Case Report

Ushers Syndrome

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Introduction

Usher syndrome is a rare heterogenous autosomal recessive genetic disorder with features of visual impairment due to retinitis pigmentosa and hearing loss. Other names for Usher syndrome include Hallgren syndrome, Usher-Hallgren syndrome, retinitis pigmentosa-dysacusis syndrome, and dystrophia retinae dysacusis syndrome[1,2].

Usher syndrome represents a genetically diverse condition that involves both early-onset sensorineural hearing loss and retinal pathology. While reports of disease prevalence vary, the condition has been estimated to occur in three in 100, 000 individuals[3].

Case Report

A 34 year old female presented to Ophthalmology outpatient department with complaints of diminished vision in both eyes more at night since 15 years. Diminution of vision was insidious in onset, gradually progressive and painless.She also had history of difficulty in hearing for last 3 years. There was no history of use of spectacles or hearing aids. No history of difficulty in walking. She was born out of a non consanginous marriage. On examination anterior segment of both eyes was found to be within normal limits; pupils of both eyes were 3mm in size, round, regular and reactive. Ophthalmoscopy of both eyes showed clear media, waxy gliotic pallor of both optic discs, severe thread like arteriolar attenuation and bone spicule retinal pigmentation in the midperiphery, characteristic of Retinitis pigmentosa (Fig 1,2,3). Colour vision was found to be normal.

UCVA in both eyes was 5/60 N6; BCVA in both eyes was 6/12 N6 with - 5.0DS. Pedigree charting was done and was found that no family members were affected. ERG was done and showed subnormal 'a' wave and 'b'wave. Visual fields showed constriction of peripheral fields (Fig 4,5).

ENT consultation was done and audiometry showed-moderate to severe sensorineural deafness in both ears (Fig 6). Vestibular function was normal. ECG and all routine investigations done and physician opinion was obtained. Putting together all these findings a diagnosis of Type II Usher's syndrome was made. This patient was prescribed spectacles. Vitamin A therapy started. Advised follow up after 6 months.

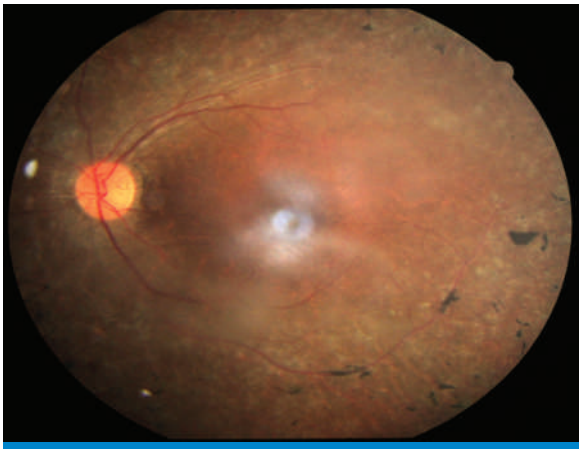

Fig 1 - Left eye disc pallor arteriolar attenuation and bony spicules suggestive of retinitis pigmentosa

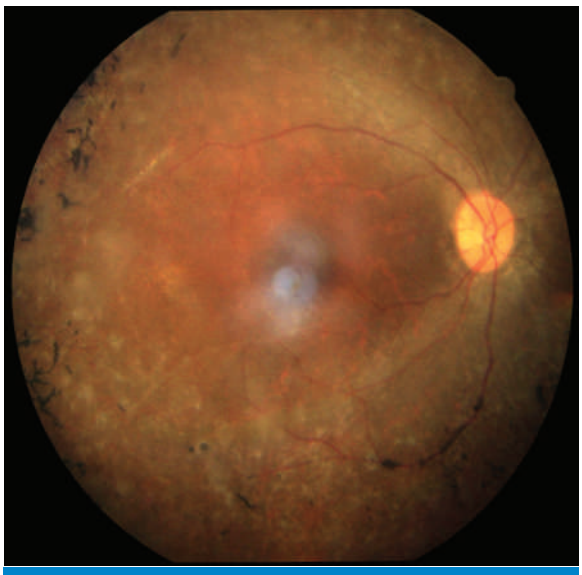

Fig 2 - Right eye disc pallor arteriolar attenuation and bony spicules suggestive of retinitis pigmentosa

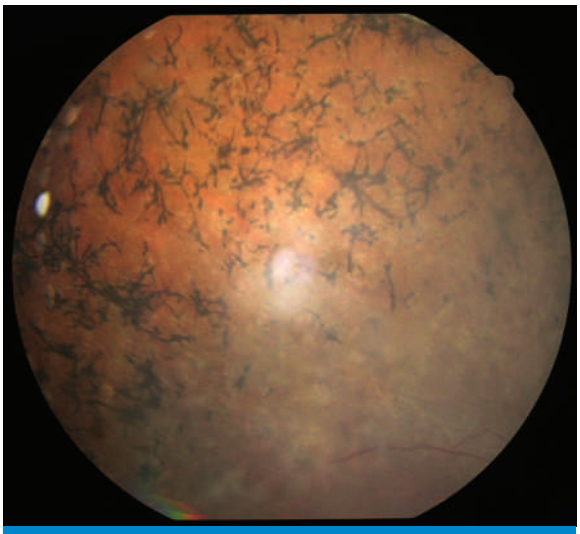

Fig 3 - Bony spicules in periphery

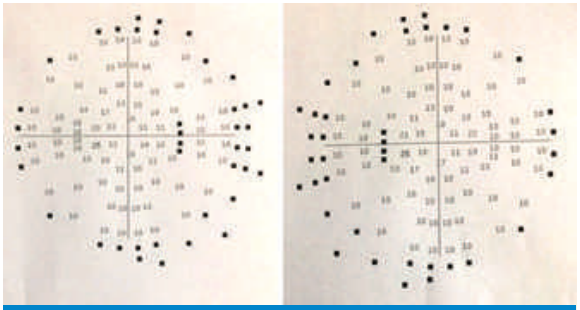

Fig 4 &5 - Constriction of peripheral fields

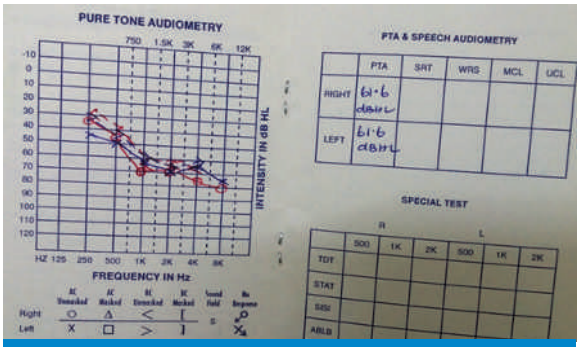

Fig 6 - Moderate to severe sensorineural hearing loss in audiometry

Discussion

Charles Usher, Scottish ophthalmologist examined the pathology and transmission of the disease in 1914 on the basis of 69 cases and hence named after him.However, Albrecht von Gräfe, a pioneer of modern ophthalmology described the disease[4,5]. Three years later, one of his students, Richard Liebreich, examined the population of Berlin for disease pattern of deafness with retinitis pigmentosa. Liebreich noted Usher syndrome to be recessive, since the cases of blind-deafness combinations occurred particularly in the siblings of blood-related marriages or in families with patients in different generations. His observations supplied the first proofs for the coupled transmission of blindness and deafness, since no isolated cases of either could be found in the family trees[6,7]. Classification of Usher's syndrome can be divided in to three major groups; Type 1, Type 2, Type 3.

Usher type - I

Usher I patients have difficulties in maintaining their balance owing to problems in the vestibular system and are born deaf. Babies with Usher I are usually slow to develop motor skills such as walking. Worldwide, the estimated prevalence of Usher syndrome type I is 3 to 6 per 100,000 people in the general population. Usher type I is caused by mutations in any of the following genes: *cdh23, myo7a, pcdh15, ush1c, and ush1g*. These genes function in the development and maintenance of inner ear structures such as hair cells (stereocilia), which transmit sound and motion signals to the brain. Hence alterations in these genes can cause an inability to maintain balance (vestibular dysfunction) and hearing loss[8]. These genes help in the development and stability of the retina by influencing the rod photoreceptor cells and supporting cells called the retinal pigmented epithelium. Mutations that affect the normal function of these genes can cause retinitis pigmentosa.

Type I is more common in people of Ashkenazi Jewish ancestry (central and eastern European) and in the French-Acadian populations (Louisiana)[9,10].

Usher syndrome II

Usher II is characterized by hard-of-hearing and their hearing does not reduce over time with a normal vestibular system. Usher syndrome type II occurs at least as frequently as type I, but because type II may be underdiagnosed or more difficult to detect, it could be up to three times as common as type I. Usher syndrome type II may be caused by mutations in any of three different genes: *ush2a, gpr98, and dfnb31*. The protein encoded by the *ush2a* gene, usherin, is located in the supportive tissue in the inner ear and retina[11].

Usher Syndrome III

Usher III is characterized by 'progressive' loss of hearing and half have vestibular dysfunction. The incidence of Usher III is highest in the Finnish population, but rare in a other ethnic groups. Mutations in only one gene, *clrn1*, have been found in Usher III. *clrn1* encodes clarin-1, a protein important for the development and maintenance of the inner ear and retina. But how its mutation causes hearing and vision loss, is still not clearly understood[12].

Differential diagnosis

Other syndromes that can be associated with pigmentary retinopathy and deafness must be ruled out when considering a diagnosis of Usher's syndrome. These include infantile and adult Refsum disease,Kearns Sayre syndrome, Cockayne syndrome, Alstrom disease, Bardet Biedl syndrome.[13]

Treatment

Currently, there is no cure for Usher syndrome. The best possible treatment is early identification so that educational and counseling programs can be done. Treatment will include hearing aids, assistive listening devices, cochlear implants, or other communication methods such as American Sign Language; orientation

and mobility training; and communication services and independent-living training that may include Braille instruction, low-vision services, or auditory training. Some ophthalmologists believe that a high dose of vitamin A palmitate may slow, but not halt, the progression of retinitis pigmentosa[14].

Conclusion

Investigation of Usher's syndrome in patients with hearing loss and impaired vision in dark will promote better rehabilitation and monitoring of patients. Consanguinity should be sought in affected individuals. Our case report shows a patient with deafness and blindness diagnosed to be Type 2 Usher's syndrome. So any patient with retinal degeneration for whom there is suspicion of even slight hearing loss must receive audiologic evaluation and treatment to minimize the effect of major sensory problems that arise from combined hearing and vision deficits.

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