Choroidal melanoma presented as glaucoma in a dog: case report and review of the literature

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Introduction

Although relatively rare, uveal melanomas are the most common primary intraocular tumours in dogs, and usually develop from the iris and/or ciliary body [7, 25]. Melanocytic tumours arising from the choroid are far less common, occurring at approximately 5% of the frequency of anterior uveal melanomas, and are generally considered benign [5, 10]. By contrast, choroidal melanoma is the most common primary ocular malignant neoplasm among adult humans. It represents 85% of all uveal melanomas, and carries a 25-40% mortality rate [11, 20]. Most of these tumours are discovered during a routine examination of the fundus or following visual symptoms, and they typically appear like a dark grey-colored and elevated lesion [18]. Canine choroidal melanomas may also present like a retrobulbar brown pigmented mass visualized during funduscopic examination [5, 14], but in most cases they are not discovered until secondary ocular disease occurs, such as visual impairment [2], chronic uveitis [5], retinal detachment [4], retrobulbar expansion [14], intraocular haemorrhage [4], or glaucoma [4].

The present paper describes the original clinical presentation of a choroidal melanoma in a dog.
Case report

A 7-year-old intact male mixed-breed dog was referred to the National Veterinary School of Toulouse for evaluation of a slowly progressive enlargement associated with vision loss on the right eye. Two weeks prior to referral, a presumptive diagnosis of glaucoma had been made by a local practitioner, and the eye had been treated with timolol maleate eye drops. At presentation, the dog was clinically normal. Ophthalmic assessment revealed a red buphthalmic but painless right eye. The unilateral blindness was confirmed by loss of the menace response. Direct and consensual pupillary light reflexes of the right eye were negative and resulted in an areflexic mydriasis. On the left eye, the absence of consensual light reflex confirmed a severe ocular or pre-chiasmatic lesion on the right side. Subepithelial corneal oedema, slight aqueous flare and a dense leucocoria were also observed on the right eye. The presence of a polar haemorrhage was suspected in the retrolental area. Intraocular pressures evaluated by applanation tonometry (Tonopen XL®, Mentor) were 46 mm Hg and 16 mm Hg in the right and left eye respectively. As opacification of the lens precluded adequate visualisation of the posterior segment, ultrasound examination was performed using a 10 MHz probe. On transverse B-scans, two retrolental highly echogenic convex lines formed a funnel-shaped image connected to a conical echodense lesion protruding into the vitreous cavity at the posterior pole (Figures 1 and 2). The mass lesion appeared to have a maximal thickness of approximately 6 mm. Nasal and temporal fluid spaces posterior to the funnel-shaped structure were filled with lower-amplitude echoes uniformly distributed (Figure 2). Cataract was identified in the lens cortex (Figure 2). Examination of the left eye, including gonioscopy (Figure 2), revealed a heavily pigmented mass arising from the optic disc and protruding as a second mass into the optic nerve head adjacent to the globe (Figure 5). A massive haemorrhagic exsudate filled the ocular cavities. Histologically, the tumour was a well-delineated subretinal melanocytic proliferation, tapering off peripherally into the choroidal tissue without scleral infiltration but breaking the optic disc and protruding as a second mass into the optic nerve head. This tumour was composed of a majority of large plump polyhedral heavily pigmented cells associated with some polyhedral to spindle less pigmented cells (Figure 6). Nuclei were central, round, small and regular in shape with clear chromatin and central nucleolus. No mitotic figures were seen. There was no histologic evidence of involvement of the anterior uvea and orbital portion of the optic nerve with subretinal haemorrhages, uveal neoplasm with retinal and/or choroidal detachment and hypertensive haemorrhagic endophthalmitis with posterior inflammatory cataract. The owner refused any further diagnostic procedure and rejected suggested surgical treatments for the glaucoma. Thus, the eye was treated with topical applications of a timolol-dorzolamide fixed combination and dexamethasone alcohol eye drops. In spite of the treatment the glaucoma worsened, and the dog was reexamined two months later because the right eye had become painful. A severe blepharospasm was noted in association with conjunctival and episcleral hyperaemia, deep peripheral corneal vascularization and stromal oedema. The intraocular pressures were 64 mm Hg and 15 mm Hg in the right and left eyes, respectively. On B-scan images, the funnel-shaped echogenic structure was still present, but the conical lesion at the posterior pole had enlarged in size and changed into a roundish mass which connected to the parapapillary area (Figure 3). The mass was largely protruding into the vitreous cavity and was acoustically heterogeneous (Figures 3 and 4). The base of the tumour with lesser reflectivity determined indentation of the surrounding normal choroidal outline (Figures 3 and 4). A slowly progressive tumour was strongly suspected, and as there was no evidence of metastatic dissemination on thoracic radiographs, enucleation of the right eye was recommended and performed. When the fixated globe was sagittally cut in half, gross examination revealed a heavily pigmented mass arising from the parapapillary area and invading into the optic disc. The tumour was protruding into the vitreous cavity, and caudally extended to the optic nerve head. A massive haemorrhagic exsudate filled the ocular cavities. Histologically, the tumour was a well-delineated subretinal melanocytic proliferation, tapering off peripherally into the choroidal tissue without scleral infiltration but breaking the optic disc and protruding as a second mass into the optic nerve head. This tumour was composed of a majority of large plump polyhedral heavily pigmented cells associated with some polyhedral to spindle less pigmented cells (Figure 6). Nuclei were central, round, small and regular in shape with clear chromatin and central nucleolus. No mitotic figures were seen. There was no histologic evidence of involvement of the anterior uvea and orbital portion of the optic nerve
removed with the globe. A severe exudative haemorrhagic anterior and posterior uveitis characterized by lymphocytic and plasma cell multifocal infiltrates was present, and was associated with a fibrino-haemorrhagic clot surrounding the lens. Other associated lesions included: cataract formation, complete retinal detachment and degeneration with cyclitic membrane formation over the posterior lens capsule and ciliary processes. Numerous large pigment laden cells were seen in the exudate. The histologic diagnosis was primary choroidal melanoma with cytologic features suggestive of benign biological behaviour. Two years after diagnosis, the owner contacted by telephone reported no signs of local recurrence or metastatic disease. No signs of glaucoma were observed on the fellow eye.

Discussion

Even if melanomas are the most common intraocular tumours in dogs, choroidal origin has been estimated to be no more than 4% to 5% [10]. We reviewed the veterinary literature from 1984 to 2006 and found only 22 cases that were histopathologically proven [1, 2, 4-6, 12-15, 19, 24]. The demographic data available for 21 of these dogs indicate that the median age of dogs with choroidal melanoma is 7 years (range, 13 months to 14 years), and that there is no sexual preponderance; ten dogs were female, from which 6 were spayed, and 11 were males. Nine breeds of dogs were represented with Golden and Labrador Retrievers (n = 7), mixed-breed-dogs (n = 5), and Beagles (n = 3) being the most common. This may represent a breed-related susceptibility for retrievers.

Clinically, canine choroidal melanomas may present as raised, darkly pigmented lesions of the fundus identified at routine ophthalmologic examination [1, 6, 24]. In other cases, the choroidal mass cannot be detected until it results in secondary changes manifesting like vision impairment, globe enlargement, and/or ocular pain [16]. These clinical signs may be associated with intraocular haemorrhage, uveitis, retinal detachment, or secondary glaucoma as in the current case [12-14, 19]. In man, most choroidal melanomas are detected during routine funduscopic examination. Patients may be completely asymptomatic or present with visual field defects [11]. Association between choroidal melanomas and secondary glaucoma has also been reported in humans by several authors who observed that tumours presenting a large
volume, mainly those accompanied by total retinal detachment were more frequently associated with secondary glaucoma [3, 8, 17, 21, 23]. This observation may apply to the present case too.

A diagnosis of choroidal melanoma is based on history, ophthalmic examination, and results of supplementary tests such as ocular ultrasonography, computed tomography, magnetic resonance imaging, and cytological puncture. Differential diagnoses for the mass may include neoplasia, infectious granuloma (i.e. blastomycosis in endemic areas), parasitic granuloma (i.e. Dirofilaria or Toxocara), hematoma, abscess or cyst [4, 19]. In human beings the differential diagnosis includes various lesions, such as choroidal nevus, exudative haemorrhagic chorioretinopathy, congenital hypertrophy of the retinal pigment epithelium, circumscribed choroidal hemangioma, and age-related macular degeneration [22]. B-scan ultrasonography will help confirm the clinical diagnosis by demonstrating a mass lesion located at the posterior pole of the globe. In the present case, the base of the choroidal tumour had low internal reflectivity compared with surrounding normal high-reflective choroid. This ultrasonographic finding resembled choroidal excavation which is reported in 65% of the human choroidal melanomas [9]. Color Doppler is used in human beings to provide further support for diagnosis, and might be of value in dogs. The presence of blood flow was observed in the interior of 39/44 cases of human choroidal melanomas, but was not identified in benign lesions [17]. In complement to ultrasonography, computed tomography or magnetic resonance imaging may help evaluate extracocular involvement of the tumour [11, 14].

Typically choroidal melanomas are slowly expansive. They disrupt the overlying pigmented epithelium, rupture through the Bruch’s membrane, and eventually develop inside the vitreous cavity [18]. Canine choroidal melanomas usually show similar gross appearance consisting of a well-delineated heavily pigmented subretinal lesion with tapering edges [6, 16]. The pigmented mass may surround and/or encroach the optic disc, as observed in our case [2, 6, 13, 14]. Expansion into the sclera and retrobulbar tissues is not an uncommon occurrence [10]. Amelanotic choroidal melanomas exist but are very rare in dogs [16].

Histologically, canine choroidal melanomas have common features with choroidal nevus and melanocytomas in humans [6], but a small percentage assumes features of malignant spindle cell tumours [5]. Other microscopic changes may include detachment and atrophy of the retina, neovascular glaucoma, uveitis, preiridal fibrovascular membranes, and cataract formation [5, 16]. In our case the tumour was mostly composed of plump pigment laden polyhedral cells with no evidence of mitosis, corresponding to Type 1 cells, as defined by Collinson and Peiffer [5]. A few Type 2 cells corresponding to plump spindle cells were also present. Thus, this case showed histologic features previously reported in canine choroidal melanomas classified "amelanocytoma".

Enucleation is the treatment option when the eye is painful, or when the lesion progresses or causes secondary changes [7, 16, 25]. When the eye is comfortable, enucleation should be discussed because of the benign characteristics previously reported, and a continuous monitoring of the mass is the alternative to evaluate for its enlargement or other secondary changes [13, 14]. In some cases no clinical signs appeared for several years without any treatment [24]. Radiotherapy is currently the popular treatment for choroidal melanoma in humans. Enucleation is used for patients with a blind, painful eye or when the tumour exceeds 40% of the ocular volume [11]. There is no evidence that chemotherapy is helpful in the management of these tumours. In man, prognosis after any treatment depends on the size of the tumour, the patient’s age, the cell type and the extrascleral extension [11]. The risks for metastasis include increasing tumour size and poorly defined margins. Choroidal melanomas carry approximately a 46% of metastasis by blood way that can occur within 15 years of evolution. By contrast, choroidal melanomas in dogs seem to metastasize at a very low rate, as there is only one report of metastatic canine choroidal melanoma [12].

In conclusion, glaucoma may be the initial feature of choroidal melanoma and the present case illustrates the fact that every glaucomatous blind eye with opaque media requires ultrasonographic and, if enucleated, histopathologic examination.

Acknowledgements

The authors are grateful to Françoise Michaud for revising the English prose style.

References