Heterochromia Iridium with Open Angle Glaucoma of Left Eye: A Rare Clinical Case Report

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Abstract

In anatomy, heterochromia is a Greek word meaning a difference in coloration, usually of the iris but also of hair or skin. Heterochromia is a result of the relative excess or lack of melanin (a pigment). It may be inherited, or caused by genetic mosaicism, chimerism, disease, or injury. Heterochromia of the eye (heterochromia iridis or heterochromia iridum) is of three kinds. Incomplete heterochromia, one iris is of different color from the other. In sectoral heterochromia, part of one iris is a different color from its remainder and finally in “central heterochromia” there are spikes of different colors radiating from the pupil. A patient was noted to have two different eye colors and miosis in his left eye. He ultimately received a diagnosis of heterochromia iridium with underlying chronic open angle glaucoma. Determinants of eye color and possible clinical significance are discussed in our case.

Key Words: Heterochromia Iridium, Open Angle Glaucoma, Absolute Glaucoma, Glaucomatous Optic Atrophy, Hypertension, Diabetes Mellitus

Introduction

Eye color, specifically the color of the irises, is determined primarily by the concentration and distribution of melanin with both genetic and physiologic factors affecting determination and maintenance of iris color. The affected eye may be hyperpigmented (hyperchromic) or hypopigmented (hypochromic). In humans, usually, an excess of melanin indicates hyperplasia of the iris tissues, whereas a lack of melanin indicates hypoplasia. Heterochromia is classified primarily by onset: As either genetic or acquired. Although a distinction is frequently made between heterochromia that affects an eye completely or only partially (sectoral heterochromia), it is often classified as either genetic (due to mosaicism or congenital) or acquired, with mention as to whether the affected iris or portion of the iris is darker or lighter. The most cases of heterochromia are hereditary, caused by a disease or syndrome, or due to an injury. Sometimes one eye may change color following certain diseases or injuries. Although some patients have pigment changes involving only 1 segment of the iris (segmental heterochromia or heterochromia iridium) our patient’s entire iris was involved (complete heterochromia or heterochromia iridum). Heterochromia iridis is rare, affecting fewer than 200,000 people in the United States. Although uncommon in humans, it is common in some breeds of cats, dogs and horses.

Most human cases of heterochromia are sporadic and benign, and they occur without any detectable underlying abnormality. Congenital heterochromia occurs in a variety of syndromes, including Sturge–Weber syndrome, Waardenburg syndrome and Parry–Romberg syndrome. Acquired factors that can lead to heterochromia include ocular trauma, foreign body (ocular siderosis), melanocytic infiltration (diffuse iris nevus or melanoma), and impaired sympathetic tone leading to differential hypo- or hyper-pigmentation of 1 eye. Chronic cases of both open angle and closed angle glaucoma cause hypopigmentation of the iris. Latanoprost, a glaucoma treatment and a prostaglandin F2α analogue, which was not used by our patient, has also been associated with changing eye color in up to one-third of people who use the drug for 5 or more years.

Case Report

A 60-year-old man presented to the Medicine department in Sapthagiri Institute of Medical Sciences and Research Centre, Bengaluru, Karnataka, India with hypertension and diabetes mellitus. He presented with a history of intermittent severe headaches with vomiting. The patient had a past medical history of hypertension and diabetes mellitus for more years.

During the medical examination, we noted that he had 2 different colored eyes (heterochromia) and miosis of his left eye (Figure 1). The patient reported that his eyes had been different colors since many years and he could not remember the exact time interval. He did not give any family history of glaucoma or long-term use of topical steroids. After a thorough medical evaluation, his diabetic status was stabilized with both oral anti-diabetic medications, including glimepiride.
in a dose of 4 mg/day with metformin 2 g/day, the patient was also started on analogue insulin levemir at night. The above measures ensured that the patient’s fasting and post-prandial sugars were under control with a hemoglobin A1c between 6.5% and 7%. The patient was then referred to the ophthalmology department for further detailed evaluation of heterochromia.

There it was elicited that the history of heterochromia iridium was from childhood. The patient had undergone right eye cataract operation 2 years back and was undergoing treatment for Primary open angle glaucoma with alpha 2 agonist and beta blocker (Brimocheck T eye drops) since 6 years (Figure 2). On examination, heterochromia was a unilateral entity defined in the category of complete heterochromia. The best corrected visual acuity at presentation was PL+ in left eye (affected eye) with no pin hole improvement and 6/60 improving to 6/24 in the right eye. The anterior segment of the left eye including eyelids, cornea, anterior chamber was normal. There was no sign of nevus of Ota in conjunctiva associating with open angle glaucoma. Iris of affected eye (left) was pure white in color with loss of whole details in iris anatomy and pupil was irregular in shape and miotic.

Color vision was impaired in right eye a bit. At initial presentation, a mild relative afferent pupillary defect was noticed in the right eye and rest of anterior segment was normal with pseudophakia. Slit lamp examination with the 90 D lens to see posterior segment confirmed the presence of vitreous haze making media hazy. Optic disc of the left eye revealed glaucomatous optic atrophy and the pupil of the left eye was dilating very slightly with the mydriatic and cycloplegic drops (Figure 3).

Rest of the fundus was normal. Central field of the patient revealed an upper arcuate scotoma (right eye) and left eye visual field was not appreciated by the patient due to gross diminution of the vision.

A gonioscopy of both eyes was done the left eye showed Shaffer’s Grade IV closure of the angle and the right eye also revealed Grade IV closure of the angle.

A rare clinical diagnosis of chronic open angle glaucoma of both eyes with left eyes going for absolute stage and heterochromia Iridium left eye was made for our case, following which treatment was advocated consisting of brimonidine with timolol BD, and multivitamin tablet for optic nerve.

Discussion

Heterochromia iridum is innate or acquired ocular condition. Eye color is determined by the concentration and distribution of melanin in the iris, with both genetic and physiologic factors affecting determination and maintenance of iris color. Disruption of the sympathetic stimulation of the melanocytes in the superficial stroma of the iris (especially as a child) can lead to heterochromia. Heterochromia of the eye (heterochromia iridis or heterochromia iridum) is of three kinds. Incomplete heterochromia, one iris is of different color from the other. In sectoral heterochromia, part of one iris is a different color from its remainder and finally in “central
heterochromia” there are spikes of different colors radiating from the pupil.

**Etiology**

It can be due various congenital genetic causes and also acquired too.

**Congenital Heterochromia**

Heterochromia that is congenital is usually inherited as an autosomal dominant.

**Sectoral Heterochromia**

When there is sectoral heterochromia, the iris contains two completely different colors in the same area. Sectoral heterochromia looks like an irregular spot that is a different color than the eye color and does not form a complete ring around the pupil like central heterochromia. Sectoral heterochromia is extremely rare in humans, only about 1% of the population has it.

**Causes for it are:**

*Abnormal iris darker*

1. Lisch nodules – Iris hamartomas seen in neurofibromatosis
2. Ocular melanosis – A condition characterized by increased pigmentation of the uvea oculodermal melanocytosis (nevus of Ota)
3. Pigment dispersion syndrome – A condition characterized by loss of pigmentation from the posterior iris surface, which is disseminated intraocularly and deposited on various intraocular structures, including the anterior surface of the iris
4. Strüge–Weber syndrome – A syndrome characterized by a port wine stain nevus in the distribution of the trigeminal nerve, ipsilateral leptomeningeal angiomata with intracranial calcification and neurologic signs, and angiomata of the choroid, often with secondary buphthalmos.

*Abnormal iris lighter*

1. Simple heterochromia – A rare condition characterized by the absence of other ocular or systemic problems. The lighter eye is typically regarded as the affected eye as it usually shows iris hypoplasia. It may affect an iris completely or only partially
2. Congenital Horner’s syndrome sometimes inherited, although usually acquired
3. Waardenburg syndrome – A syndrome in which heterochromia is expressed as a bilateral iris hypochromia in some cases. A Japanese review of 11 albino children with the disorder found that all had sectoral/partial heterochromia
4. Piebaldism – Similar to Waardenburg’s syndrome, a rare disorder of melanocyte development characterized by a white forelock and multiple symmetrical hypopigmented or depigmented macules
5. Hirschprung’s disease – A bowel disorder associated with heterochromia in the form of a sector hypochromia. The affected sectors have shown to have reduced numbers of melanocytes and decreased stromal pigmentation
6. Incontinentia pigmenti

**Acquired Heterochromia**

Heterochromia that is acquired is usually due to injury, inflammation, and the use of certain eye drops that damages the iris or tumors.

**Abnormal Iris Darker**

1. Deposition of material
   - Siderosis – Iron deposition within ocular tissues due to a penetrating injury
   - Hemosiderosis – Long standing hyphema (blood in the anterior chamber) following blunt trauma to the eye.
2. Certain eyedrops – Prostaglandin Analogues (latanoprost, isopropyl unoprostone, travoprost, and bimatoprost) are used topically to lower intraocular pressure in glaucoma patients. A concentric heterochromia has developed in some patients applying these drugs
3. Neoplasm – Nevi and melanomatous tumors
4. Iridocorneal endothelium syndrome
5. Iris ectropion syndrome.

**Abnormal Iris Lighter**

1. Glaucoma and cataract
2. Fuchs heterochronic iridocyclitis – A condition characterized by a low grade, asymptomatic uveitis in which the iris in the affected eye becomes hypochromic and has a washed-out, somewhat moth eaten appearance
3. Acquired Horner’s syndrome – usually acquired, as in neuroblastoma, although sometimes inherited. Acquired heterochromia can occur in adults in rare cases as a result of acquired Horner syndrome. In contrast to patients with acquired Horner syndrome, patients with congenital Horner syndrome, such as our patient, often lack several features of the syndrome
4. Neoplasm – Melanomas can also be very lightly pigmented, and a lighter colored iris may be a rare manifestation of metastatic disease to the eye
5. Posner–Schlossman syndrome, or glaucomatocyclitic crisis, may cause a lighter iris with repeated attacks
6. Heterochromia has also been observed in those with Duane syndrome

Central heterochromia is an eye condition where there are two colors in the same iris; the central (pupillary) zone of the iris is a different color than the mid-periphery.
Conclusion

We have discussed about a case of congenital heterochromia iridium with the miotic pupil with open angle glaucoma both eyes, left eye going for the absolute stage. Patient being a known hypertensive and diabetic since 8 years and is on treatment for both open angle glaucoma and his systemic conditions for which congenital Horner’s syndrome was ruled out.

End Note

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Conflict of Interest

None declared.

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