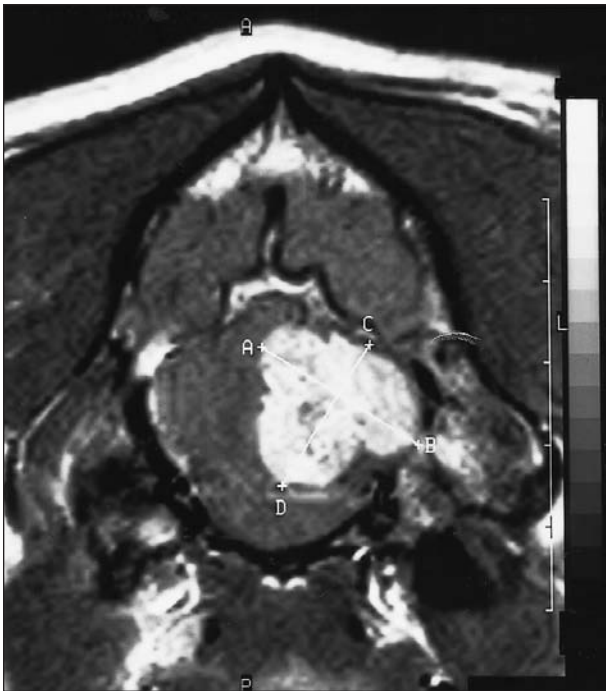


Figure 1—T1-weighted, transverse magnetic resonance image (MRI) through the brain at the level that includes the caudal lobe of the cerebellum. Notice the extent of the cerebellar mass (23.6 mm X 20.7 mm).



Figure 2—T1-weighted, transverse MRI through the brain at the level that includes the rostral lobe of the cerebellum and the tympanic bullae of the skull. Notice the material with a soft tissue consistency within the right tympanic bulla (arrow).

Compression of the flocculonodular lobe by the tumor was a potential cause of the vestibular signs (ie, head tilt, ataxia, broad-based stance), which may result in a contralateral head tilt and ipsilateral postural reaction deficits.<sup>4</sup> Mucopurulent material was found within the bulla of our dog, which may have caused soft tissue swelling within the inner ear resulting in vestibular signs. Thus, the possibility of combined paradoxical and peripheral vestibular signs existed. However, historically the otitis externa had not included a head tilt or paresis making our dog most likely to have had a classic case of paradoxical vestibular disease.

Other neurologic abnormalities were a depressed menace response and bilaterally depressed PLR. The depressed menace response could have been a result of the cerebellar tumor and compression or edema. It has been speculated that an anatomic pathway through the cerebellum may involve a corticopontocerebellar pathway that could affect the rostral colliculus.<sup>4</sup> The depressed PLR response may have been a result of a hydrocephalus, observed on the MRI and characterized by dilatation of the lateral ventricles of the cerebrum. Periaqueductal edema and pressure resulting from the hydrocephalus and cerebellar mass may have caused a neuropraxia of CN III prior to exiting the cranium. Alternatively, a unilateral lesion of the cerebellar medulla affecting the fastigial nuclei may have resulted in contralateral pupillary dilation, incomplete constriction to light, and narrowed palpebral fissure.<sup>5</sup> However, because the PLR were only depressed in our dog, the abnormality was most likely related to aged ciliary body or iridial muscle disease.

## References

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