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Case Report

Ophthalmology Section

Congenital Bilateral Aniridia with Ectopia Lentis: A Case Report

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ABSTRACT

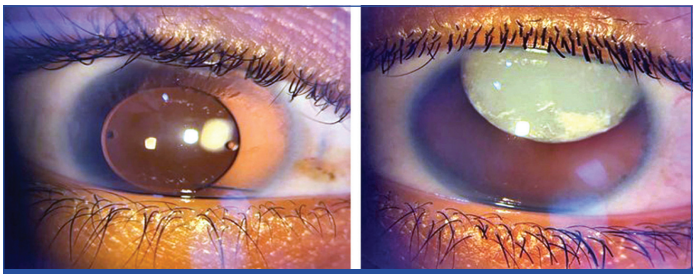
Aniridia is characterised by variable degrees of hypoplastic iris or complete absence of iris tissue and is a rare congenital disorder. Mutation in the PAX6 gene is mostly responsible for aniridia. It is associated with various ocular manifestations involving both anterior and posterior segments of the eye. A 14-year-old male patient, presented to the ophthalmology outpatient department with complaints of a gradual decrease in vision in his left eye. Upon examination, photophobia and bilateral aniridia associated with nystagmus were present in both eyes, along with a sclerally fixated intraocular lens in the right eye and a superiorly subluxated mature cataract in the left eye. Intraocular pressure was elevated in the left eye. Gonioscopy revealed rudimentary iris tissue in both eyes. Upon systemic examination, the patient was diagnosed with hydro-ureteronephrosis of the right-side, which was asymptomatic, and borderline intellectual functioning. This case highlights the unique features of WAGR syndrome (Wilm's tumour, Aniridia, Genito-urinary anomalies, Range of developmental delay) presenting with aniridia and genito-urinary conditions, along with borderline intellectual functioning without the presentation of Wilm's tumour. Cataract extraction by lens aspiration with scleral fixation of intraocular lens implantation was performed in the left eye. This study adds to the broader knowledge of the disease entity's spectrum, exploring the diagnostic challenges associated with the case and potentially influencing diagnostic criteria. It may guide future studies exploring the diverse clinical presentations of WAGR syndrome.

Keywords: Cataract, Glaucoma, Genetics, Syndrome

CASE REPORT

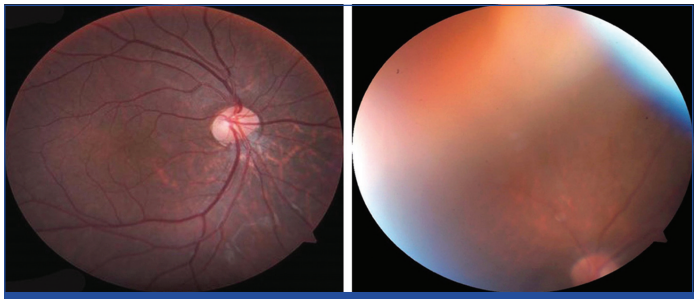
A 14-year-old male patient presented to the ophthalmology outpatient department with a gradually progressive and painless decrease in vision in his left eye since childhood. It was associated with intolerance to light and was impacting daily activities and school performance. He had a history of cataract extraction in his right eye five years ago. The patient denied any history of trauma and had intermittent episodes of acute abdominal pain. Moreover, the patient did not provide any significant family history.

Based on clinical examination, the patient's right eye had a best-corrected visual acuity of 6/24 on Snellen's chart, while the left eye had hand movements with perception of light present and projection of rays accurate in all quadrants. The patient had nystagmus in both eyes and was photophobic. Slit lamp examination showed a sclerally fixated intraocular lens in the right eye [Table/Fig-1] and hypermature cataract with a superiorly subluxated lens in the left eye [Table/Fig-2]. The intraocular pressure was measured with a Goldmann applanation tonometer, and it was 22 mmHg in the right eye and 36 mmHg in the left eye at 10 am. Gonioscopic examination using a Zeiss 4-mirror Gonioscope confirmed the presence of a rudimentary iris stump in both eyes.

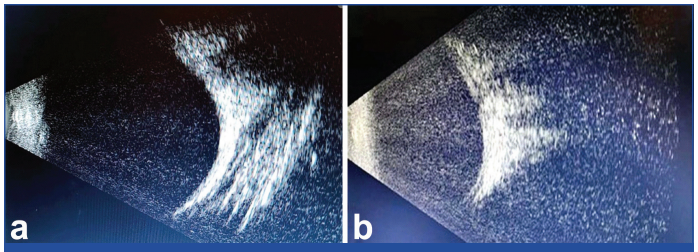


[Table/Fig-1]: Slit lamp picture showing Aniridia with a scleral fixated intraocular lens in right eye. **[Table/Fig-2]:** Slit lamp picture showing Aniridia with superiorly subluxated mature cataractous lens in the left eye. (Images from left to right)

Based on the fundus examination using an Indirect ophthalmoscope, it was found that the right eye had a normal fundus, but the foveal reflex could not be appreciated [Table/Fig-3]. On the other hand, the left eye had a normal disc, but the rest of the details could not be visualised due to the presence of cataract [Table/Fig-4]. However, a B-scan was performed on the left eye, and the results were within normal limits [Table/Fig-5].



[Table/Fig-3]: Fundus photo of the right eye showing normal fundus with no appreciation of foveal reflex. **[Table/Fig-4]:** Fundus photo of the left eye showing hazy media with disc seen hazily due to cataract. (Images from left to right)

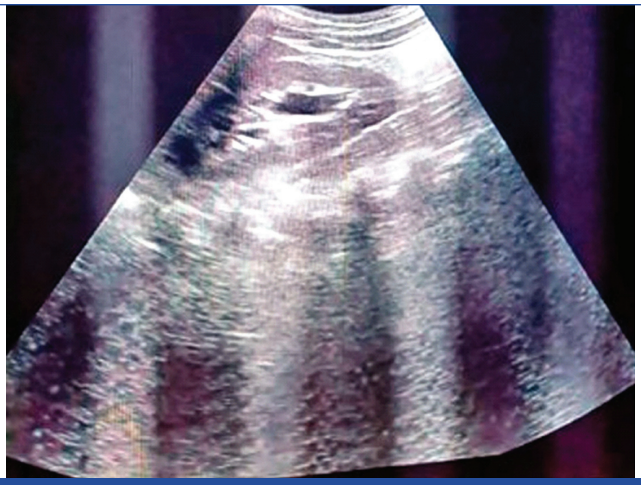


[Table/Fig-5]: a,b) B scan ultrasonography in the right eye and left eye respectively with no abnormality detected.

Considering the history of episodic abdominal pain, Ultrasonography of the abdomen and pelvis was advised, which showed the presence of right-sided Hydrourethronephrosis [Table/Fig-6]. Intelligence quotient testing was also performed to rule out syndromic associations with aniridia, which showed borderline intellectual functioning.

The patient was started on Tablet (Tab.) Acetazolamide 125 mg once daily, along with eye drop Brimonidine 0.2% with Timolol 0.5% twice daily for four days.

A provisional diagnosis of atypical WAGR syndrome was made.



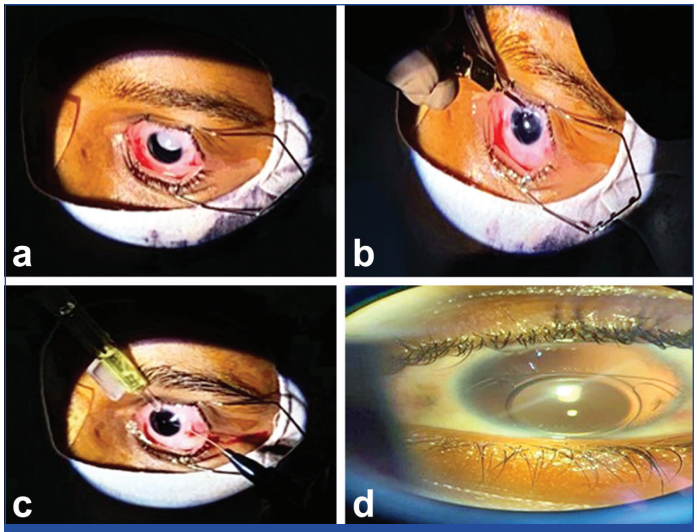
[Table/Fig-6]: Ultrasonography of the abdomen and pelvis showing right-sided hydrourethronephrosis.

Further intervention for cataract extraction and intraocular lens implantation was performed after obtaining written informed consent from the patient and the relatives, as well as ensuring fitness for surgery under general anaesthesia.

The surgical site was sterilised before the eyelids were retracted with a lid speculum [Table/Fig-7a]. Next, two partial-thickness scleral flaps were created at 3 and 9 o'clock, 180 degrees apart from each other. Two Sclerotomies were created under the scleral flaps, and intrascleral tunnels were made on either side, parallel to the limbus, using a crescent blade. After cauterising both sides, a 2.8 mm clear corneal incision was made, and nucleus aspiration was performed using a 23G Simcoe cannula [Table/Fig-7b]. Following this, an anterior vitrectomy was done using a 23G vitrectomy cutter. A scleral tuck foldable intraocular lens was then inserted through the corneal incision with the help of an injector [Table/Fig-7c]. Using an intraocular end-gripping forceps through the sclerotomy on one side, the leading haptic was exteriorised from the scleral tunnel, then an intraocular forceps was introduced through the opposite sclerotomy, and the trailing haptic was pulled out through it. The haptics on each side were then inserted into the scleral tunnels on both sides and tucked intrasclerally.

Challenges encountered during surgery were an unstable capsular bag during nucleus aspiration and the presence of a thin sclera during scleral flaps.

The post-operative visual acuity on day one was 6/60 with lid oedema, conjunctival congestion, sub-conjunctival haemorrhage at 3 and 9, a superior corneal incision, 2+ cells in the anterior chamber, and the intraocular lens in-situ. Fundus examination was normal, with the foveal reflex unable to be appreciated in the left eye. An increase in intraocular pressure was observed immediately after the surgery, with a value of 46 mmHg. Intravenous Mannitol 20% 100 mL was administered to the patient to control the pressure, followed by eye drop Brimonidine 0.2% with Timolol 0.5% twice daily. The patient was also prescribed oral antibiotics such as T. Ciprofloxacin 500 mg twice a day, T. Pantoprazole 40 mg once daily, and T. Ibuprofen 400 mg once daily for three days, along with topical antibiotics such as eye drop Moxifloxacin 0.5% with Prednisolone 1% eight times, eye drop Nepafenac 0.1% thrice daily, and eye drop Homatropine 2% twice daily for 15 days. The patient was instructed to return for a follow-up for an intraocular pressure check-up and was continued on eye drop Brimonidine 0.2% with Timolol 0.5% twice daily. During the first follow-up after 15 days, the intraocular pressure was 22 mmHg. Sub-conjunctival haemorrhage had reduced, with anterior chamber 1+ cells and the IOL in-situ. The patient was advised to taper eye drop Prednisolone and to discontinue eye drop Homatropine and eye drop Nepafenac. During the one-month follow-up, the patient's best-corrected visual acuity was 6/24, and the intraocular pressure was under control [Table/Fig-7d].



[Table/Fig-7]: a) Showing superiorly; b) Showing aspiration of cataractous lens with 23G Simcoe cannula; c) Showing intraocular foldable lens implantation; d) Showing one month post-operative slit lamp image.

The patient was advised to undergo regular eye check-ups for monitoring and maintaining intraocular pressure.

DISCUSSION

Aniridia is a rare disease [1], with an incidence of 1.8 per 100,000 births [2]. It is usually bilateral and has both panocular [3] and systemic effects [4]. In the majority of cases, aniridia occurs in an autosomal dominant pattern without any systemic associations due to mutations in the PAX6 gene [5]. A few cases can also present as sporadic forms with a systemic associations, such as WAGR syndrome, caused by the deletion of the PAX6 gene and WT1 gene [4]. The autosomal recessive pattern is seen in 1-3% of cases and is associated with systemic manifestations such as cerebellar ataxia along with intellectual disability, known as Gillespie syndrome [5].

It is important to note that individuals with WAGR syndrome typically have two or more of the following conditions: Wilm's tumour, Aniridia, Genito-urinary abnormality, and a range of developmental delays. The phenotype is highly variable [6]. However, it is also possible for someone to have WAGR syndrome without having all of these conditions. A case was reported where a boy was born with aniridia, cryptorchidism, and facial dysmorphism, and he developed Wilm's tumour one year after birth [7]. In contrast, in this case, there was aniridia at birth with no genital and facial abnormalities.

An atypical case of WAGR syndrome was reported where the patient had microphthalmos with microcornea and an absent anterior chamber, with un-descended testes, bilateral Wilm's tumour, and mental retardation noted [8]. In this case, there was aniridia with ectopia lentis, showing the diversity of presentations of WAGR syndrome. A newborn baby presented with facial dysmorphism, bilateral ptosis, down-slanted palpebral fissures, an epicanthal fold, cataract in the left eye, bilateral nystagmus with foveal hypoplasia, a depressed nasal bridge, a high palate, a post-operative scar of Wilm's tumour, and bilateral post-axial polydactyly scars on the feet [9], whereas in this case, there was no presence of ptosis, epicanthal folds, or facial dysmorphism seen. There was no polydactyly in this case.

Wilm's tumour occurs in about half of the cases of WAGR syndrome. The tumour usually develops between 1 to 3 years of age and is mostly detected by six years of age [10]. In rare cases, it can occur late. In this case, the patient was not diagnosed with Wilm's tumour nor had any signs of a tumour. Monitoring of signs can be done by periodic ultrasound and watching for symptoms.

In this case, the patient had congenital aniridia with a subluxated cataractous lens with raised intraocular pressure and foveal hypoplasia presenting as nystagmus, and the presence of hydro-ureteronephrosis unilaterally with borderline intellectual functioning.

There are two theories for raised intraocular pressure in aniridia. It is observed that in aniridia, the angle of the anterior chamber is open in the early years of life. However, as an individual approaches their second decade, they may experience angle closure due to the rotation of the rudimentary iris stump covering the trabecular meshwork with remnant iris tissue or due to the formation of peripheral anterior synechia, which can increase intraocular pressure [4]. In this case, aniridia is associated with raised intraocular pressure with the presence of an iris stump seen on gonioscopic examination.

Foveal hypoplasia presenting with nystagmus can be due to phototoxicity as a result of iris maldevelopment or it can be secondary to a PAX6 mutation and is roughly present in 10% of patients with aniridia [11]. In this case, there is the presence of foveal hypoplasia with nystagmus. The range of intellectual disability differs from person to person, ranging from mild to severe mental disability, and a few children may have normal intelligence [12]. In the above case, the patient is having borderline intellectual functioning assessed using Malin's intelligence scale for Indian children.

It is important to note that WAGR syndrome has been linked to multiple genito-urinary abnormalities such as cryptorchidism, ambiguous genitalia, streak ovaries, ureteric abnormalities, urethral strictures, duplicate ureters, horseshoe kidney, renal cysts, unilateral renal agenesis, and hypoplastic kidney [13]. Due to this, it is recommended to undergo a thorough evaluation of the genito-urinary anatomy. In this case, there is asymptomatic right-sided hydro-ureteronephrosis.

Recent advances in aniridia correction with intraocular lens, such as Morcher aniridia ring segments, provide a pseudo-iris but do not correct aphakia [14]. The Ophtech model 311 is a device used to correct both aniridia and aphakia [15]. A special PMMA aniridia lens may also be used to correct both aphakia (post-operative) and aniridia. This device is designed as a 5.5 mm IOL optic that is clear, with an outer band containing pigmented PMMA where the optics act as a refracting surface and the outer band of pigmented surface acts as a pseudo-iris. The haptics have holes that allow for scleral fixation of the lens [16]. Posterior chamber aniridia implants produce satisfactory results and are complication-free [17].

CONCLUSION(S)

The severity of the disease can vary from person to person. It is important to undergo visual rehabilitation at an early stage to improve the quality of life. A systemic evaluation should be conducted to rule out any systemic associations with the disease. Genetic counseling is crucial as it raises awareness about the condition and its implications. Frequent eye check-ups are recommended to screen for glaucoma, and visual field tests should be conducted at regular intervals to prevent glaucoma.

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