CASE REPORT

Anisometropic amblyopia in a case of type 2 Waardenburg syndrome

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SUMMARY

This study presents a case of an 8-year-old boy with iris heterochromia and anisometropic amblyopia who was diagnosed with Waardenburg syndrome (WS) type 2. An ophthalmic examination revealed iris heterochromia and anisometropic amblyopia in our patient. In the systemic examination, a white forelock and vitiligo on the arms and body were observed and neurosensory hearing loss was revealed, for which the patient used hearing aids. Identification and typing of patients with WS is crucial to address neurosensory hearing loss, glaucoma and fundus changes. While it might be challenging to communicate with a patient with speech and hearing problems, visual acuity should be examined carefully and probable amblyopia should be identified. Anterior segment changes and signs of glaucoma should also be evaluated in detail.

BACKGROUND

Waardenburg syndrome (WS) is a rare disease with an autosomal dominant trait characterised by pigmentary changes of skin, hair and eyes, neurosensory hearing loss, and craniofacial abnormalities.[1] The incidence of this syndrome in different societies varies between 1/20 000 and 1/42 000.[2 3]

WS was first defined by Waardenburg in 1951; changes in iris pigmentation (segmental or total hypopigmentation), neurosensory hearing loss, hair hypopigmentation (white forelock, body hair bleaching), dystopia canthorum (lateral displacement of the inner canthus) and history of a first-degree relative with WS have been considered the main diagnostic criteria.[4 5] The minor diagnostic criteria are congenital leukoderma, synophrys (extending medial eyebrows), wide nasal bridge, hypoplasia of the nasal wings and greying of the scalp hair before the age of 30.

The presence of two main diagnostic criteria or the presence of one main diagnostic criterion and two minor criteria are required for a diagnosis of WS. Ocular signs have also been reported, such as hypopigmentation or hyperpigmentation areas in the fundus, open angle glaucoma and branch retinal vein occlusions.[6]

Amblyopia is the presence of two or more lines of difference between the visual acuity of the eyes, without any organic or visual pathway pathology. Treatment has been found to be effective in the first 12 years of life.

WS is a condition wherein speech and hearing problems are common and prominent. As such, performing a detailed eye examination might be challenging due to the communication difficulties, and amblyopia might be overlooked if such an examination is not performed in patients with this syndrome.

To the best of our knowledge, an association between WS and anisometropic amblyopia has not been made. With this case report, our goal was to draw attention to this association and to the necessity of performing a detailed ophthalmic examination of patients with this syndrome.

CASE PRESENTATION

An 8-year-old male patient presented with low vision. His best corrected visual acuity (BCVA) was 1.0 with +5.0 dioptre (D) in the right eye and 0.3 with +6.5 D in the left eye. Slit-lamp examination revealed wide iris hypopigmentation in the right eye, just sparing a section between 6 and 10 o'clock and total iris hypopigmentation (Waardenburg blue eyes) in the left eye. Intraocular pressure (IOP), measured with an applanation tonometer, was normal. Dilated fundus examination was unremarkable in both the eyes. Eye movements were free in all directions. Anisometropic amblyopia was present in the left eye. We did not observe dystopia canthorum in our patient. On inspection, the patient had a white forelock and patchy hypopigmentation of body hair (figure 1). Neurosensorial hearing defect was discovered through hearing tests. A laboratory workup, including complete blood count, blood chemistry and erythrocyte sedimentation rate was performed, but the results were non-specific. There was no family history of WS among the first-degree relatives. Temporal bone findings were normal according to CT, and MRI did not reveal any cranial abnormality. With these findings, the patient was diagnosed with WS type 2.

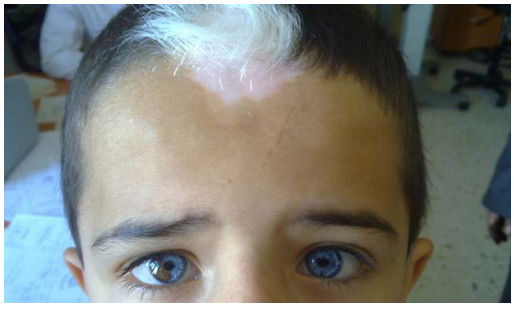

Figure 1 Wide iris hypopigmentation in the right eye, total iris hypopigmentation (Waardenburg blue eyes) in the left eye and white forelock.

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OUTCOME AND FOLLOW-UP

Occlusion therapy was applied for the anisometropic amblyopia in the left eye, and the patient's BCVA improved to 0.4 at the 2-month follow-up.

DISCUSSION

WS is a typical syndrome with a characteristic phenotype and speech and hearing problems. In our case, we observed anisometropic amblyopia in the left eye; however, to our knowledge, anisometropic amblyopia had not been documented previously in connection with WS.

WS is a rare disease induced by abnormality in the development of neural crest cells; it has been defined in four subgroups.[2] The presence of dystopia canthorum (longer distance between the medial canthi and displacement of the lacrimal punctum laterally) is a landmark that helps determine the type of syndrome. In WS Type I, prominent dystopia canthorum is present, however, in WS type II, dystopia canthorum is not present, but hearing loss and heterochromia are at the forefront. If there is microcephaly, mental retardation and skeletal abnormalities with upper extremity involvement accompanying WS type 1, it is called Klein-Waardenburg syndrome (WS type 3). The presence of Hirschsprung's disease with WS type 2 is called Shah-Waardenburg syndrome (WS type 4).[7 8] In our case, neurosensorial hearing loss, iris heterochromia and hair hypopigmentation (poliosis) were the most prominent findings, and dystopia canthorum was not present. As such, we considered the case to be WS type 2.

The absence of melanocytes in affected areas is the cause of the hearing loss and pigmentation disorders associated with WS. Melanocytes (except for the retinal pigment epithelium) derive from progenitors and migrate from the embryonic neural crest. Melanocytes are involved in maintaining the ionic composition of the cochlear endolymph at the stria vascularis. Endocochlear function deteriorates in the absence of melanocytes, and as a result, the collapse of Reissner's membrane and destruction of hair cells occur and hearing loss develops thereafter.[9 10]

The most important aspect of WS that affects patients' lives is the hearing loss.[7 11] First, the level of hearing loss should be identified and the patient's quality of life should be improved. At this point, the diagnosis should be made as early as possible. In our case, bilateral profound sensorineural hearing loss was present.

In WS patients, changes of the iris are seen at a rate of 21–28%, which may be in the form of segmental hypochromia iridis or the characteristic bright blue iris (Waardenburg blue eyes).[12] Kadoi *et al*[13] have stated that in the presence of ocular pigmentation changes, Horner's syndrome, Vogt-Koyanagi-Harada syndrome and Fuchs heterochromic iridocyclitis should be considered in the differential diagnosis. In our case, heterochromia iridis was present in the right eye and Waardenburg blue eye was present in the left eye.

A white forelock in the hair is the most common aspect of WS, and it is reported in 17–58.4% of patients. Rarely, this colour can be red, brown or black. In addition, bleaching of the eyelashes, eyebrows and body hair can be seen earlier than usual.[12] Hypopigmentation areas on the skin or hyperpigmented lesions on normal skin might also appear.[2 12] In the cases of Ozturk *et al*[14] bristle hyperpigmentations were present. Our patient had a white forelock and other skin findings.

Effective screening and early diagnosis is important in amblyopia, which is a public health problem. Delayed diagnosis and lower visual acuity at the time of diagnosis are factors that negatively affect response to therapy; however, the quality of life of children with WS can change with proper treatment.[15] In our case, anisometropic amblyopia was identified, which we found to be unique after conducting a literature review. The patient's visual acuity improved by one line in the second month of occlusion therapy.

CONCLUSION

WS is fairly easy to diagnose, because its phenotypic characteristics are pathognomonic. One should always take into account other accompanying abnormalities in addition to the classic signs of the syndrome. A detailed ophthalmological examination should be performed, and amblyopia should be investigated, to avoid any delay in diagnosis and treatment of additional pathologies.

Learning points

- Waardenburg syndrome is a typical syndrome with a characteristic phenotype and speech and hearing problems.
- Ocular examination and early diagnosis is important in amblyopia, which is a public health problem. The quality of life of children can change with proper treatment.
- Early treatment of amblyopia increases the chances of successful treatment.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

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