

CASE REPORT

Unilateral foveal hypoplasia in a child with bilateral anterior segment dysgenesis

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Introduction

We present a 13-week-old female infant with bilateral aniridia, Axenfeld anomaly and unilateral foveal hypoplasia in the absence of other systemic findings. The anterior segment and foveal structures were delineated with spectral domain optical coherence tomography. Her fraternal twin brother has normal ocular findings. After 1 year of follow-up, the child's vision remains central, steady and maintained in each eye, without nystagmus or the need for amblyopia therapy. Her presentation is suggestive of a unilateral variant of a recently described syndrome of foveal hypoplasia, optic nerve decussation defects and anterior segment dysgenesis (FHONDA). We review and discuss the evaluation and management of anterior segment dysgenesis and foveal hypoplasia in infants.

Case Presentation

A 13-week-old female infant presented to the pediatric ophthalmology clinic after her pediatrician noted “abnor-

Key Clinical Message

In patients with foveal hypoplasia, anterior segment dysgenesis and an absence of systemic findings, consider a recently described syndrome of foveal hypoplasia, optic nerve decussation defects and anterior segment dysgenesis (FHONDA) in the differential diagnosis.

Keywords

Foveal hypoplasia, anterior segment dysgenesis, aniridia, FHONDA syndrome.

mal pupils” during a routine exam. She was the product of a 33-week, twin gestation, delivered by emergent cesarean section due to maternal preeclampsia. Family history was significant for a “lazy eye” in her maternal grandmother. The remaining medical history and family history were unremarkable.

On initial examination, the patient fixated and followed appropriately for age with each eye. Intraocular pressures (IOP) by rebound tonometer were 5 mm Hg in the right eye and 8 mm Hg in the left eye. Portable slit lamp examination of both eyes was significant for widely dilated pupils with iris stumps and prominent posterior embryotoxon (Fig. 1). Given the suspicion of anterior segment dysgenesis and increased glaucoma risk, an examination under anesthesia (EUA) was scheduled. During the EUA, IOP measured 17 mm Hg right eye and 9 mm Hg left eye by Tono-Pen (Tono-Pen XL applantation tonometer, Reichert Inc., Buffalo, NY). Nonmydriatic gonioscopy showed open angles with iris strands attached to the posterior embryotoxon in the both eyes, which was verified with anterior segment optical coherence tomography



Figure 1. External anterior segment photograph demonstrating posterior embryotoxon.

(OCT, iVue, Optovue Inc., Fremont, CA; Fig. 2). Fundus examination revealed intact foveal contour and normal pigmentation of the macula in the right eye and blunting of the foveal reflex with decreased macular pigmentation in the left eye. Absence of a foveal pit was documented with macular OCT (Fig. 3A–C). No medical treatment was initiated at the conclusion of the EUA.

The patient was followed every 3 months in the clinic. Over the next 12 months, there has been no evidence of ocular hypertension and the child has not developed nystagmus. On the most recent clinic visit, she showed central, steady and maintained fixation in each eye. Genetic evaluation showed no deletions in *PAX6* or the surrounding regions on chromosome 11, and her systemic evaluation remained unremarkable. Our patient has undergone genetic analysis to the fullest extent possible in the context of resources, as further analysis of the 16q region is not commercially available.

Discussion

The anterior segment findings in our patient are suggestive of pseudoaniridia in Axenfeld–Rieger syndrome, which carries a 50% risk of secondary glaucoma [1]. However, the unilateral foveal hypoplasia is highly unusual, and, to our knowledge, has never been reported in the context of an Axenfeld–Rieger diagnosis. Alternatively, these findings may suggest a diagnosis of unilateral foveal hypoplasia, optic nerve decussation defects and anterior segment dysgenesis (FHONDA) syndrome, although visual-evoked cortical potential testing has not been performed to assess decussation patterns.

Foveal hypoplasia is often associated with systemic diseases, most commonly albinism and aniridia. However, in 1987 Oliver *et al.* [2] described 15 patients with isolated bilateral foveal hypoplasia without other ocular or systemic findings. In 2004, Pal *et al.* [3] described a consan-

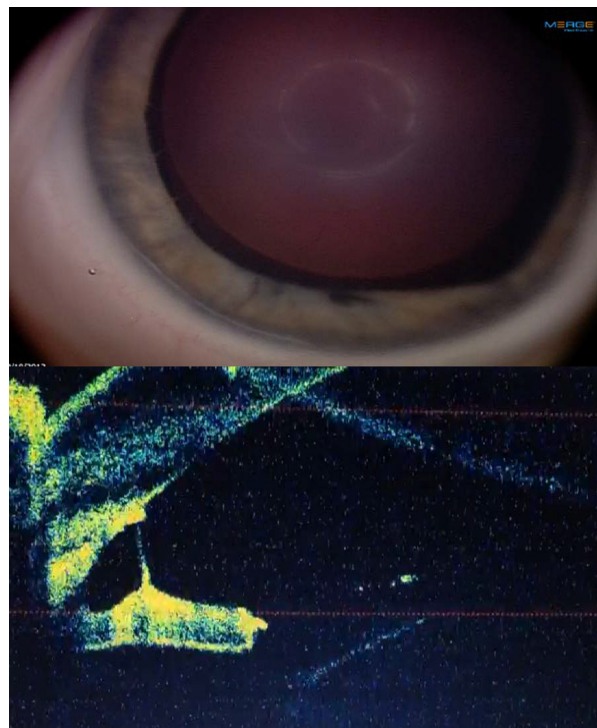


Figure 2. Gonioscopic photograph and anterior segment optical coherence tomography of the right eye demonstrating posterior embryotoxon with iris adhesions.

guineous Asian family with foveal hypoplasia and anterior segment dysgenesis. Linkage analysis excluded mutations in the *PAX6* gene, while 37 positional candidate genes were identified on chromosome 16q, suggesting a new syndrome of foveal hypoplasia and anterior segment dysgenesis. Two years later, van Genderen *et al.* [4] reported a case series of three darkly pigmented patients (two of whom were sisters) with foveal hypoplasia and optic nerve decussation defects without systemic findings, challenging the notion of chiasmal misrouting as a pathognomonic finding in albinism.

The researchers further speculated that these case series may represent spectrums of the FHONDA syndrome. Hence, the subjects were pooled for linkage analysis, which demonstrated a region of homozygosity on the 16q telomere, and the FHONDA syndrome gene was mapped to the 16q23.3–24.1 region containing 33 genes. Although the area of the FHONDA syndrome has been mapped, commercial testing for this genetic mutation is not currently available.

Conclusion

Our patient's presentation of foveal hypoplasia with anterior segment dysgenesis suggests the FHONDA syndrome,

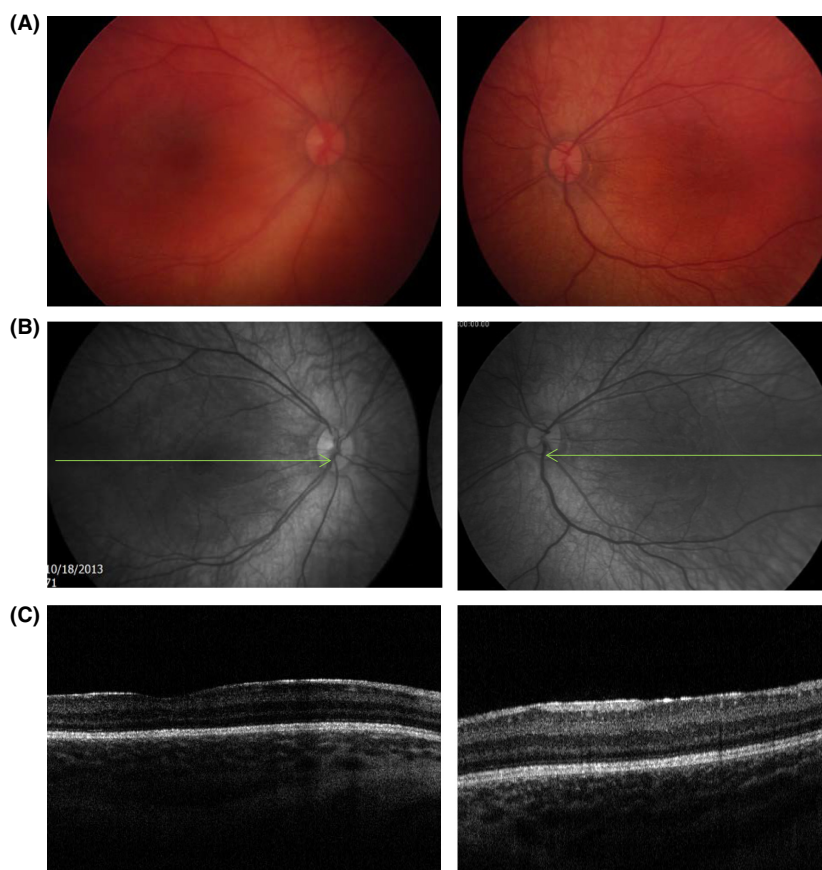


Figure 3. (A) Fundus photographs of the right and the left eyes showing intact and blunted foveal reflexes, respectively; (B) autofluorescence of the right and left eyes, (C) optical coherence tomography of the right and left eyes demonstrating foveal hypoplasia on the left.

although the unilateral foveal hypoplasia remains puzzling. It is conceivable that our patient may have a chimeric phenotype after acquiring a *de novo* mutation embryologically. Advances in molecular genetic techniques are broadening our understanding of anterior segment dysgenesis-spectrum disorders and will likely alter the diagnostic and therapeutic paradigm in these rare diseases.

Conflict of Interest

Authors have no proprietary interests in the materials described in the article and no conflicting relationship exists for any of the authors.

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