CLINICAL VIGNETTE

A Newborn with Alarmingly Eccentric Pupils

Nathan Samras, MD, MPH and Simon Fung, MD

Relevant History

A 2-week-old full term male presented to the primary care for a regular scheduled well child checkup. The mother was concerned about eccentric pupils that were not noted on prior evaluations in the hospital and outpatient clinic. His past medical history was unremarkable with normal prenatal care and a typical postnatal course. There was no eye trauma or unusual exposures since birth. There was no family history of developmental issues or eye diagnoses except for Duane syndrome in the mother.

Physical Exam: The well appearing infant had adequate weight gain for a neonate, with a normal physical exam except for bilateral eccentric pupils on external exam. A slit lamp examination performed by ophthalmology at a later appointment showed bilateral corectopia with both pupils round but displaced superonasally. A fine overlying persistent pupillary membrane was adherent to the anterior capsular surfaces of the otherwise clear natural lens in each eye. Tonometry was reassuring without signs of congenital glaucoma. The ophthalmologist made the diagnosis of corectopia secondary to persistent pupillary membrane.

Laboratory: Genetic testing of the patient at age six months via the 2022 Prevention Genetics Custom Corectopia Panel with copy number variant detection was negative for sequencing changes and small insertions/deletions within single genes: *OVOL2, GRHL2, PITX3, CPAMD8, ASPH, B3GLCT, COL4A1, CYP1B1, ELP4, FOXC1, FOXE3, PAX6, PITX2, SH3PXD2B.* Parents declined additional exome sequence testing as of the date of this publication.

Discussion

There are many abnormalities of pupil size such as anisocoria that are relatively common in adults, but congenital abnormalities of position of the pupil are rare. Corectopia is a rare physical exam finding where one or both pupils are not centered in the eye, sometimes referred to as eccentric pupils. Eccentricity more than 1.0 mm is considered abnormal as less than that is clinically and cosmetically insignificant.[1] Corectopia can be congenital as in this case, or acquired such as with midbrain corectopia in adults where pathology in the Edinger-Westphal nucleus can paralyze sphincter tone and lead to an eccentric pupil.[2,3] The congenital form is associated with multiple conditions, such as iris coloboma,[4] ectopia lentis et pupillae,[5] hyperplastic pupillary membrane,[6] congenital pupillary-iris-lens membranes with goniodysgenesis,[7] Axenfeld-Rieger syndrome,[8] idiopathic tractional corectopia,[9] and persistent pupillary membrane (PPM), which was the cause in this case.

Although the finding of corectopia is rare, the presence of PPM is a relatively common and usually asymptomatic congenital anomaly that occurs when the anterior tunica vasculosa lentis, which supplies the blood for the developing lens of the fetus, does not completely disappear by about the eighth month of gestation.[10] The remnants of these capillaries persist as fine strands along the iris.[11] It is usually sporadic although there are occasional familial forms.[12] PPM varies in appearance and size, and can be unilateral or bilateral.[13] In this vignette, the PPM led to eccentric pupils but in its extreme forms it can also present as a membranous structure that extends across the pupil.[14]

The management of the PPM depends on the size of the pupillary opening affected by the size of the pupillary membrane. Vision is usually not impaired, and most PPMs atrophy in the first year of life and do not require treatment. Remnants of the PPM are found in about 95% of neonates and 20% of adults.[15] Management is indicated when the visual axis is obscured and the child at risk of amblyopia, but surgical intervention for the pupil abnormality is usually not required,[16] as a combination of mydriatic agents, refractive correction, and patching for amblyopia are usually sufficient for PPMs.[17] At least 1.5mm pupillary opening is required for adequate cortex development from the retinal stimulation, and therefore thick PPMs may require surgical excision.[18]

For our patient, medical or surgical intervention has not been necessary. He is now 10 months old and the physical exam findings and genetic workup to date have otherwise been reassuring. The parents do not report problems with his vision. There is a concern of mild gross motor delay and monitoring is ongoing, but it is most likely that the finding of corectopia from PPM is an isolated abnormality.

This report of a rare physical exam finding has multiple important conclusions for clinicians. Although eccentric pupils can be concerning for the parents, this case is an example that some types of corectopia can be monitored without intervention if the pupillary opening is sufficiently large to avoid amblyopia. A thorough physical exam with attention to detail is always

important. The pupil abnormality was not initially noted after multiple evaluations from pediatricians in the hospital and the outpatient clinic, possibly because the providers focused their exam to evaluate red reflex and because newborns usually open their eyes for only a moment. Finally, it is important to evaluate for related syndromes through genetic testing and serial physical exams including the monitoring of both visual and systemic development.

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