Lens Luxation in a CD-1 Mouse

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Abstract: Lens luxation was found in a male CD-1 (ICR) mouse. Ophthalmologic examinations revealed conical cornea anterior synechia and corneal neovascularization in the right eye. The lens was dislocated heterocentrically within the posterior chamber. Histologically, anterior lens luxation and adhesion between the iris and cornea were observed.

Key words: lens luxation, mouse

Lens luxation was found in a male Crl:CD-1 (ICR) mouse purchased from Charles River Japan, Inc. at 5 weeks of age. Abnormality of the eye was noted upon arrival, and for further observation the animal was individually housed for 10 weeks in an aluminum cage with wire-mesh floor and kept in the animal room with room temperature at 24 ± 2°C and relative humidity at 55 ± 15%, ventilated 15 times per hour, and illuminated 12 hr per day. Commercial diet (MF, Oriental Yeast Co., Ltd.) and tap water were given ad libitum.

A portable funduscamera (GENESIS, KOWA) and a slit lamp biomicroscope (SL-2, KOWA) with a photographic unit were used for ophthalmologic examinations. A drop of mydriatic (Midrin-P, Santen) and miotic (Sanpilo 1%, Santen) was instilled before and after the examinations, respectively. For microscopical examinations, the mouse was killed by exsanguination under ether anesthesia at 15 weeks of age. The eyes were removed, fixed in a combined fixative of 1% formaldehyde and 1.5% glutaraldehyde, processed to paraffin-embedded sections, and stained with hematoxylin and eosin (HE).

On ophthalmological examination at the time of arrival, the eyes were seen to be asymmetrical; the right eye being larger than the left. The medial part of the cornea of the right eye was conically protruded, and a network of neovascularization was clearly visible. This corneal finding was associated with corectopia. The lens of the right eye was dislocated into the posterior chamber and placed heterocentrically to the lateral aspect. Transparency of the lens was kept normal (Fig. 1). Upon instillation of a mydriatic to the right eye, no reaction was noted from which synechia was suspected. These findings remained unchanged until the time of necropsy. Although corectopia was also noted in the left eye, the pupil was dilated with instillation of the mydriatic, and no histological abnormality was observed in the eye.

On histological examination of the right eye, the contour of the eye globe was distorted, which was consistent with conical cornea observed clinically. The cornea was partially bulged, resulting in marked expansion of the posterior chamber (Fig. 2) and the epithelial layer of the regional cornea was noticeably thinned and

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accompanied by neovascularization (Fig. 3). The iris adhered to the corneal endothelium throughout the site of the conical cornea (Fig. 4). The lens was completely apart from the zonule of Zinn, and dislocated into the dilated posterior chamber (Fig. 2). No other abnormality was noted in any part of the eye.

Lens luxation is the outcome of detachment of the lens from the zonule of Zinn as a result of rupture of the zonule [1, 4]. The cause of rupture may be trauma or genetic factors [1, 3, 4]. Associated with lens luxation, glaucoma and corneal opacity have been reported [3, 4]. In this report, the animal already had the luxated lens at 5 weeks of age at which time no discernible evidence of trauma was found. Although a congenital lesion is suspected, the unilateral presence of luxation eliminates a genetic pathogenesis in which the luxation is observed bilaterally. Because the posterior chamber was extensively dilated and a conical protrusion of the cornea was noted, the complication of glaucoma was considered. Lens dislocation may be a sequela to glaucoma, and alternatively glaucoma can be preceded lens dislocation [4]. In this case, the luxated lens did not appear to be the primary factor which would block the current of aqueous humor. In-
stead, the glaucoma was more likely caused as the result of disturbed outflow of aqueous humor by anterior synechiae. It is therefore assumed that the present lens luxation is a lesion secondary to severe glaucoma. The histological changes in the cornea indicating mild keratitis were likely caused by repeated abrasion at the site of protrusion.

There only are a few reports available on lens luxation in rats [2, 3], and this condition has not been reported in mice, suggesting that it is very rare in these species. In a 30-week-old rat the lens was dislocated forward into the anterior chamber and in a 38-week-old rat the lens was displaced backward within the vitreous. Although adhesion of the lens to the cornea and cataract respectively, were associated, the causes of the lens luxation were not apparent in either case.

Daily careful clinical observations would be very important to find such a rare lesion.

References