Persistent Hyperplastic Primary Vitreous (PHPV) in Two Siberian Husky Dogs

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ABSTRACT. Three eyes in two Siberian husky dogs were clinically diagnosed as persistent hyperplastic primary vitreous (PHPV) by means of ophthalmoscopy and ultrasonography (USG). Examination of mildly affected PHPV eyes with an ophthalmoscope showed the axial part of the posterior capsule to be opaque. The central lesion of the posterior capsule in severely affected eyes had been opaque with many blood vessels. Echographic changes in mild cases of PHPV were outside of the lens, linearly hypechoic, parallel to the posterior lens capsule. In a severely affected eyeball, funnel-shaped hypechoic change was noted in the retrolental space. Two months later, phacoemulsification was performed for diagnostic treatment of PHPV since progressive cataract was observed in this eye. — KEY WORDS: persistent hyperplastic primary vitreous (PHPV), Siberian husky.

Persistent hyperplastic primary vitreous (PHPV), and persistent hyperplastic tunica vasculosa lentis (PHTVL), are congenital ocular anomalies caused by a failure in regression of the fetal hyaloid vasculature [2, 14]. Histopathologically, accompanying fibroplasia of mesodermal elements within the posterior tunica vasculosa lentis results in opaque fibrovascular tissue on the posterior surface of the lens [2, 3, 5, 11]. This anomaly is rare and has not been reported in Siberian husky dogs. PHPV was observed by the author in three eyes of two Siberian husky dogs apparently unrelated in pedigree.

Three eyes diagnosed as PHPV in two Siberian Husky dogs (left eye of a three-month-old male dog and both eyes of a six-year-old male dog) were examined with an ophthalmoscope (Matsumoto Medical Instruments Inc., Osaka, Japan) and a slit lamp (SL-5, Kowa, Tokyo, Japan) following application topically with a midriatic agent (Midorin P®, Santen Pharmaceutical Co., Osaka) and a ultrasonography (USG). All eyes had a good light reflex. Initially, three PHPV eyes had been diagnosed as a cataract and in the following examination, USG was performed using a SSP-630 and a 7.5 MHz realtime in-line mechanical sector scanner (Aloca Co., Tokyo). Surface anesthesia was applied with oxybuprocain hydrochloride (Benoxyl®, Santen Pharmaceutical Co.) prior to the examination, and ophthalmic methyl cellulose solution (Scopisol®, Senju Pharmaceutical Co., Osaka) applied on the cornea. Horizontal and vertical views of the eyes were obtained. When abnormal changes in the lenses and posterior segments were seen, videos and photographs were taken. The eyes were flushed with saline after examination [9, 10]. A progressive cataract which was later operated by phacoemulsification, was carried out in one PHPV eye. Pre- and post-operative ophthalmoscopic and USG examinations were also carried out.

Preoperative ophthalmoscopic examination revealed secondary cataract formation. However, abnormality of PHPV was not shown (Fig. 1). USG changes in severely affected PHPV revealed hypechoic, funnel-shaped, outside lenses, and a retrolental vitreous area. Also, there was a small echoic spot in the vitreous near the optic disk (Fig. 2).

Circular hypeechoic changes in the lens, possibly due to both sidal cataract were observed while they had not been when the dog was examined initially. These echoic changes in the lens had disappeared by the postoperative USG (Fig. 3). USG in mildly affected PHPV indicated linear echogenicity parallel to the posterior lens capsule, highest intensity at the center and gradually decreasing thickness peripherally (Fig. 4). In the ophthalmoscopic and slit lamp examinations of severely affected PHPV, the central lesion of the posterior capsule was occupied by plaque tissue containing a network of blood vessels (Fig. 5). In mildly affected eyes, the axial part of the posterior capsule was slightly opaque, and then became radiant and only slight at the periphery (Fig. 6), although the anterior capsule and cornea were clear. Posterior lenticous was observed.

PHPV is not so common and occurs sporadically in dogs...
The usual clinical appearance is white plaque tissue containing a network of blood vessels attached to the posterior lens capsule [2, 11] and one eye in this report had a similar appearance (Fig. 5). Hereditary PHPV in some breeds is a pleomorphic condition, usually occurring bilaterally and characterized by punctate brown pigment foci within the retrolental fibrovascular plaque [2, 15, 18]. Animals affected with PHPV in these cases should not be used for breeding. Mildly affected dogs have only these punctate pigment foci disturbed over the posterior lens capsule, without retrolental plaque (Fig. 6). Vision in these cases is unaffected, but breeding studies suggest that the dogs may be genetic carriers. Pathologically fibrovascular tissue is usually funnel-shaped, occupying retrolental space and the site of the Cloquet’s canal [2, 3, 5]. Similar to the pathological findings, USG of one PHPV eye in this report showed funnel-shaped and hyperechoic change in the retrolental space [4, 17]. There was a small echoic spot in the vitreous near optic disk (Figs. 2, 3) which strongly suggests that this PHPV eye was associated with persistent hyaloid arteries and Bermeister’s papilla [2, 18] (Fig. 7).

PHPV has been noted in Doberman pinschers, Staffordshire bull terriers, Black-coated Labrador retrievers, Irish wolfhounds, Irish setters, German shepherds, Miniature poodles, and Greyhounds [2, 3, 5, 7, 15, 18], but not recorded in Siberian huskies [12, 16]. In Japan, the Siberian husky is one of the most popular western-derived breeds, so that PHPV may be overlooked in this breed.

The diagnosis of PHPV in dogs is based on the history, clinical appearance of the anomaly with complete mydriasis, and elimination of other causes of leukocoria [2, 3]. In humans, USG has been used for diagnosing PHPV [1, 6, 8]; echographic patterns of PHPV in dogs have been reported only recently [4, 17]. The differential diagnosis of PHPV
Fig. 6. Ophthalmoscopic photograph of same eye as in Fig. 4. Retrolental plaque (arrow) and radiant opacity can be seen in the posterior capsule.

includes cataract, total retinal detachment, neoplasia of the posterior segment, vitreous abscess or endophthalmitis, and organized intraocular hemorrhage [2, 11]. With congenital cataracts, lesions would be limited to the lens when the vitreous is clear (if visible). In the cases of retinal detachments, one would usually encounter a folded, floating vascular membrane, with a dilated non-responding (to direct light) pupil and abnormal tapetal reflex [11]. Embryonic ocular tumors are infrequent, and their major diagnostic clue would be an enlarging intraocular mass, with resultant pain and global enlargement. Cataract, retinal detachment, and ocular tumors can also be diagnosed by USG [4, 9, 10, 17]. Endophthalmitis is an inflammatory problem, with progressive signs of ocular and systemic infection [11]. Actually, the cases in this report were misdiagnosed as being cataracts, and PHPV was then definitively diagnosed using USG. The cataracts such as seen in this study, especially in Siberian husky dogs with retrolental opacity, should be differentiated from PHPV. USG is very useful for differentiating between cataract and with PHPV. USG examination before cataract surgery was essential in those breeds in which PHPV has been noted, and Siberian huskies should be included in these breeds.

Unilateral PHPV cases do not require treatment, but bilateral cases with visual impairment may be treated with topical application of 1% atropin at 3 to 4 times a day to dilate the pupil and extend the visual field [2, 3, 11]. Dogs with PHPV and the total cataract have been treated successfully by intracapsular lens extraction with anterior vitrectomy, although intraocular hemorrhage, retinal detachment, and uveitis may likely be a complication [2, 3, 14]. One severely affected PHPV case in this study showed progressive secondary cataract treated successfully by phacoemulsification to avoid the likely occurrence of complications. Mild case in this study showed no visual impairment and progression of abnormality without treatment. Lastly, euthanasia should be considered for puppies with intralenticular hemorrhage or bilateral cataracts [2].

REFERENCES