

Isolated Congenital Hereditary Cataract in a Dizygotic Twin: Prenatal Ultrasonographic Diagnosis

Kyung A Lee,¹ Mi-Hye Park,² Young Ju Kim,² and Sun Hee Chun²

¹Department of Obstetrics and Gynecology, University of Ulsan College of Medicine, Asan Medical Center, Seoul, Korea

²Department of Obstetrics and Gynecology, School of Medicine, Ewha Womans University, Seoul, Korea

Cataract, defined as opacity of the lens in one or both eyes, is a major cause of blindness throughout the world, and not uncommon, particularly in the elderly population. However, congenital cataracts are rare and occur with a frequency of 30 cases in 100,000 births. About one-third of the cases fall into the group inherited without systemic abnormality. Importantly, congenital cataracts produce deprivation amblyopia, refractive amblyopia, and retinal detachment, leading to lifelong visual impairment. Successful management is dependent on early diagnosis and referral for surgery when indicated. Here we present a case of hereditary bilateral cataracts in a dizygotic twin detected on prenatal ultrasound examinations and postnatally confirmed as congenital cataracts associated with posterior lenticonus.

■ **Keywords:** congenital cataract, heredity, posterior lenticonus, prenatal diagnosis, twin

A 23-year-old nulliparous woman, a recent immigrant from the Philippines who married a Korean, was referred to our center for close examinations on discordance of body weight between the first and second fetuses, which had developed in the late third trimester at 36+4-week gestation. On routine ultrasound examinations at a local clinic in the first and second trimesters, there were no specific findings. This twin conception was spontaneous. Her obstetric, medical, and familial history was not significant.

Targeted ultrasound examinations (Accuvix XQ, Medison, Seoul, Korea) showed a dichorionic and diamniotic twin pregnancy with definite discordance of estimated fetal weight between the first and second fetuses, weighing 2,500 g (male) and 1,700 g (female), respectively, at 36+4-week gestation. A complete sonolucent center of the lens within the hyperechoic ring on examination of the first fetus was lost in the eyes of the second fetus (Figures 1(a) and (b)). A coronal view of the fetal head revealed relatively echogenic contour of both the ocular lenses of the second fetus (Figure 1(b)). A transverse section of the fetal face at the level of the orbits showed ill-demarcated echogenicity around the junction between the hyaloid artery and the lens (Figures 1(c) and (d)).

These findings prompted a pedigree analysis of congenital hereditary cataracts. The father of the affected twin had contributory family history for cataracts. On a four-generation pedigree analysis, we found that the father of

the affected twin, his sister with two affected children, his mother, and his maternal grandfather also had early-onset cataracts (Figure 1(e)). The family was unaware of anyone being affected in generations previous to this generation. Maternal serologic tests for toxoplasmosis, rubella, cytomegalovirus, and herpes simplex (TORCH) were carried out and there was no evidence for congenital infection. The genetic sonogram of the second fetus showed no congenital anomalies associated with karyotypical abnormalities.

At 37 weeks, the first baby, male, weighing 2,640 g and the second baby, female, weighing 1,850 g, were born with cesarean section. Apgar scores at the first 1 min and 5 min were 10 points for both the twins. Placenta was dichorionic diamniotic, and weighed 688 g. Both twins were evaluated for congenital cataracts by an ophthalmologist after birth and results were consistent with prenatal findings. In addition, Magnetic Resonance Imaging (MRI) was performed to evaluate abnormal small mass-like lesions around the

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ADDRESS FOR CORRESPONDENCE: Dr Mi-Hye Park, MD, PhD, Department of Obstetrics and Gynecology, School of Medicine, Ewha Womans University, Seoul, Korea. E-mail: ewhapmh@ewha.ac.kr

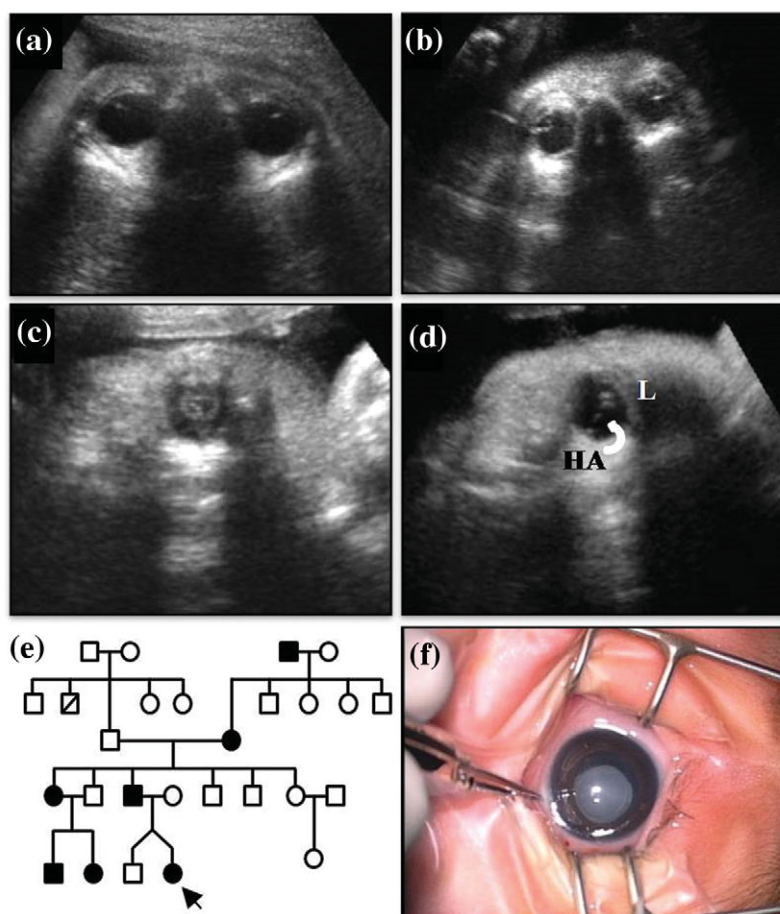


FIGURE 1

(Colour online) A coronal view of the fetal head. (a) Orbits of the first normal fetus (central part of the lens: completely sonolucent). (b) Highly echogenic areas of both the lenses of the second fetus. (c) Transabdominal ultrasound examinations at 36+4-week gestation show hyperechogenicity of the lens surface with irregularity of the left eye of the second fetus. (d) On a transverse image at the level of fetal orbits, an irregular thickness of the boundary between the hyaloid artery (HA, curved arrow)-lens (L) junction was noted. The hyaloid artery appeared as a delicate echogenic line connecting the posterior part of the orbit (the optic disc) and the posterior aspect of the lens capsule. (e) Four-generation pedigree. Circles represent females, and squares represent males. Solid symbols indicate affected individuals. The affected female twin is marked with an arrow. (f) Postnatal cataract at 2 months of age. Lamellar opacity immediately after birth was replaced by dense opacity of lens at the time of cataract surgery, which was urged by rapid progression of cataracts.

ocular disc on prenatal ultrasound examinations (no related scan was shown), but failed to find any other associated ocular abnormalities.

Cataracts of the affected twin showed lamellar opacity immediately after birth. In a short time, rapid progression of lens opacity urged an ophthalmologist to remove and replace the cloudy natural lens with a synthetic lens to restore lens' translucency at two months of age (Figure 1(f)). The major findings of the surgery were that opaque lenses with posterior capsule ruptured and crystalline materials spread into the vitreous body. The final diagnosis was cataracts complicated with posterior lenticonus.

Discussion

Our case demonstrated congenital hereditary cataracts in a dizygotic twin pregnancy with discrepancy in body weight

and affected status between two fetuses; one twin, the smaller female, was affected, and the other, the larger male, was unaffected. The principal finding was relatively echogenic areas around ocular lenses rather than advanced opacification of crystalline lens in previously reported cases of congenital hereditary cataracts with no other associated abnormalities (Cengiz & Baxi, 2001; Drysdale et al., 1997; Monteagudo et al., 1996). Congenital cataracts were mostly presented as homogeneous opacity of the lens and loss of hypochoic center of the lens within a hyperechoic ring of the normal fetal lens (Bronstein et al., 1991; Cengiz & Baxi, 2001; Drysdale et al., 1997; Graw, 2004; Monteagudo et al., 1996; Pedreira et al., 1999; Reches et al., 2007; Romain et al., 1999). However, there are various sonographic features of cataracts in echogenicity and affected location that hinders the diagnosis of congenital cataracts before birth (Monteagudo et al., 1996). In this case, a discrepancy of

the affected status between the twins made it possible to compare eyes with the relative thick echogenic contour and irregularly dense inner linear lesions in the affected twin with those in the unaffected twin.

The prenatal diagnosis of congenital cataracts was also facilitated by the identification of persistent hyaloid artery and increased echogenicity of the junction between the lens and the hyaloid artery on a transverse image of the fetal face at the level of the orbits. The hyaloid artery, a branch of the ophthalmic artery, is located within the optic stalk of the eye and extends from the optic disc through the vitreous humor to the lens (Bronshstein et al., 1991). The major role of the hyaloid artery is to supply nutrient to the developing fetal lens (Bronshstein et al., 1991). An important, unusual feature of the human eye is the spontaneous regression of the hyaloid artery during in utero conversion of the primary vitreous to the secondary adult vitreous (Bronshstein et al., 1991). Achiron et al. (2000) reported that timing for the hyaloid artery involution was beyond 29-week gestation. There have been no studies on the usefulness of scrutinizing scans of the hyaloid artery (Achiron et al., 2000). In our case, the hyaloid artery's disappearance at 36+4-week gestation was a good indicator in the diagnosis of congenital cataract, which was located posteriorly in the direction of the optic disc. Not all cataracts are progressive (Zetterstrom & Kugelberg, 2007). While anterior polar cataracts are usually static, cataracts associated with posterior lenticonus, lamellar and subcapsular typically progress, and for better visual prognosis early diagnosis and surgery is critical (Zetterstrom & Kugelberg, 2007).

A small mass near the optic disc present prenatally was in question. Postnatal MRI failed to reveal nature of the mass. The mass was persistently observed until two months of age. At the time of surgery, there was no tumor-like lesion around the optic disc. The mass was no more a problem after lensectomy and was considered as a fragment detached from the hydrated lens and then spontaneously absorbed into the vitreous humor. Ophthalmologic consultation on ocular abnormalities *in the antenatal period* by a pediatric ophthalmologist by a pediatric ophthalmologist gives parents more specific details of what can be expected and lessens the nervousness of parents about the unknown future of the affected fetus (Lehman, 2003).

Although congenital cataracts are usually associated with intrauterine infections (i.e., rubella), metabolic disorders, trauma, medication and chromosomal abnormalities, and congenital cataracts may also be inherited as an isolated ocular abnormality (Cengiz & Baxi, 2001; Drysdale et al., 1997; Monteagudo et al., 1996). Unfortunately, in this study, genetic analysis of distinct gene mutations was not performed. However, recent studies have identified genetic mutations of various encoding proteins leading to congenital inherited cataract (Santana & Waiswo, 2011; Sun et al., 2011). Santana et al. (2009) reported a novel mutation in the gamma-D crystallin (*CRYGD*) gene and an association between a

mutation in the alpha-A crystallin (*CRYAA*) gene and nuclear congenital cataract in Brazilian families. They (Santana et al., 2009) also suggested that genetic and molecular analyses be considered for prophylactic therapy, including medication of antioxidant, vitamin and carotenoid, diet therapy, and gene therapy.

In high-risk pregnancies with a family history of cataracts, thorough prenatal ultrasound examinations, pedigree and genetic analyses, and ophthalmologic consultation are warranted because timing of surgery is crucial to prevent visual loss.

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