ejpmr, 2025, 12(2), 220-222

SJIF Impact Factor 7.065

EUROPEAN JOURNAL OF PHARMACEUTICAL AND MEDICAL RESEARCH

www.ejpmr.com

Case Study

ISSN 2394-3211

EJPMR

AXENFELD RIEGER SYNDROME: A RARE CONGENITAL ANOMALY

Dr. Sejal Katoch[1], Dr. Mayur Garkar[2], Dr. Gaurav Sharma[3] and Dr. Bijoyata Reang[4]*

[1,2,4]Junior Resident, Department of Ophthalmology Dr RPGMC Tanda.
[3]Proff and Head, Department of Ophthalmology Dr RPGMC Tanda.

***Corresponding Author: Dr. Bijoyata Reang**

Junior Resident, Department of Ophthalmology Dr RPGMC Tanda.

Article Received on 02/12/2024 **Article Revised on 23/12/2024** **Article Accepted on 12/01/2025**

INTRODUCTION

The story of Axenfeld-Rieger syndrome (ARS) was first reported in 1920 when German ophthalmologist Dr. Theodor Axenfeld described prominent and displaced Schwalbe's line (posterior embryotoxon) along with adhesions between the iris and corneal endothelium, a condition he termed Axenfeld anomaly.[1] In 1935, Dr. Albert Rieger expanded the understanding of this disorder by identifying more severe ocular features, including iris abnormalities such as hypoplasia, corectopia (pupil displacement), and polycoria (multiple pupils), which he named Rieger anomaly. Systemic manifestations such as dental anomalies, facial bone abnormalities, umbilical defects, hypospadias, and pituitary dysfunction, collectively are referred to as Rieger syndrome. Over time, the overlapping features of Axenfeld anomaly and Rieger anomaly were recognized as part of a broader spectrum, leading to the adoption of the term "Axenfeld-Rieger syndrome" to encompass both ocular and systemic manifestations.[2]

ARS is a rare disorder, occurring in approximately 1 in 200,000 live births. It is most commonly inherited in an autosomal dominant manner, though sporadic cases can also occur.[3] Genetic mutations associated with ARS include PITX2 (chromosome 4q25), FOXC1 (chromosome 6p25), PAX6 (chromosome 11p13), FOXO1A (chromosome 13q14), and CYP1B1 (chromosome 2p22.2).

Glaucoma, a significant complication of ARS, occurs in about 50% of cases. This is attributed to the developmental arrest of neural crest cells during gestation, leading to incomplete development of the trabecular meshwork or Schlemm's canal in the anterior chamber angle.[4] Combination of various medical management and surgical techniques are required to manage the complications.

CASE REPORT

A 10-year-old female presented to the outpatient department with complaints of diminished near vision at night, which had significantly worsened over the past two months. There was no history of trauma, ocular pain, floaters, or previous ocular infections. The patient reported reduced vision since the age of four, for which she had been prescribed spectacles. She was advised to consult an ophthalmologist for abnormal pupil findings at that time but did not follow up. The patient was not on any systemic or topical medications.

The patient's father is known case of glaucoma, having undergone bilateral trabeculectomy is currently on medication for glaucoma management.

General Examination: The patient was vitally stable with no systemic complaints. Facial abnormalities included frontal bossing, hypertelorism, Down-slanting palpebral fissures, depressed nasal bridge, maxillary hypoplasia, hypodontia, mandibular prognathism, proptosis.

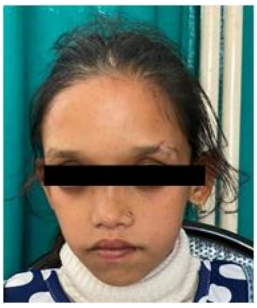

Fig. 1: Facial features showing frontal bossing, Down-slanting palpebral fissures, depressed nasal bridge, maxillary hypoplasia, mandibular prognathism.

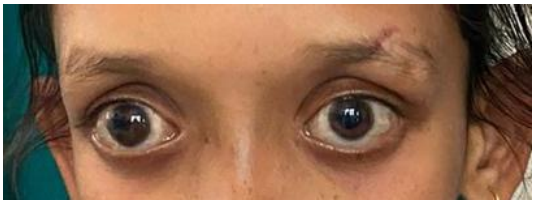

Fig. 2: Ocular findings showing hypertelorism and proptosis.

Ocular Examination: In the right eye, BCVA was 6/60. Pupil was reacting normally. On slit-lamp examination there was corectopia (pupil displaced temporo-nasally) and posterior embryotoxon Intra ocular pressure was 28mmHG. The patient was started on IOP lowering drugs for the same.

Fundus examination revealed temporal pallor of the optic disc with increased cup-to-disc ratio with tessellations.

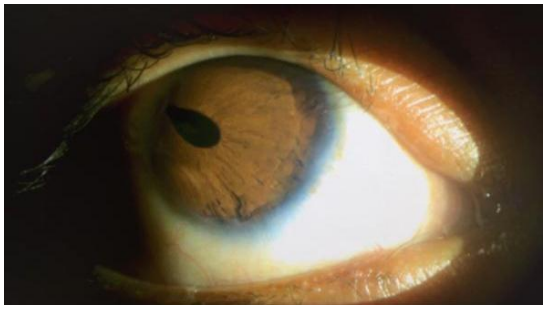

Fig. 3: Right eye showing corectopia with posterior embryotoxon with shallow anterior chamber.

On examining the left eye BCVA was 6/24. Pupil was reacting normal to light.

On slit-lamp examination there were Bitot spots temporal to the cornea along with posterior embryotoxon. IOP was normal.

Fundus examination revealed increased cup-to-disc ratio with tessellation.

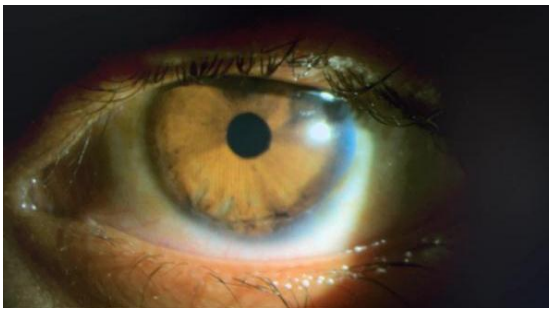

Fig. 4: Left eye showing posterior embryotoxon.

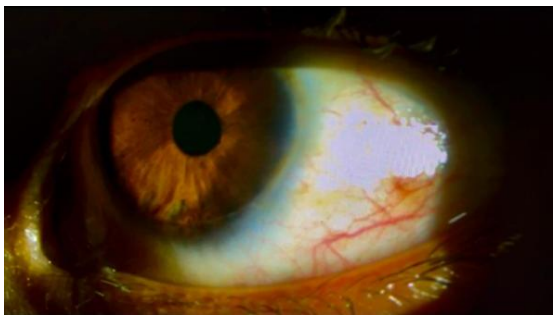

Fig. 5: Bitot's spot in temporal side of left eye.

The patient was diagnosed with axenfield rigor syndrome.

A pediatric consultation was done for Vit A deficiency and she was kept on routine followup for management ocular complains.

DISCUSSION

ARS is an autosomal dominant. ARS type 1 is caused by a heterozygous mutation in the PITX2 gene located on chromosome 4q25. ARS type 2 is linked to chromosome 13q14. ARS type 3 chromosome 6p25.3, specifically involving the FOXC1 gene.[5] The prevalence of ARS is estimated to be around 1 in 50,000 to 100,000 to 1 in 200,000 live births.[6] During late gestation, the primordial endothelium that covers the cornea is expected to undergo resorption; disruption in this process may result in the development of posterior embryotoxon and abnormal insertion of the iris, causing pupillary changes such as pseudo-polycoria or ectropion uveae.[7] Posterior embryotoxon is incidentally found in approximately 8% to 15% of normal individuals. This finding often occurs without any ocular or systemic abnormalities, including glaucoma.[8] The extent of iris defects and iris stands in the angle do not correlate well with the severity of glaucoma. However, the high iris insertion appears to be more pronounced in eyes with glaucoma.[4] Facial features include mild craniofacial dysmorphism, telecanthus, hypertelorism, maxillary hypoplasia, and broad flat nasal bridge. Other systemic associations include hypospadias, redundant periumbilical skin, umbilical hernia, hydrocephalus, deafness, anal stenosis, renal anomalies, cardiac (valvular) abnormalities, arachnoid cyst,[9] pituitary (empty Sella) abnormalities[10] endocrine abnormalities (short stature, growth retardation), and congenital hip dislocation.

Approximately half of the patients will develop glaucoma, which may eventually require surgical procedures such as trabeculectomy and trabeculotomy.[11]

Patients with ARS who require glaucoma surgery typically undergo multiple surgeries, with an average of approximately 2.2 surgeries performed on each eye.[12] Late diagnosis and delayed management of glaucoma can cause blindness, phthisis, or painful blind eye.[13]

REFERENCES

1. Axenfeld TH. Embryotoxon cornea posterius. Klin Monatsbl Augenheilkd, 1920; 65: 381-382.
2. Shields MB. Axenfeld-Rieger syndrome: a theory of mechanism and distinctions from the iridocorneal endothelial syndrome. Trans Am Ophthalmol Soc., 1983; 81: 736-84.
3. Alward WLM. Axenfeld-Rieger syndrome in the age of molecular genetics. Am J Ophthalmol., 2000; 130(1): 107-115.
4. Shields MB. Axenfeld-Rieger syndrome. A theory of mechanism and distinctions from the iridocorneal endothelial syndrome. Trans Am Ophthalmol Soc., 1983; 81: 229-247.

5. Mears AJ, Jordan T, Mirzayans F, Dubois S. Mutations of the forkhead/winged-helix gene, FKHL7, in patients with Axenfeld-Rieger anomaly. Am J Hum Genet., 1998; 63(5): 1316-1328.
6. Seifi M, Walter MA. Axenfeld-Rieger syndrome. Clin Genet., 2018; 93(6): 1123-1130.
7. Idrees F, Vaideanu D, Fraser SG, Sowden JC, Khaw PT. A review of anterior segment dysgeneses. Surv Ophthalmol., 2006; 51(3): 213-231.
8. Ho DK, Levin AV, Anninger WV, Piccoli DA, Eagle RC. Anterior Chamber Pathology in Alagille Syndrome. Ocul Oncol Pathol., 2016; 2(4): 270-275.
9. Reis LM, Maheshwari M, Capasso J, Atilla H. Axenfeld-Rieger syndrome: more than meets the eye. J Med Genet., 2023; 60(4): 368-379.
10. Shields MB, Buckley E, Klintworth GK, Thresher R. Axenfeld-Rieger syndrome. A spectrum of developmental disorders. Surv Ophthalmol., 1985; 29(6): 387-409.
11. Mandal AK, Pehere N. Early-onset glaucoma in Axenfeld-Rieger anomaly: long-term surgical results and visual outcome. Eye (Lond)., 2016; 30(7): 936-942.
12. de Vos IJ, Stegmann AP, Webers CA, Stumpel CT. The 6p25 deletion syndrome: An update on a rare neurocristopathy. Ophthalmic Genet., 2017; 38(2): 101-107.
13. Tripathy K, Chawla R, Temkar S, Sagar P. Phthisis Bulbi-a Clinicopathological Perspective. Semin Ophthalmol., 2018; 33(6): 788-803.