

Canine Primary Corneal Fibrosarcoma – Case Report

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A B S T R A C T

This is the first report of a primary corneal fibrosarcoma in a canine. A 4-year-old male dog, Blue Heeler, was examined because of a reddish nodular mass in the right eye. A complete ophthalmic exam was conducted, including slit-lamp biomicroscopy, applanation tonometry, funduscopy, ocular and abdominal ultrasound, hemogram, serum biochemistry profile, and a thoracic X-ray. After the ophthalmic evaluation of the right eye, conjunctival hyperemia and the presence of a .5 cm diameter mass was found in the cornea. The diagnosis of fibrosarcoma was confirmed by histopathological analysis. The keratectomy showed satisfactory results in the removal of the corneal fibrosarcoma. The patient was followed up on for 18 months after the surgical procedure, and there were not any signs of local recurrence or metastasis.

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Background

In general, primary ocular neoplasms are uncommon and can represent about 5.56% of cases when compared to other neoplasms that affect other organs in different species.^{1–3} In contrast, ocular surface and adnexal tumors are more frequent, occurring mainly as meibomian glands adenomas, conjunctival squamous cell carcinomas (SCCs), papillomas, and melanocytic and vascular tumors.^{4–6}

Fibrosarcoma is a malignant mesenchymal neoplasm caused by an abnormal proliferation of cells called fibroblasts. Its occurrence is most commonly reported in soft tissues in the oral and nasal cavity of several domestic species.⁷ In ocular structures, fibrosarcoma is more common in the orbit and retrobulbar tissues and can extend to the eyelid,^{8,9} although it has been reported in other tissues,¹⁰ such as the corneal limbus.¹¹

Macroscopically, fibrosarcoma is characterized as a single and unilateral mass, firm, white/gray to a pink color with a smooth and sessile surface, and is rarely ulcerated. Microscopically, it consists of spindle-shaped cells of variable pleomorphism, separated by small amounts of collagen and reticular fibers. These cells are arranged in longitudinal, perpendicular, or oblique bundles in the same field.^{12,13}

The objective of the present study was to conduct the first report of a primary corneal fibrosarcoma in a canine.

Case Presentation

A 4-year-old male dog, Blue Heeler, weighing 24 kg and not neutered, was presented at the Veterinary Hospital because of the growth of a reddish nodular mass in the right eye with occasional bleeding for 3 weeks (Fig 1). The owner reported a previous ocular trauma caused by plant thorn, however, the time elapsed was not specifically described, referencing approximately 3 months.

The ophthalmic examination revealed focal conjunctival hyperemia and a .5 cm diameter nodule in the cornea with possible infiltration into the bulbar conjunctiva. Examination with the Slit-lamp biomicroscope (SL-17 Kowa®, Japan) confirmed that the mass was superficial

and did not infiltrate the corneal stroma or anterior chamber. The results of the Schirmer tear test (STT-1) were 22 mm/min for the right eye and 20 mm/min for the left eye. After topical instillation of 1 drop of .5% proxymetacaine eye drops, the intraocular pressure was measured at 17 mm Hg OD and 18 mm Hg in the right and left eye, respectively, by applanation tonometry (TonoPen Vet, Medtronic, FL). No alterations were verified with the funduscopy examination. The fluorescein eye stain test was negative, and the intraocular ultrasound did not reveal any intraocular changes. The complete hemogram and serum biochemistry tests (alkaline phosphatase, alanine aminotransferase, urea, creatinine, and total proteins) were also within the normal ranges for this species. Possible different diagnoses for the corneal mass included granulation tissue, hemangiosarcoma, lymphoma, cyst, nodular granulomatous episcleritis, foreign body reaction, and SCC, noting that SCC should be considered in any differential diagnosis of corneal proliferative lesions.¹⁴ Moreover, thoracic X-ray and abdominal ultrasound did not reveal changes in visceral structures.

Based on clinical and complementary results, a superficial keratectomy was performed to completely excise the nodular mass, followed by a temporary lateral tarsorrhaphy. The material collected was sent for histopathological examination. The tissue sample was immediately fixed in a 4% formaldehyde solution for 48 hours and processed routinely with the infiltration of paraffin wax to support the tissue for thin sectioning. Tissues of 5-micron were analyzed in bright-field microscopy using both routine hematoxylin and eosin (HE) staining and special Gomori trichrome staining to identify collagen fibers in green. Tissues were then submitted to histopathologic examination, which revealed hypercellularity with cells behaving in irregular beams in a diffuse and extensive dense fibrous tissue. In slides with H&E, neoplastic cells had scarce eosinophilic cytoplasm that was poorly defined and nuclei that varied from oval to spindle-shaped, presenting clear chromatin and sometimes irregular contours. This indicated remarkable nuclear pleomorphism and 1 to 2 preeminent nucleoli. The mitotic rate was 2–4 figures per 400× field, and the special TG staining strongly showed the collagenous green color of the cells. Unfortunately, it was not possible to perform immunohistochemical tests, but the characteristics found were sufficient for the diagnostic conclusion, being compatible with a unilateral corneal fibrosarcoma (Figs 2 and 3).

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Fig 1. Dog's right eye. Presence of a bloody nodular mass, approximately 0.5 cm in diameter.

For the postoperative treatment, it was decided to use tramadol hydrochloride (4 mg/kg, oral, SID, 5 days), meloxicam (.1 mg/kg, oral, SID, 3 days), and sodium dipyron (25 mg/kg, oral, SID, 3 days). For the right eye, .5% moxifloxacin hydrochloride eye drops (4/4 hours, 10 days) were prescribed, in addition to an Elizabethan collar to prevent the animal from scratching the affected eye. No medications were prescribed for the left eye. The animal returned for a postoperative appointment and to remove the stitches. Upon examination of the ocular surface with a slit-lamp biomicroscope, a smooth pinkish tissue was observed on the cornea, which started in the limbus and extended over the keratectomy site, resembling granulation tissue. However, it could not be confirmed whether it was usual postsurgical healing or recurrence of the tumor, so it was decided to re-evaluate it after 10 days. Upon the return of the animal after 10 days, remission of the tissue and the resumption of the corneal transparency was observed, and the observed moderate opacity and discrete neovascularization suggested a healing process (Fig 4).

Therefore, periodic follow-up was established every 3 months, due to the malignant nature of the tumor and the risk of metastasis. The patient was followed up on for 18 months after the surgical procedure, and there were not any signs of local recurrence or metastasis.

Discussion

A study conducted by Moreira et al (2018) between 2012 and 2015 evaluated 197 ocular and periocular lesions in domestic and wild animals.⁶ The authors reported that the neoplasms were the

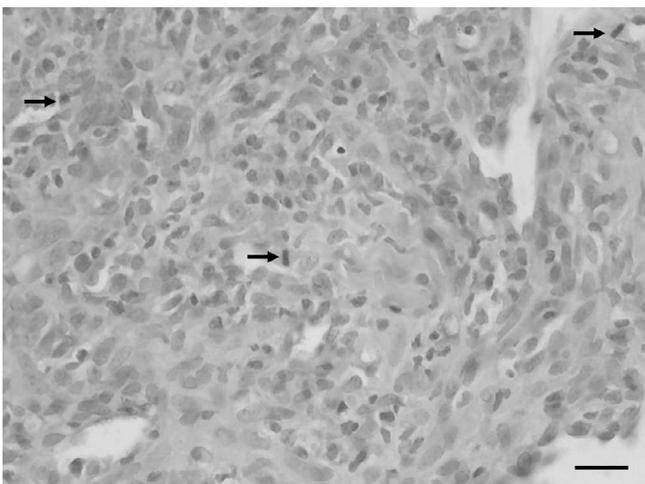


Fig 2. Photomicrograph of corneal fibrosarcoma in a dog. Presence of polygonal cells with moderate pleomorphism and discrete nucleoli, in addition to mitosis figures (arrows). HE, 400 \times . Bar: 20 μ m.

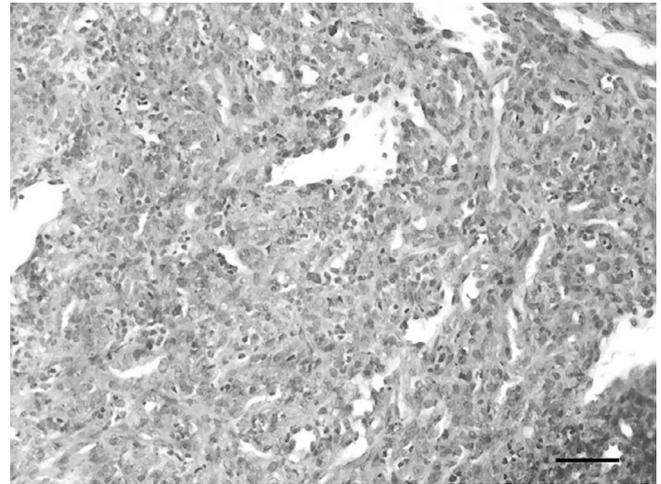


Fig 3. Photomicrograph of corneal fibrosarcoma in a dog. Application of special staining showing the presence of a large amount of collagenous matrix of the neoplasm. Gomori trichrome, 200 \times . Bar: 50 μ m.

most frequent, occurring in 92 of the cases (46.7%). Of the 92 cases, 72 occurred in dogs and none affected the cornea.⁶ Because the cornea is avascular, it is rarely affected by primary neoplasms,^{1,2,5,6,15} and it acts as a barrier, thereby preventing the intraocular spread of adnexal or orbital neoplasms.⁸

The most commonly reported primary tumor in the cornea of dogs is the SCC,¹⁵ which mainly affects brachycephalic, middle-aged dogs with a history of keratitis or keratoconjunctivitis sicca.^{5,16,17} Other primary corneal tumors have been described, such as melanocytoma,² hemangiosarcoma,¹⁴ papilloma, and adenocarcinoma.¹⁸ However, to the best of our knowledge, this is the first report of a primary corneal fibrosarcoma case in the canine species, while only one other case has been reported in feline species.¹⁹

In the case of primary feline corneal fibrosarcoma, it was diagnosed in a 12-year-old domestic cat that presented a history of persistent corneal sequestrum, as well as the subsequent development of an epidermal inclusion cyst and corneal ulcer. The authors hypothesize that the chronic stromal inflammation resulting from the corneal sequestrum has induced the formation of fibrosarcoma,¹⁹ which may also have occurred in the present case. In cats, the development of fibrosarcoma in different ocular structures is secondary to traumatic injuries that cause perforation of the lens and induce chronic inflammation.^{16,20} Such a neoplastic syndrome is called feline ocular post-traumatic sarcoma, which also includes osteosarcoma and giant cell tumors.⁵

The development of most neoplasms after the initial aggression of a replicating cell is a well-established principle in ophthalmic



Fig 4. Corneal appearance after 24 days of keratectomy. Presence of smooth, pink-colored tissue from the limbus to the surgery site.

oncology. In general, the response to tissue damage varies according to type, duration, and severity of the injury. A substantial or long-lasting injury stimulates adaptive processes in an attempt to repair tissue. Thus, there is cell proliferation and increased tissue mass (hyperplasia), associated or not to hypertrophy. This proliferative process can become disordered (dysplasia) and culminate in neoplasm.^{5,15} Therefore, it is hypothesized that the corneal trauma caused by the perforation with the plant thorn could have been the triggering factor for the development of fibrosarcoma.

The complete ophthalmic examination was crucial in identifying the origin of the tumor tissue, as well as its extension, and this allowed for the establishment of the therapeutic approach to be adopted. Until further study of the case, the keratectomy surgery to completely excise the nodular mass proved to be effective for the treatment of corneal fibrosarcoma, demonstrating its therapeutic importance.

The patient case was reviewed every 3 months and was important for follow-up since an adjunctive therapy be recommended if there was a recurrence. Complete ophthalmic examination, physical examination, complete hemogram, and serum biochemistry tests (alkaline phosphatase, alanine aminotransferase, urea, creatinine, and total proteins), as well as abdominal ultrasound, were performed, however, there was no evidence of recurrence during the evaluation period. If there were recurrences in the site, one of the therapeutic possibilities would have been the use of topical 5-fluorouracil (5-FU).²¹ Topical 1% 5-FU ointment was used as monotherapy for the treatment of canine corneal SCC, causing minimal side effects and was an effective option.²¹ It was observed that 5-FU increased the apoptosis of cancer cells in model animals with fibrosarcoma.²² It is important to note that local remission of completely excised primary corneal neoplasms is rare, and metastases are even rarer. However, most of the available data is for canine corneal SCC.²³

This report is of great relevance to the scientific community because, in addition to presenting a rare case of primary corneal neoplasia, it also reports the first case of corneal fibrosarcoma in the canine species.

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