

ACUTE BLINDNESS IN OUR PATIENTS

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1/ Sudden Acquired Retinal Degeneration Syndrome (SARDS)

SARDS has been reported only in dogs. The typical presentation is of acute blindness. Pupils are dilated and are slowly responsive to bright white light. When performing the *chromatic PLR test*, pupils are unresponsive to red, but responsive to blue, light stimulation.

Auten et al compared 151 SARDS patients to a reference population. Although dogs of 36 breeds were affected, the Dachshund (21%), Schnauzer (11%) and Pug (7%) were significantly overrepresented. Similarly, dogs 6-10 years of age and between 10-20 kg in body weight were significantly overrepresented, as were spayed females (59%).

Initially the fundus of SARDS patients looks normal, although ophthalmoscopic signs of progressive retinal degeneration, including tapetal hyperreflectivity and vascular attenuation, may appear over the next few months. Because an animal with distal optic neuritis may also be presented with similar signs of acute blindness, dilated and unresponsive pupils, and a normal-looking fundus, the ERG, rather than the chromatic PLR test, is considered the gold standard in distinguishing between the SARDS and distal optic neuritis patients. The ERG signal is normal in optic neuritis but extinguished in SARDS. The extinguished ERG in SARDS is correlated with OCT findings demonstrating thinning of the outer retinal layers, and histopathologic studies showing loss of photoreceptor outer segments and numerous apoptotic nuclei in the outer nuclear layer of the diseased retinas with both cones and rods affected. The disease is most common in obese middle-aged adult dogs of small breeds, and spayed females are overrepresented.

Although SARDS is an acquired disease, intensive research has not succeeded in identifying the primary cause. For many years, the most commonly accepted theory was that SARDS is the result of an endocrinologic disorder. This is because a history of recent polyuria, polydipsia, polyphagia, weight gain, and lethargy is typical. A significant percentage of patients also have clinicopathologic results suggestive of hyperadrenocorticism with lymphopenia, elevated liver enzymes, hypercholesterolemia, and an abnormal adrenocorticotrophic hormone stimulation test result. However, only about 20% of dogs are diagnosed with typical hyperadrenocorticism, and Oh et al reported discriminating laboratory parameters between dogs with SARDS and hyperadrenocorticism including post-ACTH serum cortisol (<19.3 µg/dL), AST:ALT ratio (>0.343), and urine specific gravity (>1.030). Furthermore, in a study by Carter et al of 13 dogs with confirmed SARDS, 85% had elevated levels of one or more sex hormones, and 69% had elevated cortisol. Only one dog had completely normal adrenocorticotrophic hormone (ACTH) stimulation test results. Proteinuria and systemic hypertension were also common findings.

Alternatively, it has been suggested that SARDS is an autoimmune inflammation of the retina. This theory is based on a similar disease in humans, cancer associated retinopathy, in which patients with non-ocular cancer produce antiretinal autoantibodies causing acute blindness and loss of ERG function. However, there is conflicting evidence to support this etiology in dogs. Grozdanic et al have been able to demonstrate cancer in their 2021, but not their 2019, case series; and there are similarly conflicting reports regarding the presence of antiretinal antibodies in SARDS patients. As suggested by the name of the disorder, it is quite possible that SARDS is a syndrome, encompassing several diseases, and indeed

many patients have been shown to suffer from other (seemingly unrelated) abnormalities, including loss of hearing and smell senses, neurohormone imbalance, and blood hypercoagulability.

Unfortunately, because the primary cause has yet to be identified there is currently no demonstrably safe and clinically proven treatment for SARDS, and the blindness is considered irreversible, as would be expected by photoreceptor damage shown histologically. Surveys by both Stuckey et al and Washington et al of owners who attempted treatment reveal that a small percentage of owners believe that partial vision was restored in their dogs. However, this was not confirmed by veterinary ophthalmologists, and many owners reported significant, sometimes life-threatening, side effects of the hormonal or immunosuppressive treatment.

2. Optic Neuritis

Optic neuritis is an inflammation of the optic nerve. The inflammation may be unilateral, although it is usually bilateral. It may affect the entire nerve or parts of it.

2.1 Causes

Causes of canine optic neuritis (in decreasing frequency) are:

- In dogs, most inflammations are classified as idiopathic (also called isolated, or immune-mediated)
- Inflammatory diseases, most commonly the ocular form of GME or MUE
- Orbital diseases (e.g., orbital cellulitis and orbital abscess)
- Trauma, especially after proptosis of the globe
- Neoplastic disorders that may be primary optic nerve tumors (e.g., meningioma) or orbital tumors with secondary involvement of the nerve
- Infectious diseases affecting other nervous tissues (e.g., distemper, *Cryptococcus neoformans*, *Toxoplasma gondii*).

In cats, reported causes of optic neuritis include localized and systemic infections, neoplasia and systemic hypertension. No idiopathic or immune-mediated cases have been reported in felines.

2.1 Clinical signs

The clinical signs of optic neuritis are as follows (in retrobulbar neuritis, the ophthalmoscopic signs marked with an asterisk [*] may be absent, because only the more distal part of the nerve is affected; in these cases, the optic disc and other fundus structures may look normal):

- Acute loss of vision in the affected eye
- The pupil is dilated and unresponsive. In unilateral cases, the indirect PLR is present when stimulating the unaffected eye but absent when stimulating the affected eye
- The optic disc is swollen and raised. It appears to be congested, and its margins are blurry.*
- Optic disc or peripapillary hemorrhage, or dilation of retinal vasculature *
- The retina around the disc may be edematous or detached. With time, peripapillary retinochoroidal degeneration may appear.*

- Exudation and haze in the adjacent vitreous*
- Punctate to linear to curvilinear dark, gray, or white foci in the peripapillary region that are not contiguous with the optic nerve head*
- Hyperintensity and thickening of the optic nerve may be seen on T2-weighted and fluid-attenuated inversion recovery (FLAIR) MRI. The inflamed nerve may also be enhanced with intravenous gadolinium. Contrast enhancement of the optic chiasm, and changes to the optic disc(s) and within the CSF volume surrounding the optic nerve(s) may also be seen.
- Concurrent signs of CNS disease may be present, depending on the primary cause. Cerebrospinal fluid (CSF) analysis may demonstrate pleocytosis (particularly lymphocytes) and elevated protein (particularly IgG) levels
- Optic neuritis, if untreated or uncontrolled, frequently leads to optic nerve atrophy, with a pale, grayish, shrunken optic disc, attenuation of blood vessels, and permanent visual & PLR deficits.

Patients with distal optic neuritis (i.e., presenting with a normal-looking fundus, and without the signs marked by *) constituted just 4/96 dogs (4%) in a case series by Smith et al, but as many as 14/48 (29%) in a case series by Bedos et al.

The appearance of optic neuritis should be distinguished from papilledema, in which the optic disc is similarly swollen. Another differential is excessive myelination of the optic disc, which may be mistaken for blurry disc margins. However, patients with these two conditions are not blind.

2.1 Treatment and prognosis

Comprehensive ophthalmic, neurologic, and physical examinations should be performed to identify the primary cause (if present), and appropriate therapy should be instituted. The inflammation itself is treated symptomatically with high doses of systemic immunosuppressive drugs (unless contraindicated by the patient's systemic condition), that may include prednisolone alone, or combined with azathioprine, cytosine arabinoside and/or cyclosporine. Topical medications do not reach the optic nerve, and are not beneficial. The prognosis for return of vision is poor, and indeed some of the primary causes (e.g., distemper, GME) may even be life threatening.

Smith et al reports on follow-up >14 days in 72 dogs with optic neuritis. Fifty dogs (69%) remained blind, 10 (14%) had partial visual improvement and just 12 (17%) had normal vision. Bedos et al report vision recovery in 24/48 (50%) of eyes after 10.5 days (median). Median duration of treatment for dogs that recovered vision was 365 days, with 5 dogs relapsing after tapering the dose of immunosuppressive drugs.

3. Hypertensive Retinopathy

Hypertensive retinopathy is disease a condition wherein high systemic blood pressure causes funduscopic lesions. In mild cases, increased arterial vascular tortuosity and retinal oedema or petechia may be seen. Moderate cases may present with multifocal retinal edema, haemorrhage or detachment (due to subretinal exudation), while severe cases will present with complete retinal detachment and blindness. Cirila et al showed that the severity of signs is correlated with systolic (but not diastolic) blood pressure. Hyphema, vitreal hemorrhage and secondary glaucoma may also occur.

Hypertensive retinopathy should be suspected in elderly cats (and less often in dogs) presenting with acute blindness. Two studies at North Carolina State University, totaling 157 cats, report that more than 60% of cats diagnosed with hypertension presented with bilateral blindness. Blood pressure should be measured in a quiet room, and stress-free environment.

In cats, readings greater than 180/100 mm Hg are considered abnormally high, and readings greater than 200/110 mm Hg are clinically significant. While hypertension may be essential, it is often associated with chronic kidney disease or hyperthyroidism, and patients should be worked up for a primary cause of hypertension. Cirila et al diagnosed chronic kidney disease and hyperthyroidism in 60% and 29% of 225 patients, respectively, and both diseases in 8% of cats.

Unless hyphema, uveitis or glaucoma have occurred, there is no indication for topical treatment, as drugs will not reach the posterior segment. Rather, cats diagnosed with hypertensive retinopathy should be treated with appropriate hypotensive drugs, most commonly amlodipine. Successful treatment of hypertension often results in retinal reattachment and recovery of vision. Young et al report that 58% of cats that were blind at presentation recovered some vision following treatment; most cats regained vision within 3 weeks, but in some cases vision returned as late as two months after initiation of treatment. Similarly, Cirila et al report unequivocal vision in 54% of patients. However, they add that cats with severe fundoscopic disease remained blind or had severely reduced vision due to degeneration of the reattached retina.

Based on a survey of geriatric cats in New Zealand, Carter et al recommend ocular fundic examination of cats over eight years of age, as it allows identification of cats with hypertensive ocular lesions, often before the owner or veterinarian is aware the cat has vision problems. This may result in diagnosis of systemic hypertension allowing early treatment and resolution of lesions.

Systemic hypertension may also cause fundoscopic disease in dogs. Leblanc et al report on 65 canine patients with blood pressure greater than 160 mm Hg. They documented retinal haemorrhage, retinal detachment and hyphema in 40%, 24% and 19% of dogs, respectively. Similar to the studies in cats, a significant number of patients presented to clinicians because of ophthalmic abnormalities, and were subsequently referred for blood pressure measurement which confirmed the diagnosis of hypertension.