NOTE *Surgery*

Posterior Lenticonus with Congenital Cataract in a Shih Tzu Dog

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ABSTRACT. A seven-month-old, male Shih Tzu dog weighing 3.7 kg had an immature cataract in its left eye. A biomicroscopic examination revealed numerous vacuolations in the posterior cortices with nucleus cataracts, covered by an intact anterior lens capsule. The changes observed by ocular sonographic examination (OSG) of the left eye were hyperechoic, and a funnel-cone shape was observed posteriorly with cortex hyperechogenicity in the lens. The left eye was diagnosed as having a posterior lenticonus with congenital cataract. Phacoemulsification was performed on the left eye as diagnostic treatment of the posterior lenticonus and cataract. Postoperative OSG on the left eye revealed a V-shaped linear echo that was indicative of a posterior capsule of the lens. Moreover, it was confirmed that hyperechoic cataract material inside the lens had disappeared.

KEY WORDS: canine, congenital cataract, posterior lenticonus.

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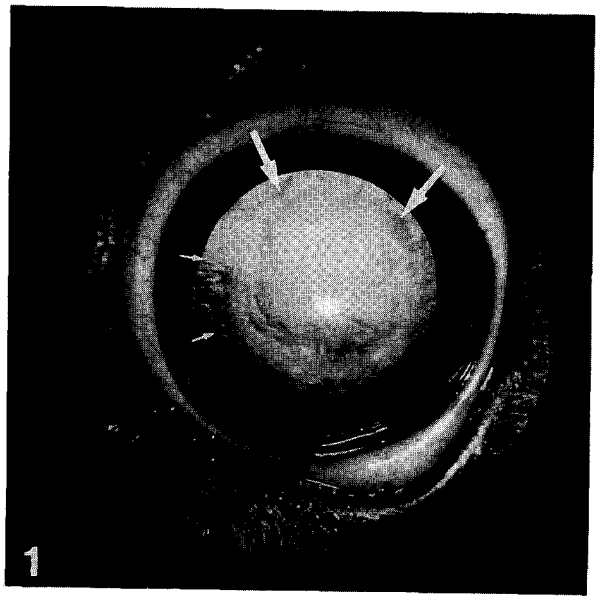
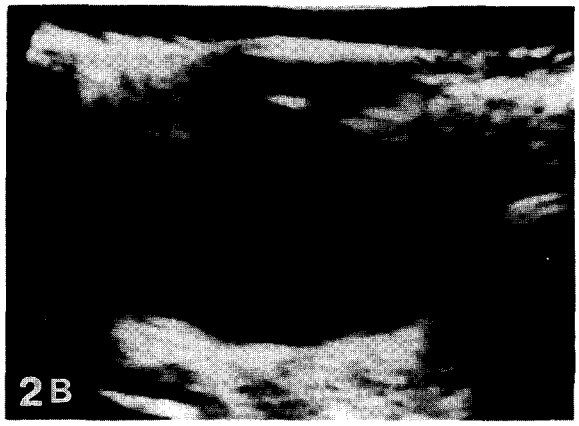
Posterior lenticonus is a congenital anomaly in the shape of the lens with a posterior protrusion of the lens in conical contours. The deformity occurs in late fetal development following normal formation of the lens nucleus. It has been reported in several canine breeds [1, 3, 5–9]. To the authors' knowledge, this is the first reported case of posterior lenticonus and a congenital cataract in a Shin Tzu. Moreover, this is the first report of B-mode characteristics of posterior lenticonus in dogs. The purpose of this study is to report on posterior lenticonus with congenital cataracts and B-mode echographic characteristics of this deformity.

A seven-month-old, male Shih Tzu dog weighing 3.7 kg was referred to the Ori Animal Hospital for evaluation and treatment of a cataract in the left eye. Historically, the referring veterinarian had diagnosed the cataract approximately four weeks previously. Vaccinations had been performed. The general physical examination findings were normal except for the immature cataract on the left eye (Fig. 1). Ocular findings of the external ocular structures and pupillary light reflexes were normal. Mydriasis was induced using a midriatic agent (Midorin P®, Santen Pharmaceutical Co., Osaka, Japan). A biomicroscopic examination revealed numerous vacuolations in the posterior cortices with nucleus cataracts, covered by an intact anterior lens capsule (Fig. 1). They were posteriorly located in the path of the tapetal reflection in the left eye. An ocular sonographic examination (OSG) was performed using a SSP-630 and a 7.5 MHz real-time in-line mechanical sector scanner (Aloca Co., Tokyo, Japan). Surface anesthesia was applied with oxybuprocain hydrochloride (Benoxyl®, Santen Pharmaceutical Co., Osaka, Japan) prior to the examination, and ophthalmic methyl cellulose solution (Scopisol®, Senju Pharmaceutical Co., Osaka, Japan) was applied to the cornea. OSG changes obtained in the left eye were hyperechoic, and a funnel-cone shape was observed posteriorly with cortex hyperechogenicity in the lens (Fig. 2A). OSG of the right eye showed no abnormalities (Fig. 2B). Thus, posterior lenticonus with congenital cataract was diagnosed in the left eye according to the results of the OSG and the biomicroscopic examination. One month later, phacoemulsification was performed with a 3 mm cornea limbus incision at the 12 o'clock position on the left eye for diagnostic treatment of the posterior lenticonus and the cataract, since there might be a possibility of cataract progression and lens-induced uveites following a lens rupture. OSG of the left eye on the 3rd postoperative day revealed a V-shaped linear echo that is indicative of a posterior capsule of the lens, and the hyperechoic cataract materials in the lens had disappeared (Fig. 3). Biomicroscopic examination revealed that the intact posterior V-shaped capsule extended posteriorly deep into the vitreous body. The postoperative eye condition was good and the owner reported that the dog had no visual impairment.

Posterior lenticonus or lentiglobus is a congenital defect of the posterior lens surface. Instead of having a smoothly convex surface, the posterior cortical and capsular regions have a circumscribed cone-like shape deep into the vitreous body [1], as in this case. The posterior lenticonus is almost always found at the posterior pole or very near it in humans [4]. During gestation, the posterior lens capsule is fully formed by 35 days, and the fetal nucleus becomes surrounded by the secondary or cortical fibers by 40 days. Once the cortical fibers are present, posterior lens capsule material is no longer formed [2]. The presence of an intact lens capsule surrounding the posterior lenticonus suggests that the defect occurred prior to the formation of the lens capsule [1]. Also, the presence of nuclear opacity extending into the posterior border of the lenticonus indicates that the posterior lenticonus occurred at the time when the primary lens fibers began to elongate [2]. Histological sections obtained from several cases of posterior lenticonus in humans have demonstrated a very thin but intact lens capsule, with the aberrant growth of subcapsular epithelium overlying the lenticonus [4].

By surgical observation, in our case the posterior capsule





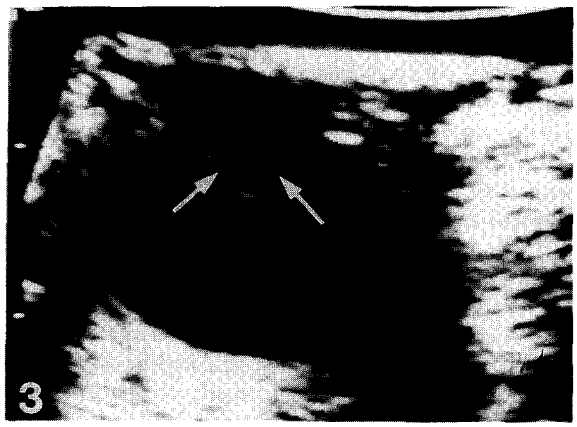


Fig. 1. Ophthalmoscopic photograph of the left eye of a Shih Tzu dog at the time of first observation. Numerous vacuolations (small arrows) of the lenticular equator and nucleus cataract (large arrows) can be seen.

Fig. 2. Ocular sonography (OSG) of a Shih Tzu dog at the time of first observation. (A) affected left eye. Hyperechogenic funnel-cone shape (arrow) posteriorly with cortex hyperechogenicity in the lens suggesting posterior lenticonus with cataracts. (B) normal right eye.

Fig. 3. OSG on the third day after phacoemulsification of the same eye as in Fig. 1. The V-shaped linear echogenicity (arrows) suggesting a posterior lens capsule. Hyperechoic cataract material is not seen.

was intact but very thin, and the shape of the posterior capsule was cone-like. Such findings indicated that the abnormality was the result of an overgrowth of lens fibers [1]. Posterior lenticonus occurs frequently with other ocular anomalies including congenital cataracts and microphthalmia [5, 6]. The condition may affect one or both eyes. This case also had a congenital cataract in one eye. Biomicroscopic examination of the posterior lenticonus lens revealed an intact posterior cortex and a capsule that extended posteriorly deep in to the vitreous body [5].

Posterior lenticonus has been reported in several canine breeds, including Bull Mastiff [1], Miniature Schnauzer [1, 6], Akita dog [7], Old English Sheepdog [3], Golden Retriever [8], and Cavalier King Charles Spaniel [9]; all these dogs had cataracts [6]. With posterior bulging of the posterior lens capsule, retrodisplacement of the lens nucleus and posterior cortex was likely [6].

Ocular sonographic examination (OSG) in the left eye revealed a hyperechoic, funnel-cone shape with cortex hyperechogenicity in the lens (Fig. 2). Then, a definitive diagnosis of posterior lenticonus was made by OSG. Moreover, the OSG technique is also useful for diagnosing persistent hyperplastic primary vitreous (PHPV/PHTVL). OSG changes observed in PHPV cases are hyperechoic and funnel-shaped outside lenses as well as in the retrolental vitreous area [10]. Therefore, based on these observations, PHPV can be differentiated from posterior lenticonus. OSG is a very useful diagnostic tool for posterior lenticonus, particularly

when anterior portions of the eye are opacified, such as by cataracts. It is conceivable that a poorly formed or altered posterior capsule might encourage the rupture of the cataractous lenses into the anterior vitreous body [7]. Lens-induced uveitis developed in some adult dogs with advanced hypermature cataracts [6, 9]. Posterior lenticonus with cataracts may be operated on to remove cataractous lens material to prevent lens-induced uveitis and severe eye problems later in life. However, removal of a lens that extends into the posterior segment can be difficult, possibly complicated by the loss of vitreous, traction on the retina and hemorrhaging [5]. Therefore, we suggest that OSG should be done for preoperative evaluation of cataract surgery.

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