Feline Ocular Sarcoma

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A 7.2-lb (3.3-kg), 12-year-old, spayed, domestic shorthaired cat presented to Winter Park Veterinary Hospital in Winter Park, Florida, for evaluation of a large mass in the right eye (FIGURE 1).

History
The patient—an outdoor-only, semiferal cat—had a several-month history of a severely enlarged right eye. The patient had no known medical or vaccination history. The differential diagnosis included FeLV, FIV, larval migrans, neoplasia, and abscess. A thorough workup was needed before considering enucleation.

Evaluation
On presentation, the patient was alert and febrile (103.5°F [normal: 100°F to 102.5°F]). Heart rate and rhythm, respiratory rate, and mucous membrane color were all within normal limits. The client reported that the patient's bowel movements and urination had been normal but that the cat had a recent episode of anorexia. The cat's body condition score was 5 of 9. No coughing, sneezing, vomiting, or diarrhea had been observed. The patient's right eye was severely buphthalmic and proptosed (FIGURE 2A; FIGURE 2B). The eyelids of the right eye were lagophthalmic, leaving the tissue fully exposed. Because fibrous tissue covered the cornea, the intraocular structures could not be examined. A direct ophthalmoscope was used to examine the left eye, which contained a 2- to 3-mm mass at the ventral pupillary margin. Fundic examination—which evaluates the optic disc, the retina (including the tapetum), and the retinal vessels—of the left eye produced normal results.

Presurgical Workup
An in-house FeLV/FIV test produced negative results. Hookworms were detected by fecal flotation, so 18.2 mg of praziquantel/pyrantel pamoate/febantel (Drontal, Bayer Animal Health) was administered. A complete blood count revealed mild neutrophilia (13.37/µL; normal: 1.15/µL to 10.29/µL). A chemistry profile revealed mild hyperglycemia (glucose: 175 mg/dL; normal: 71 to 159 mg/dL), a low creatinine level (0.5 mg/dL; normal: 0.8 to 2.4 mg/dL), hyperglobulinemia (globulins: 5.3 g/dL; normal: 2.8 to 5.1 g/dL), and hypokalemia (potassium: 3.2 mmol/L; normal: 3.5 to 5.8 mmol/L). These few abnormalities were determined to be caused by stress, chronic inflammation, and recent anorexia. No pulmonary lesions were present on lateral or ventrodorsal thoracic radiographs. An indwelling catheter was placed in the cephalic vein, and crystalloid fluid was initially administered at 1 mL/lb/h. Cefovecin sodium (Convenia, Pfizer Animal Health; 26.4 mg) and buprenorphine (0.07 mg) were administered subcutaneously. A combination of tiletamine and zolazepam (Telazol, Fort Dodge Animal Health; 7.3 mg) was used to induce anesthesia. The patient was intubated, and isoflurane was administered to maintain anesthesia.

Surgery
After intubation, the intravenous fluid rate was increased to 10 mL/kg/h. Heart rate, respiratory rate, Pao2, carbon dioxide level, non-invasive blood pressure, mucous membrane color, and capillary refill time were monitored and readings recorded every 5 minutes.
To improve exposure of the globe, the surgeon performed a lateral canthotomy (FIGURE 3A; FIGURE 3B; FIGURE 3C; FIGURE 3D). The globe, nictitating membrane, and eyelid margins were removed by enucleation using a surgical laser. Once the globe was removed, the orbit was explored, revealing irregular, discolored, friable tissue, which was ablated.

The patient’s recovery from anesthesia was uneventful (FIGURE 4). Postsurgical analgesia protocol consisted of buprenorphine (0.04 mg bid sublingually for 3 days) and meloxicam (Metacam, Boehringer Ingelheim; 0.33 mg sid PO for 4 days), both of which were administered while the patient was awake. The entire globe was submitted for histopathologic examination.

**Globe Submission**

When submitting a globe for histopathologic testing, ask the pathologist which submission technique he or she prefers. Some pathologists require a specific fixative, which makes the eye firmer for easier sectioning. Some pathologists may require the fixative to be injected directly into the globe, while others prefer not to have the globe punctured before fixation. The globe should be placed immediately into the fixative of choice to prevent tissue degradation. In addition, the extraocular tissue should be trimmed from the globe unless the tissue needs to be assessed. In this case, pathologist Dr. F. Sam Kennedy of Veterinary Pathology Services (Orlando, FL) preferred submission of the entire globe in 10% buffered formalin. In her experience, formalin penetrates the globe and fixes the entire eye, precluding the need to puncture it.

**The Pathology Report**

Dr. Kennedy’s pathology report stated the following:

The globe submitted contains a narrowly excised, malignant neoplasm with features of a pleomorphic ocular sarcoma composed of large, variably sized, neoplastic spindle cells with large, variably sized, hyperchromatic nuclei with prominent nucleoli and little gray-blue cytoplasm (FIGURE 5). There is multifocal, severe, acute hemorrhage and caseous necrosis and chronic, lymphohistiocytic panuveitis. The lens had been destroyed, and neoplastic cells have invaded the entire uvea and posterior chamber and sclera. No organisms were seen. Neoplastic cells extended near to margins of the sections examined from the globe multifocally.

**Discussion**

The diagnosis was feline ocular sarcoma. Feline intraocular sarcoma—also known as *posttraumatic ocular sarcoma*—is a rare, malignant, intraocular neoplasm that occupies the iris, ciliary body, and posterior chamber.1 This sarcoma is often associated with a history of chronic ocular inflammation and/or trauma.2 The pathogenesis of this neoplasia is as follows: after the lens is perforated, significant inflammation is accompanied by the hyperplastic epithelial regeneration that occurs in wound healing. In some cats, this strong fibroblastic wound healing response exceeds normal biologic control and becomes neoplastic.3

The tumor occupies the posterior iris and expands diffusely into the posterior chamber, retina, and choroid. The tumor commonly invades the extraorbital space, beginning at the limbus or the optic...
The tumor may metastasize to regional nodes, and bone involvement has been documented. The cellular origin of the tumor is hypothesized to be the lens uveal epithelium or a pluripotent uveal mesenchymal cell.

The propensity to develop this sarcoma is unique in cats and is not seen in dogs. There is no breed or sex predilection, but this sarcoma is more common in males because of their higher incidence of trauma, often due to fighting. Feline ocular sarcoma has not been reported in cats younger than 7 years. The tumor typically presents as a fibrosarcoma but may have epithelial and mesenchymal features. In an eye with a history of trauma or chronic inflammation, common presentations include changes in pupil color, blindness, hyphema, uveitis, or glaucoma.

Staging and diagnostic options include a minimum database to establish the overall health of the animal, ocular ultrasonography, magnetic resonance imaging, and computed tomography. The treatment of choice for ocular sarcoma is enucleation. The cats that benefit most from surgery are those in which the tumor has not extended beyond the globe. Using advanced imaging techniques can help to identify the best candidates for surgery.

Soft tissue sarcoma has not been treated successfully using chemotherapy. Radiation may play a role in the future but will require extremely sophisticated computer equipment to control the required high doses without damaging the central nervous system.

**Conclusion**

The patient recovered well from surgery and remained hospitalized until suture removal because the client could not keep the patient indoors or administer medication. The analgesia protocol kept the patient comfortable, and the cat ate well during its stay. Because the patient feared humans and handling, the technicians made efforts to keep its environment quiet and to use calm, gentle restraint. These efforts appeared to successfully reduce the patient's stress level. It was recommended to the client to have the left eye evaluated by a board-certified veterinary ophthalmologist. The client elected not to pursue this option and chose to continue monitoring the eye for further changes. Because neoplastic cells had likely already invaded the extraorbital space of the left eye, the surgery may not have been completely curative. Although the long-term prognosis for this patient was poor, the case was still rewarding because (1) treatment alleviated pain and improved the patient's quality of life and (2) the staff's efforts to reduce the patient's stress were successful.

**References**


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**Glossary**

- **Buphthalmos**—abnormal enlargement of the eye
- **Enucleation**—removal of an intact organ or other mass from its supporting tissues
- **Extraocular**—outside the eyeball
- **Fundic**—pertaining to the bottom or base of an organ or the back of the interior of the eye
- **Hyperchromatic**—abnormally highly colored, excessively stained, or overpigmented
- **Hyphema**—hemorrhage within the anterior chamber of the eye
- **Intraocular**—within the eye
- **Lagophthalmos**—incomplete or defective closure of the eyelids
- **Mesenchyme**—meshwork of embryonic connective tissue in the mesoderm from which connective tissues, blood, and lymphatic vessels are formed
- **Metaplastic**—pertaining to a change in normal adult cells to an abnormal form
- **Panuveitis**—inflammation involving all parts of the uvea, including the iris, ciliary body, and choroid
- **Pleomorphic**—pertaining to the occurrence of various distinct forms by a single organism or within a species
- **Proptosis**—forward displacement of the globe
- **Retrobulbar**—situated, occurring, or administered behind the eyeball
- **Sarcoma**—a malignant tumor of mesenchymal derivation
- **Uvea**—the iris, ciliary body, and choroid
1. **Feline ocular sarcoma**
   - a. is most common in young male cats.
   - b. is almost never seen in female cats.
   - c. has been reported only in cats aged 7 years and older.
   - d. is seen only in purebred cats.

2. **The common presentation of feline ocular sarcoma does not include**
   - a. hyphema.
   - b. hyperemia.
   - c. glaucoma.
   - d. uveitis.

3. **The best treatment option for feline ocular sarcoma is**
   - a. chemotherapy.
   - b. radiation.
   - c. enucleation.
   - d. administration of antibiotics.

4. **Which statement is true regarding the pathogenesis of feline ocular sarcoma?**
   - a. In some cats, a strong fibroblastic wound healing response exceeds normal biologic control and becomes neoplastic.
   - b. Feline ocular sarcoma develops in all cases of lens perforation.
   - c. All cats with glaucoma eventually develop ocular neoplasia.
   - d. Uveitis is the primary catalyst of feline ocular sarcoma.

5. **Which statement is false regarding the cellular origin of feline ocular sarcoma?**
   - a. The origin is unclear.
   - b. The origin is epithelial and mesenchymal.
   - c. One possible origin is the lens uveal epithelium.
   - d. A pluripotent mesenchymal cell origin is unlikely.

6. **Feline ocular sarcoma is often associated with a history of**
   - a. FeLV.
   - b. chronic ocular inflammation.
   - c. trauma.
   - d. b and c

7. **Which statement is true regarding ocular tumors?**
   - a. Posttraumatic ocular sarcoma is unique in cats.
   - b. Older dogs have a propensity for ocular tumors.
   - c. Posttraumatic ocular sarcoma is common in dogs.
   - d. Young cats are often diagnosed with ocular sarcoma.

8. **Feline intraocular sarcoma occupies the ________ and expands diffusely into the posterior chamber, retina, and choroids.**
   - a. posterior iris
   - b. anterior iris
   - c. retrobulbar cavity
   - d. extraorbital space

9. **Feline ocular sarcoma commonly invades the ________ space, beginning at the limbus or the optic nerve.**
   - a. retrobulbar
   - b. anterior
   - c. extraorbital
   - d. posterior

10. **Staging and diagnostic options for ocular sarcoma do not include**
    - a. a minimum database.
    - b. ocular ultrasonography.
    - c. magnetic resonance imaging or computed tomography.
    - d. radiography of the skull.