In collaboration with the American College of Veterinary Radiology

What Is Your Diagnosis?

History

A 7-year-old 10.2-kg spayed female Cavalier King Charles Spaniel was referred to Colorado State University Veterinary Teaching Hospital’s Ophthalmology Service because of exophthalmos of the right eye (oculus dexter [OD]) with secondary conjunctivitis. Previous medical history included signs of pain of the cervical neck region that was diagnosed with MRI as caudal occipital malformation syndrome with mild cervical syringohydromyelia and treated with prednisone (2.5 mg, PO, q 12 h).

On referral neuro-ophthalmic examination, findings were clinically normal for both eyes (oculus uterque [OU]), consistent with a visual dog; however, there was dorso-temporal deviation of the globe OD, with enophthalmos nasally, exophthalmos temporally, hyperemic conjunctiva, and episcleral injection. Examination of the adnexal structures OD revealed mild scrotal discharge. The right third eyelid was mildly elevated and hyperemic with a well-circumscribed mass effect and firm cystic structure within the third eyelid gland palpable near the ventral orbital rim. No bone involvement could be palpated. Ophthalmic examination of anterior and posterior segment OD revealed no abnormality. An examination of the left eye’s (ocular sinister [OS]) adnexa and anterior and posterior segments did not show any signs of abnormality. Clinically normal retropulsion OU indicated the low likelihood of a retrobulbar mass. Schirmer tear test results were mildly low OD (13 mm/min; reference limit, > 15 mm/min) and clinically normal OS (15 mm/35 seconds). Results for rebound tonometry were within reference limits OU (intraocular pressure, OD: 16 mm Hg and OS: 17 mm Hg; reference range, 12 to 25 mm Hg), and results were negative for fluorescein staining OU.

The owner declined CT to determine the morphology of the suspect cystic structure but approved biopsy instead. A CBC and serum biochemical panel revealed high cholesterol concentration (359 mg/dL; reference range, 130 to 300 mg/dL) and alkaline phosphatase activity (379 U/L; reference range, 15 to 140 U/L), suspected to have been secondary to treatment with prednisone. During biopsy, purulent material was expressed from the cystic structure. Samples of the purulent material were submitted for cytology and bacterial culture. Results indicated suppurrative and histiocytic inflammation with a light growth of β-hemolytic Streptococcus spp susceptible to several antimicrobials, including ofloxacin, chloramphenicol, amoxicillin-clavulanate, clindamycin, and others. Treatment was started with antimicrobials (topical ofloxacin 0.3% ophthalmic solution [Ofloxacin, Bausch+Lomb], 1 drop, OD, q 8 h; amoxicillin-clavulanic acid, 156.25 mg, PO, q 12 h) for 4 weeks along with eye lubrication (artificial tears [I-drop Vet, I-Med Pharma Inc.], 1 drop, OD, q 8 to 12 h). After 1 month of treatment, the cystic structure had dramatically reduced in size, yet returned 2 weeks after discontinuing the systemic antimicrobial. Treatment

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with clindamycin (75 mg, PO, q 12 h) was started and continued for 2 months with minimal change in the size of the cystic structure. Because the cystic structure did not respond to culture-directed antimicrobial treatment, CT of the dog’s head was performed (Figure 1). In preparation for anesthesia, a CBC and serum biochemical panel were repeated and found to have been static from previous results.

Formulate differential diagnoses, then continue reading.

**Diagnostic Imaging Findings and Interpretation**

Computed tomography (Gemini TF Big Bore PET/CT, Philips Medical System) revealed an oval, fluid-filled structure (22 to 25 HU and approx 17 mm long X 14 mm high X 12 mm wide) with a thin, contrast-enhancing rim along the medial rostroventral aspect of the right globe (Figure 2). Focally, there was mild thickening of the rostralateral and ventral margins of the cystic structure. Adjacent to this thickening, there was a focal punctate mineral deposit and mildly amorphous hyperattenuating material. The cystic structure caused mild dorsolateral deviation and minimal medial compression of the right globe. There was no evidence of adjacent osseous lysis. The origin of this structure was not definitively determined, but the structure was within the suspected anatomic region of the right third eyelid. The punctate mineral focus was suspected to have represented dystrophic mineralization, or less likely, foreign material. The small amount of amorphous hyperattenuating material was suspected to have been proteinaceous or cellular in nature. Based on the imaging findings, a benign cystic structure of the third eyelid or lacrimal gland or abscess was considered most likely. Based on the location of the structure and the CT findings, surgical exploration was indicated to obtain a definitive diagnosis.

**Treatment and Outcome**

Immediately following CT, the patient underwent surgery where a cystic structure (approx 1.5-cm sphere) was removed in toto without complications (Figure 2). The structure was submitted for histopathology, which revealed unique changes consistent with an epithelial inclusion cyst. To the author’s knowledge, a diagnosis of an epithelial inclusion cyst in the third eyelid of a dog has not been documented before. The owners did not return the patient for the recommended 4-week follow-up examination but emailed that the clinical signs improved with no recurrence of the cystic structure. Eight months after surgery, the patient was returned because of a deep stromal corneal ulcer, most likely secondary to keratoconjunctivitis sicca (KCS). At this recheck examination, the cystic structure had not returned.

**Comments**

An inclusion cyst of the third eyelid of the OD was diagnosed in the dog of the present report. Several differential diagnoses are considered for a cystic structure associated with the third eyelid and arising from the infraorbital soft tissues, including neoplastic growth (eg, temporal lacrimal gland adenoma, extramedullary plasmacytoma, and lymphoma),2 abscess formation,2,3 dacryoadenitis,4,5 parasite migration,2,3,6 and ductal cyst of the lacrimal gland.7 Each of these differential diagnoses may have similar clinical signs as a cystic structure on physical examination. To help determine the correct diagnosis, imaging modalities (CT, ultrasonography, and MRI) and histopathology can be used.

The physical indicators of neoplastic growth include aggressive and rapid growth, invasion of adjacent tissues, and irregular margins. Computed tomography has excellent contrast resolution to display a variety of tissue attenuations based on the structure’s composition and cellularity. Often, if a structure is highly cellular, it will have a more homogeneous appearance.4 Literature has shown that CT findings of orbital osteolysis and or periosteal reaction indicate greater probability of neoplasia than other disease.7 Visualizing malignant changes on histopathology is required for a definitive diagnosis in all cases.7

With CT or ultrasonography, abscesses and dacryoadenitis are typically well-circumscribed, fluid-filled structures with marked inflammation and edema of surrounding tissues.4,5 Histopathology typically reveals supplicative inflammation, with or without intracellular bacteria.5 Although acute dacryoadenitis can be a sterile inflammation of the lacrimal gland, it has been reported that most acute dacryoadenitis are diagnosed with a concurrent infection on histopathology.5

Due to the size and location of the cystic structure within the orbit, the third eyelid and lacrimal gland are difficult to evaluate via physical examination or...
radiographic 2-D imaging. Summation of surrounding tissues creates limitations for 2-D imaging in its ability to visualize the third eyelid and gland. In contrast, CT has increased sensitivity to disease detection, eliminates superimposition of soft tissues, and allows for multiplanar reconstructions and 3-D spatial resolution. For our patient, CT was chosen because of these advantages, in addition to its ability to identify the extent of the cyst and determine the involvement of surrounding structures. Literature has shown that CT can clearly visualize the lacrimal glands and the third eyelid using postcontrast thin-slice images. This ability makes CT an ideal imaging modality for localization of cystic structures involving the third eyelid. Additionally, CT was selected due to its ability to visualize foreign material within the cystic structure. Findings on CT for this patient confirmed that the 17-mm cystic structure was indeed a cyst due to the fluid attenuation with a contrast-enhancing rim. With possible third eyelid gland involvement and the initial low Schirmer tear test result OD, the risk for postsurgical KCS was high. With this in mind, surgical removal of the cyst was performed after imaging. Owner noncompliance likely contributed to a prolonged state of undetected KCS, and this was confirmed when the patient was seen 8 months later for deep stromal corneal ulceration secondary to KCS.

Epithelial inclusion cysts have been described in the literature as arising from the corneal layer in domestic animals. The exact etiology of corneal epithelial inclusion cysts in dogs remains uncertain; however, potential causes, including congenital disease, surgical trauma, and external corneal injury, have been reported. Corneal epithelial cells grow into the superficial corneal stroma where they become trapped during tissue repair. The cells continue to proliferate, along with desquamated keratin debris, resulting in the formation and expansion of the cyst. The dog of the present report had a third eyelid inclusion cyst, and we speculated that either an unknown trauma, foreign body, or, less likely, the first biopsy surgery caused the formation of an epithelial inclusion cyst of the third eyelid in this case.

References