

CASE REPORT

Persistent hyperplastic tunica vasculosa lentis and persistent hyperplastic primary vitreous (PHTVL/PHPV) in two cats

Ingrid Allgoewer and Beatrice Pfefferkorn

Animal Eye Practice, Spanische Allee 4, 14129 Berlin, Germany

Address communications to:

Ingrid Allgoewer

Tel.: + 49-30-80 58 98 68

Fax: + 49-30-80 58 95 79

e-mail: augen@bigfoot.com

Abstract

Two domestic shorthair cats (6 and 9 months old) were presented for examination of ocular opacities. One cat had bilateral persistent pupillary membranes, unilaterally accompanied by persistent hyperplastic tunica vasculosa lentis, persistent hyperplastic primary vitreous (PHTVL/PHPV), and cataract. The second cat had bilateral PHTVL/PHPV with dense white plaques in the posterior lens capsule and subcapsular cortex.

Key Words: cat, cataract, persistent hyperplastic tunica vasculosa lentis (PHTVL)

INTRODUCTION

Persistent hyperplastic tunica vasculosa lentis (PHTVL) and persistent hyperplastic primary vitreous (PHPV) are rare congenital eye diseases in the dog characterized by hyperplastic parts of the hyaloid system and the primary vitreous persisting postnatally.¹ These anomalies have been described to occur sporadically in many canine breeds including the greyhound,² Doberman pinscher,³ Airedale terrier, German shepherd, miniature poodle,⁴ Irish setter,⁵ Irish wolfhound,⁶ and Basset hound.⁷ PHTVL/PHPV is an inherited condition in the Doberman pinscher and Staffordshire bull terrier, and is also inherited as part of multiple anomalies in the Bouvier des Flandres.⁸⁻¹²

The anomaly has been reported in species other than dogs, including man¹³ and laboratory rats.¹⁴ Severin¹⁵ reported seeing unilateral PHPV in cats without gross visual deficits. The disorder has been investigated extensively in the Doberman pinscher,^{8,16-18} in which hyperplastic parts of the hyaloid system and tunica vasculosa lentis posterior were demonstrated as early as day 30 of gestation.^{16,19,20} Signs of PHTVL/PHPV range from very small retrolental fibrovascular dots (grade 1) to severe lenticular, retrolental, and hyaloid system malformations (grade 2-6).⁸

This report presents two cats with PHTVL/PHPV and cataract formation.

MATERIALS AND METHODS

Two male domestic shorthair cats, 6 and 9 months of age, from two different households, were presented in Berlin, Germany for obvious haziness of the eyes which had remained

unchanged since the cats were owned. Otherwise both cats were in good health.

A complete ophthalmic examination was performed in both cats before and after mydriasis induced with 0.5% tropicamide (Mydrum®, Ankerpharm, Rudolstadt, Germany). Instruments used included a slit lamp biomicroscope (SL 14®, Kowa, Japan), an indirect ophthalmoscope (Neitz, Tokyo, Japan), and an applanation tonometer (Tonopen®, Mentor). Photographic documentation was obtained with a hand-held fundus camera (Genesis®, Kowa, Japan). Ocular ultrasonography (B-scan, 10 MHz, Sonomed 3000®, Sonomed, USA) was performed in case 2. Topical anesthesia was achieved by application of oxybuprocaine hydrochloride (Conjuncain®-Edo®, Dr Mann Pharma, Berlin, Germany).

CASE REPORTS

Case 1

A 6-month-old male domestic shorthair cat showed evidence of decreased vision in bright light. Menace reflex as well as direct and indirect pupillary light reflexes were normal in both eyes. In the right eye, a persistent pupillary membrane (PPM) with corneal adhesions was present (Fig. 1). In the left eye, several thin PPM strands extended from the iris collarette to the anterior lens capsule. Some blood-filled strands extended from the iris to the posterior aspect of the lens where they divided into fibrovascular tissue. The lens nucleus was clearly delineated and irregularly shaped (Fig. 2). Ophthalmoscopy of the fundus revealed no abnormalities in either eye. The intraocular pressure was within normal limits OU. The diagnosis was bilateral PPM with PHTVL/PHPV (grade 5) OS.⁸

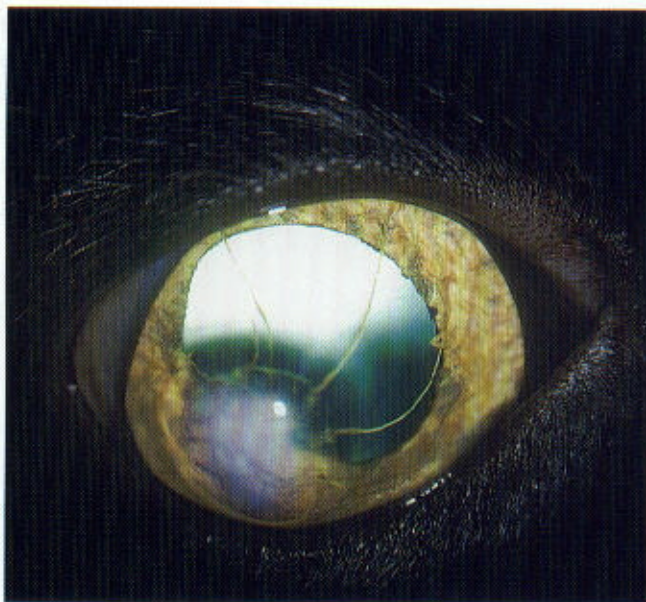


Figure 1. Case 1, right eye: persistent pupillary membrane (PPM) extending from the iris collarette to the corneal endothelium.

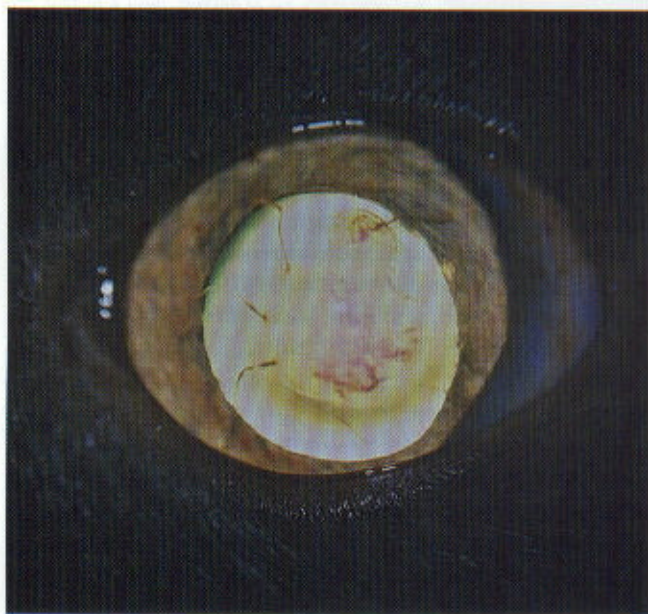


Figure 2. Case 1, left eye: PPM from iris collarette to the anterior lens capsule, persistent tunica vasculosa lentis posterior with cataract and intralenticular blood vessels.

Case 2

A 9-month-old male domestic shorthair cat was reported by its owner to have severe visual deficits in bright light. Menace reflexes were diminished bilaterally, but direct and indirect pupillary light reflexes were normal in both eyes. Slit lamp examination revealed dense white capsular and subcapsular plaques paracentrally on the anterior aspect of the lens OU, and irregular vacuolar cortical opacities in the equatorial lens. A blood-filled vascular net associated with

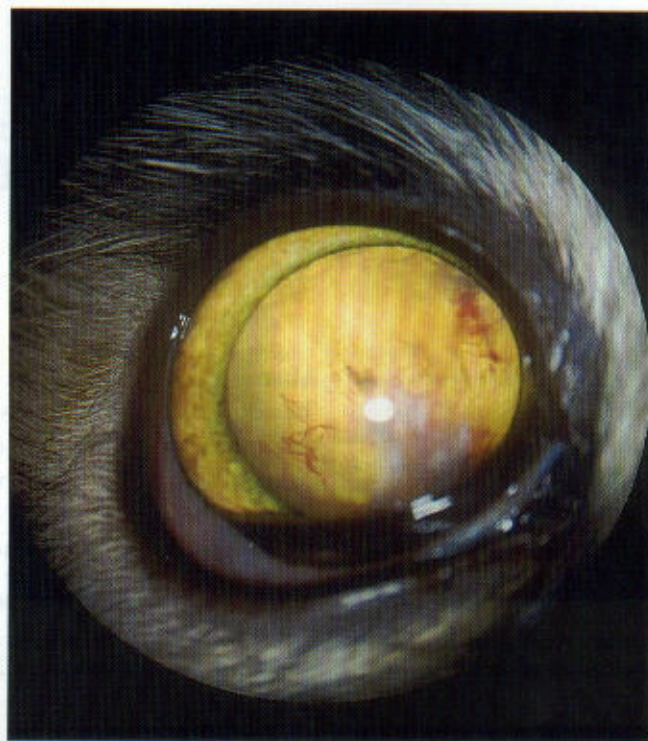


Figure 3. Case 2, right eye: capsular cataract, blood vessels within the lens cortex.

the posterior capsule was identified OD (Fig. 3). A yellowish to reddish-brown opacity was located in the region of the inferior posterior lens capsule OS. Definitively determining whether this fibrovascular tissue was confined to the posterior cortex and capsule or extended posteriorly into the vitreous was not possible with biomicroscopy. The lens anomalies and central plaques OU prevented funduscopy. Therefore the posterior segment was evaluated using ultrasonography (Figs 4 and 5). Bilateral, hyperechoic, cone-shaped structures were identified in the vitreous emanating from the posterior aspect of the lens. In the right eye, the vitreal opacity appeared to connect to the optic disc and resembled persistent parts of the hyaloid system (Fig. 4). In the left eye, the hyperechoic structure appeared more dense; however, a connection to the optic disc could not be definitively demonstrated using ultrasonography (Fig. 5). The lens cortices were hyperechoic OU. Bilateral PHTVL/PHPV (grade 5) was diagnosed.⁸ As improvement of vision after surgery was questionable, the owner declined surgical treatment.

DISCUSSION

PHTVL/PHPV is a congenital ocular disorder with early fetal manifestation.¹ It has been studied in detail in dogs,^{1,7,8,17-19} and is inherited in several dog breeds. PHTVL/PHPV occurs sporadically in a variety of species.¹⁵ It appears to be a rare disease in the cat. The authors are aware of only one description of mild, unilateral feline

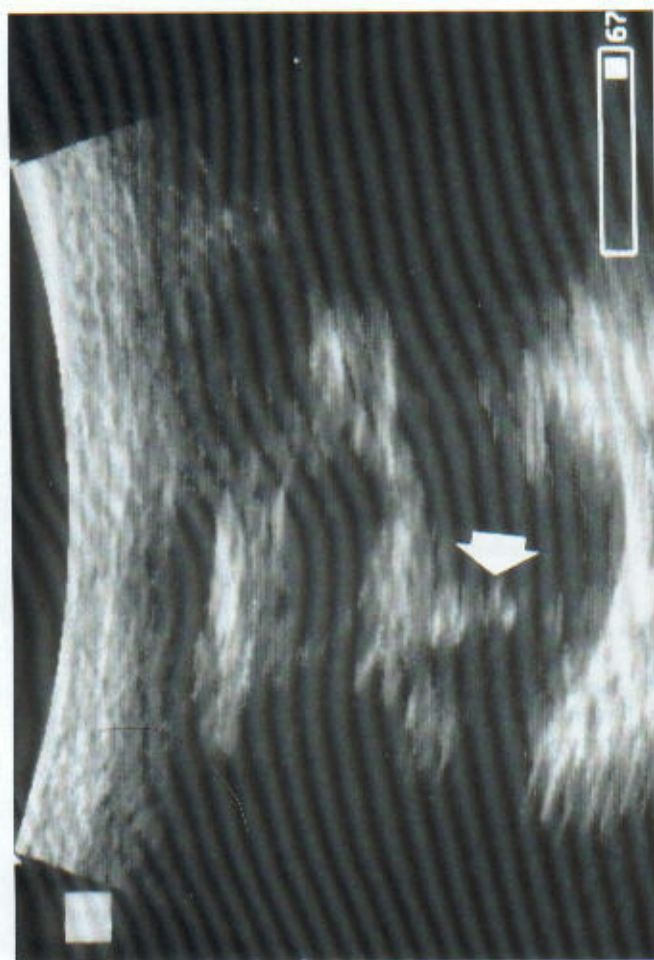


Figure 4. Case 2, right eye: ultrasound images (B-Scan, 10 MHz): persistent parts of the hyaloid system crossing the vitreous (arrow).

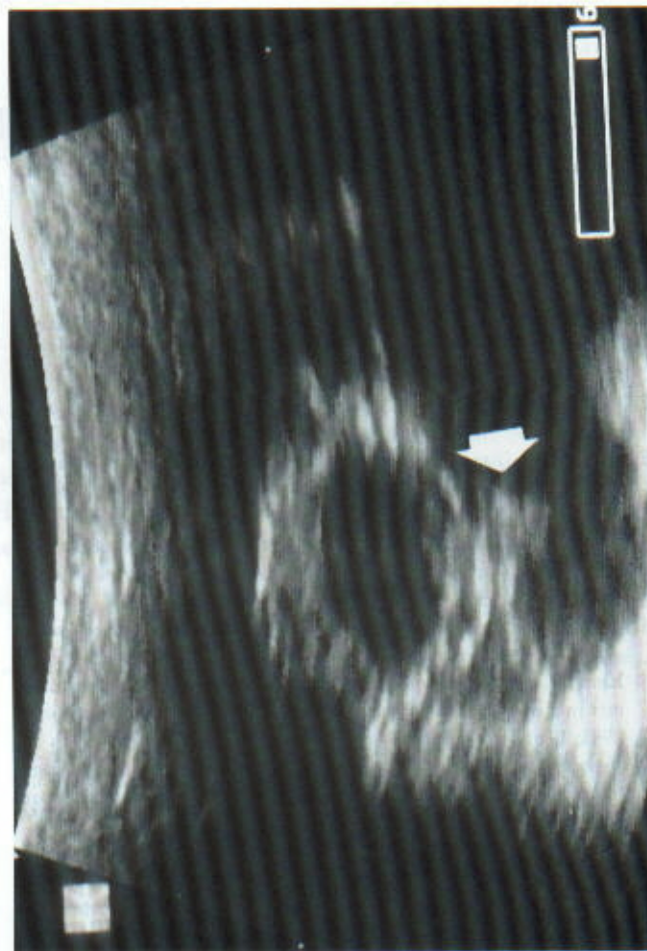


Figure 5. Case 2, left eye: ultrasound image (B-Scan, 10 MHz): hyperechoic retrolental cone-shaped structure protruding into the vitreous (arrow), hyperechoic lens cortex.

PHPV.¹⁵ The two cases described in the present report were presented for evaluation of ocular opacities and visual disturbance. Persistence of the tunica vasculosa lentis anterior and/or posterior as well as the hyaloid system were encountered bilaterally in both cats. Association of PHTVL/PHPV with PPM and tunica vasculosa lentis anterior persistens or microphthalmos has also been described in the dog.^{4-8,10-12} In the Doberman pinscher, PHTVL/PHPV grades 2-6 always result in cataract. In grades 5 and 6, cataracts are rapidly progressive and lead to complete blindness during the first two years of life.^{18,19} In our cases PHTVL/PHPV was associated with cataract in all three affected eyes.

In the dog, surgical therapy for severe PHTVL/PHPV carries a much higher risk of complications than routine extracapsular lens extraction.²¹ An even less favorable prognosis exists if a patent hyaloid artery is present because of increased likelihood of intraoperative or postoperative hemorrhage. Bleeding within the vitreous space may lead to formation of traction bands and retinal detachment.^{1,21} Posterior segment involvement must be taken into account

when surgical therapy is discussed with the owner. The posterior lens capsule may be unstable and already contain tears.^{1,17} In the dog, glial tissue is commonly accumulated around the optic nerve head, along the persistent hyaloid artery and within the fibrotic retrolental sheets.^{11,12,17} Histopathologic examination of retinal tissue from dogs with PHTVL/PHPV revealed focal areas of retinal dysplasia in six of 58 eyes.¹⁷ In our report, ultrasonography demonstrated pathologic changes within the posterior segment OU in case 2 when cataract prohibited inspection of the fundus. A cone-shaped structure protruded from the posterior pole of the lens into the vitreous OU. However, connection to the optic disc could not be proven OS.

CONCLUSION

The two cases described in this report showed severe lenticular and retrolental pathology resembling grade 5 of Stades' grading scheme for PHTVL/PHPV in the Doberman pinscher.⁸ The anomaly was of clinical significance,

because both cats developed cataracts and obvious visual deficits at an early age.

ACKNOWLEDGMENTS

The authors thank Prof. Frans Stades, DVM, PhD, Dipl. ECVO for critical review of this manuscript.

REFERENCES

1. Boevé MH, Stades FC. Diseases and surgery of the canine vitreous. In: *Veterinary Ophthalmology*, 3rd edn (ed. Gelatt KN). Lippincott Williams & Wilkins, Philadelphia, 1999; 857-868.
2. Grimes TD, Mullaney J. Persistent hyperplastic primary vitreous in a greyhound. *Veterinary Record* 1969; **85**: 607-611.
3. Keller WF, Blanchard GL, Krehbiel JD. Congenital dysplasia in a canine eye. A case report. *Journal of the American Animal Hospital Association* 1972; **8**: 29-32.
4. Barnett KC, Grimes TD. Unilateral persistence and hyperplasia of the primary vitreous in the dog. *Journal of Small Animal Practice* 1973; **14**: 561-565.
5. Rebhun WC. Persistent hyperplastic primary vitreous in a dog. *Journal of the American Veterinary Medical Association* 1976; **169**: 620-622.
6. Kern TJ. Persistent hyperplastic primary vitreous and microphthalmia in a dog. *Journal of the American Veterinary Medical Association* 1981; **178**: 1169-1171.
7. Verbruggen AM, Boroffka SAEB, Boevé MH *et al*. Persistent hyperplastic tunica vasculosa lentis and persistent hyaloid artery in a Basset hound. *Veterinary Quarterly* 1999; **21**: 63-65.
8. Stades FC. Persistent hyperplastic tunica vasculosa lentis and persistent hyperplastic primary vitreous (PHTVL/PHPV) in 90 closely related Doberman pinschers: clinical aspects. *Journal of the American Animal Hospital Association* 1980; **16**: 739-751.
9. Stades FC. Persistent hyperplastic tunica vasculosa lentis and persistent hyperplastic primary vitreous in the Doberman pinscher: genetic aspects. *Journal of the American Animal Hospital Association* 1983; **19**: 957-964.
10. Curtis R, Barnett KC, Leon A. Persistent hyperplastic vitreous in the Staffordshire bull terrier. *Veterinary Record* 1984; **115**: 385.
11. Leon A, Curtis B, Barnett KC. Hereditary persistent hyperplastic primary vitreous in the Staffordshire terrier. *Journal of the American Animal Hospital Association* 1986; **22**: 765-774.
12. Van Rensburg IBJ, Petrick SW, Van der Lugt Smit MEE. Multiple inherited eye anomalies including persistent hyperplastic tunica vasculosa lentis in Bouvier de Flandres. *Progress in Veterinary and Comparative Ophthalmology* 1992; **2**: 133-139.
13. Reese AB. Persistent hyperplastic primary vitreous. *American Journal of Ophthalmology* 1955; **40**: 317-331.
14. Kuno H, Usui T, Eydeloth RS *et al*. Spontaneous ophthalmic lesions in young Sprague-Dawley rats. *Journal of Veterinary Medical Sciences* 1991; **43**: 607-614.
15. Severin GA. (ed.) Persistent hyperplastic primary vitreous. In: *Severin's Veterinary Ophthalmology Notes*, 3rd edn, Fort Collins, CO, USA 1996; 411-412.
16. Stades FC, Van der Linde-Sipman JS, Boevé MH. Eine erbliche Augen-anomalie beim Doberman: Persistierende hyperplastische Tunica vasculosa lentis und primäres Vitreum (PHTVL/PHPV). *Kleintierpraxis* 1984; **29**: 91-98.
17. Van der Linde-Sipman JS, Stades FC, de Wolff-Rouendaal D. Persistent hyperplastic tunica vasculosa lentis and persistent hyperplastic primary vitreous in the Doberman pinscher: pathological aspects. *Journal of the American Animal Hospital Association* 1983; **19**: 791-802.
18. Boevé MH, Stades FC, van der Linde-Sipman JS *et al*. Persistent hyperplastic tunica vasculosa lentis and persistent hyperplastic primary vitreous (PHTVL/PHPV) in the dog: a comparative report. *Progress in Veterinary and Comparative Ophthalmology* 1992; **2**: 163-172.
19. Boevé MH, Stades FC, Van der Linde-Sipman JS. PHTVL/PHPV-associated cataract in the Doberman. *Tijdschrift Voor Diergeneeskunde* 1989; **114** (Suppl.1): 55S-57S.
20. Boevé MH, Van der Linde-Sipman JS, Stades FC. Early morphogenesis of persistent hyperplastic tunica vasculosa lentis and primary vitreous. The dog as an ontogenic model. *Investigative Ophthalmology and Visual Science* 1988; **29**: 1076-1086.
21. Stades FC. Persistent hyperplastic tunica vasculosa lentis and persistent hyperplastic primary vitreous in Doberman Pinschers. Techniques and results of surgery. *Journal of the American Animal Hospital Association* 1983; **19** (393-402): 22.