Narrowed Palpebral Fissure in a Dog

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Hansel, an 8-year-old neutered male German shepherd dog, was referred for persistent squinting and an inability to blink his right eye (OD).

History

Signs were present for 1 week. Hansel was otherwise normal, was current on vaccinations and heartworm and ectoparasite preventives, and had no pertinent medical history (eg, exposure to toxins, history of trauma). No blepharospasm was reported by the owner.

Examination

Physical examination revealed deviation of the nasal planum to the right and slight elevation of the right ear (***Figure 1***). Otoscopic examination was normal. Neurologic examination included evaluation of mentation, gait, postural reactions, spinal reflexes, tone, and muscle mass in all limbs; all were within normal limits. Evaluation of the cranial nerves revealed that the palpebral reflex and menace response were absent OD. A narrowed palpebral fissure OD was noted. Response to stimulation of the nasal mucosa was normal. All other cranial nerve reflexes were normal.

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Diagnostics

CBC, serum chemistry panel, thoracic radiographs, and thyroid hormone testing (thyrotropin and free thyroxine by equilibrium dialysis) were normal. MRI of the head was normal.

Diagnostic Considerations

Anatomic diagnosis: Facial nucleus in the medulla or the facial nerve (cranial nerve VII) or hemifacial tetanus (HT) of the muscles of facial expression, including the obicularis oculi muscle (narrowed palpebral fissure) and levator nasolabialis (deviated nasal planum), or denervation atrophy (contracture) of the facial muscles. The lack of other neurologic deficits suggests the lesion did not involve the medulla.

Differential diagnoses: From the medulla, the facial nerve exits the cranial cavity via the internal acoustic meatus to enter the facial canal within the petrosal portion of the temporal bone. The facial nerve exits the facial canal via the stylomastoid foramen. Once extracranial, the facial nerve courses rostrally just ventral to the external ear canal where it branches. Causes to consider include disease of the middle ear, (eg, otitis media, which secondarily affects the facial nerve), or primary diseases of the facial nerve. Primary diseases include inflammation, neoplasia, aberrant blood vessel compressing the facial nerve, and trauma.

▲ At presentation, the palpebral fissure is narrowed on the right (**arrow**) as compared with the left. The nasal planum is deviated to the right (**arrowhead**). The right ear is positioned slightly more caudal on the head as compared with the left ear.

ASK YOURSELF

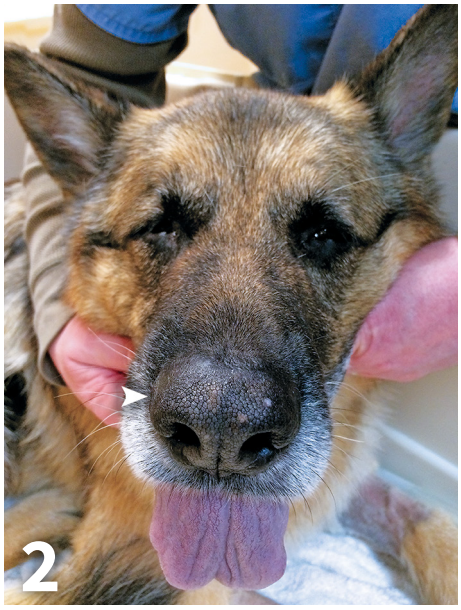
- What is the difference between ptosis and a narrowed palpebral fissure?
- What are the muscles and nerves that may cause a narrowed palpebral fissure?
- What is an appropriate differential list and diagnostic plan for a narrowed palpebral fissure?

CBC = complete blood count

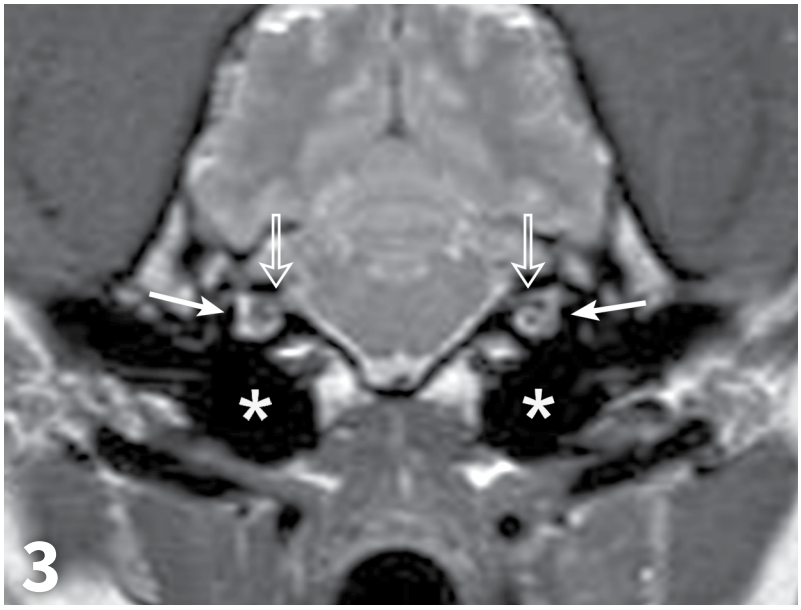
HT = hemifacial tetanus

MRI = magnetic resonance imaging

OD = oculus dexter (ie, right eye)



▲ On anesthetic induction for MRI, deviation of the nasal planum was not present (**arrowhead**). The dog's closed eyelids make it difficult to appreciate the narrowed palpebral fissure. Note the near-symmetrical positon of the ears.



▲ A transverse plane, proton density MRI at the level of the medulla and rostral cerebellum of the patient. The normal facial and vestibulocochlear nerves are seen exiting the internal acoustic meatus (**open arrows**). Normal cochlea are seen bilaterally (**solid arrows**). The normal tympanic cavities are filled with air (**asterisks**).

Diagnosis

Canine idiopathic HT

Discussion

During general anesthesia for the MRI, the patient's narrowed palpebral fissure, deviation of the nasal planum, and abnormal ear position resolved (***Figures 2*** and ***3***). On recovery from anesthesia, the abnormalities returned. This confirmed HT[1,2] and excludes from consideration denervation atrophy (contracture), as relaxation of the muscles under anesthesia would not occur.

HT results in persistent contraction of the facial muscles innervated by the facial nerve. A narrowed palpebral fissure, deviation of the nasal planum toward the affected side, and a caudal position of the ear are seen. Under general anesthesia or with local anesthesia of the facial nerve, muscle activity is inhibited, muscle relaxation ensues, and the patient appears normal.[1] In some cases, ipsilateral, hemifacial paralysis, which then resolves, may precede HT. Used synonymously, *hemifacial spasm* is a misnomer because muscle spasms are not present.

In humans, HT is associated with microvascular compression of the facial nerve by aberrant vasculature.

In humans, HT is associated with microvascular compression of the facial nerve by aberrant vasculature. Treatment options (eg, botulinum toxin injections into the affected muscles, surgical microvascular decompression) exist.[3] HT has been reported in 2 dogs secondary to a

HT = hemifacial tetanus

brain lesion.[4] In the authors' experience, HT in dogs mostly occurs secondary to an irritative lesion of the facial nerve. Irritative lesions likely cause excessive activity (depolarization) of the nerve rather than a lack of function.[1]

Diagnostics are aimed at identifying a metabolic disorder or structural lesion of the nerve or its nucleus in the medulla. An otoscopic examination should be performed to evaluate for abnormalities in the external ear canal because the facial nerve runs just ventral to it. A diagnostic evaluation consisting of CBC, serum chemistry panel, urinalysis, and thyroid hormone testing should help identify metabolic causes associated with nerve dysfunction. Finally, MRI of the head is used to evaluate the medulla and the course of the facial nerve. If an underlying cause is not identified, HT is assumed secondary to an irritative lesion. In such cases, supportive treatment aimed at muscle relaxation or empiric therapy for otitis media is not necessary.

Treatment

Given the normal results of the diagnostic testing and presumptive diagnosis, treatment was not pursued.[4] Although the underlying cause is still not fully understood, it appears to remain a benign condition. Owners should be warned that the signs can remain indefinitely.

DID YOU ANSWER?

- Ptosis is the drooping or sagging of a body part, which here refers to a drooping superior eyelid.[5] A narrowed palpebral fissure can result from ptosis, but it may also result from continual contraction of the muscles of the eyelids, blepharospasm, or enophthalmos.[1]

- The orbitalis muscle is responsible for elevating the superior eyelid and is innervated by sympathetic axons.[5] Denervation of this muscle leads to ptosis and, subsequently, a narrowed palpebral fissure. Other signs of Horner syndrome—miosis, a protruding third eyelid, and enophthalmos—will also be present.[1,6]

  In addition to the orbitalis muscle, the levator palpebrae superioris muscle is responsible for elevating the superior eyelid. This muscle is innervated by the oculomotor nerve (cranial nerve 3).

  The levator palpebrae superioris muscle, innervated by the oculomotor nerve (cranial nerve III), elevates the superior eyelid. Denervation of this muscle leads to ptosis.[5] Because the oculomotor nerve innervates multiple extraocular muscles and the iris sphincter muscle, lesions of the oculomotor nerve also result in a ventrolateral strabismus and a dilated pupil.[1]

  The orbicularis oculi muscle, innervated by the facial nerve, closes the palpebral fissure. Because of its small size in dogs, denervation rarely causes ptosis. However, denervation atrophy (contracture) of the orbicularis oculi muscle narrows the palpebral fissure. Likewise, continual contraction is observed with HT from an irritative lesion of the facial nerve.[1] Alternatively, tetanus of the facial muscle may be part of generalized tetanus secondary to the toxin elaborated by *Clostridium tetani*.

  The levator anguli oculomotor medial, which is innervated by the facial nerve (cranial nerve 7), is the third muscle that plays a significant role in elevating the superior eyelid. This muscle plays a greater role in cats than dogs. Consequently, ptosis of the superior eyelid can be observed in cats with facial paralysis.

  The muscles of mastication provide medial support of the eye in the orbit. Atrophy of the muscles of mastication results in enophthalmos. A narrowed palpebral fissure results from the caudal position of the eye in the orbit.

- A thorough neurologic examination should *always* be performed; identifying neurologic deficits aside from a narrowed palpebral fissure will determine the anatomic diagnosis. From this, a list of appropriate differential diagnoses can be developed:

  - Ptosis: Horner syndrome, oculomotor nerve denervation, facial nerve denervation (rare)
  - Facial muscle contraction: HT
  - Other: Denervation atrophy (contracture) of the facial muscles or masticatory muscle atrophy

  Ancillary procedures will be dictated based on the observation of ptosis, HT, denervation atrophy (contracture), or masticatory muscle atrophy.

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