CASE REPORT

X LINKED JUVENILE RETINOSCHISIS

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HOW TO CITE THIS ARTICLE:
M. Gopal Kishan, Sheetal Baldava, Syed Shah Asadullah H. "X Linked Juvenile Retinoschisis". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 16, April 20, 2015; Page: 2460-2464.

ABSTRACT: X linked juvenile retinoschisis is a rare genetic disorder affecting males. It is recessively inherited due to mutation in XLRS1 gene, localized to Xp22 region.(1) The characteristic funduscopic findings, are a silver-grey retinal reflex, fovealretinoschisis, and peripheral retinoschisis. Electroretinograms (ERGs) typically record reduced b-wave amplitude with relative preservation of the a-wave amplitude. Visual acuity (VA) usually deteriorates slowly until the patient is about 20 years of age, stabilises, and sometimes deteriorates further because of macular degeneration.

KEYWORDS: Retiinoschisis, genetic, X Linked, XLRS1 gene, stellate maculopathy.

CASE REPORT: We report a typical case of X linked juvenile retinoschisis in a twelve year old boy. He came with a chief complaint of diminished vision for distance in both eyes since 2 years. There was no improvement in vision despite spectacles. The loss of vision was gradual and slowly progressive. The vision was better in daytime than night. He had no history of trauma, inflammation or infectious ocular disease.

Ophthalmological examination revealed a best corrected visual acuity of RE 6/18 and LE 6/18. Extra ocular movements were full in all directions. Slit lamp biomicroscopy of the anterior segment was unremarkable in both eyes. On slit lamp biomicroscopy with +90 D lens, macula showed stellate maculopathy of radiating cystoid spaces. On indirect ophthalmoscopic fundus examination, retina showed retinoschisisin both eye in inferotemporal quadrants with fragmentation of inner layer in various areas. Vascular changes in the form of sheathing of vessels and dendritiform patterns were noted. Retinal flecks and areas of RPE degeneration were also noted in inferior quadrants. There was extensive fragmentation of inner retinal layer with strands seen lying over the remaining retina.

Fundus Fluorescein Angiography showed absence of leakage into the cystoid spaces. Optical Coherence Tomography showed schisis of retinal layers in the periphery and fovealschisis in the posterior pole with a pattern of cleavage of the retina into two distinct planes, one deep (outer retina) and one superficial. The two layers were superficially connected with thin-walled, vertical palisades, separated by low reflective, cystoid spaces, which were confluent and most prominent in the foveal region. The foveal thickness was 727 microns in right eye and 688 microns in the left eye.

As angiography revealed no leakage of dye, no intervention was planned. The parents were counseled about the progressive nature of the disease, poor long term visual prognosis, absence of a definitive cure, other modalities of visual rehabilitation and need for screening of other siblings in the family. They were also advised about the need for genetic counseling when the boy reached adulthood.

DISCUSSION: Haas described juvenile retinoschisis a century ago in a paper entitled 'Ueber das Zusammenvorkommen von Veranderungen der Retina und Choroidea.[2] though once considered rare, it is being recognized now as an often underdiagnosed condition. It is one of the commonest causes of juvenile macular degeneration.

Mutation of a single gene, XLRS1, has been described in patients affected with this disease. The gene produces a 224 amino acid soluble secretory protein, retinoschisin that is synthesized in photoreceptor inner segments and provides cell adhesion and proper interaction between cells within the inner nuclear layer as well as synaptic connections between bipolar cells and photoreceptors. In patients with XLRS, a dysfunction in this protein leads to the accumulation of retinoschisin within the inner retina and the development of cystic-like spaces primarily in the inner nuclear and outer plexiform layers of the retina as observed by OCT.

The degeneration of RPE and photoreceptors is said to be secondary to degeneration of the neuro sensory retina which shows accumulation of amorphous, proteinaceous, hyaluronidase negative material within the cystoid spaces. This material is said to have the same composition as basement membrane of Mullers cells. It is speculated that these intraretinal filaments are produced by defective Mullers cells which are central to the pathophysiology of retinoschisis. The physiological mechanism of congenital retinoschisis involves inherently weak Muller cell pillars. The Muller cell, the principal glial cell of the retina, is central to the migration and organization of other retinal cells during development. A genetic defect in the Muller cell could account for the structural and physiological abnormalities found in juvenile retinoschisis.

Affected males usually present at 5 to 10 years of age, with reading difficulties though signs may be present at much younger ages.[3] It is slowly progressive, and most patients retain relatively good vision until the fifth or sixth decades of life, when macular atrophy develops. The disease is characterized by fovelalschisis and peripheral retinal schisis.

Fovealschisis is universal, being seen in 98 – 100% of the children.[4] In adults, the typical radiating striae may regress, leaving only a blunted foveal reflex. After 50 years of age, macular pigmentary changes and retinal pigment epithelium atrophy are common. Peripheral schisis is seen in around 50% of patients. The split occurs in outer retinal layers. The inner leaf fragments over time leaving behind membranous remnants on the posterior hyaloids called vitreous veils. But outer leaf breaks are rare.

Histologically, the disorder is characterized by split at the levels of Inner Limiting Membrane and Nerve Fibre Layer. This is in contrast to adult retinoschisis which splits at Outer Plexiform Layer. Vascular changes are a prominent feature with perivascular sheathing, dendritiform patterns, micro vascular anamolies and such changes seen in the peripheral fundus.

Fundus fluorescein angiography may reveal mild leakage in the fovea into the cystoid spaces. Optical Coherence Tomography reveals a distinct pattern of schisis and is particularly useful to monitor foveal thickness after treatment.[5] Electroretinogram reveals a characteristic reduction in the b-wave amplitude. Although a-wave is normal in the early stages, older affected patients may show a wave abnormalities suggesting involvement of photoreceptors.

There is no definitive treatment for XLRS. Dorzolamide eye drops, developed and approved to treat glaucoma, may reduce cysts, foveal thickness, especially in young patients. But the effect on vision is found to be modest. Early diagnosis is nevertheless essential for

prognostication, genetic counseling and facilitating educational requirements in a child with visual handicap. It is important to identify associated conditions, such as refractive errors and strabismus, the appropriate management of which will enable the child to utilize his vision to its maximum potential.

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Fig. 1 & 2: Fundus picture of right and left eyes of boy with XLRS with maculae showing stellate maculopathy.

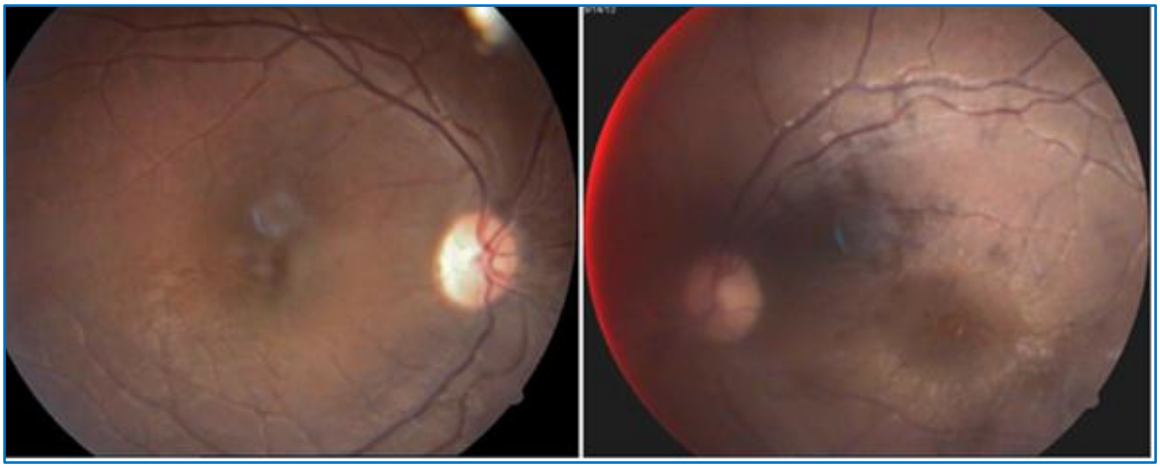

Fig. 1 & 2

Fig. 3: Sheathed retinal vessel and dendritiform lesions.
Fig. 4: Pigment epithelial disruption in the lower quadrant.

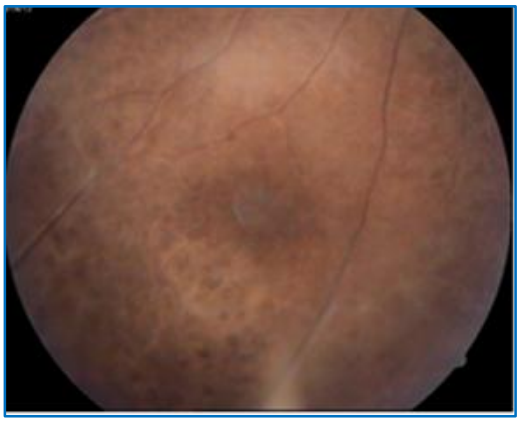

Fig. 3

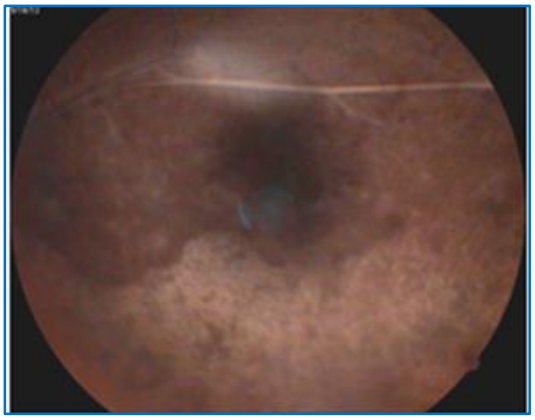

Fig. 4

Fig. 5: Cytoid degeneration of peripheral retina.
Fig. 6: Inner retinal layer showing fragmentation and warping.

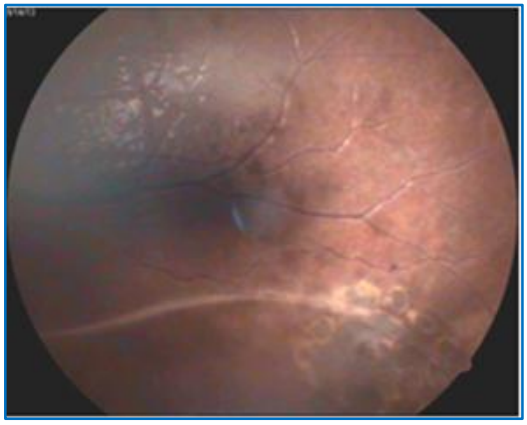

Fig. 5

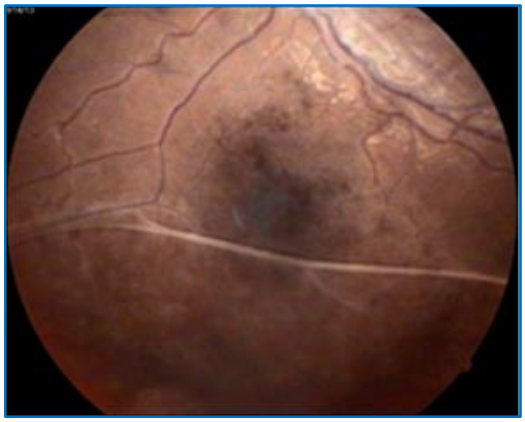

Fig. 6

Figures 7 & 8: FFA shows no leak in the macular area. OCT reveals large cystoid spaces in the fovea.

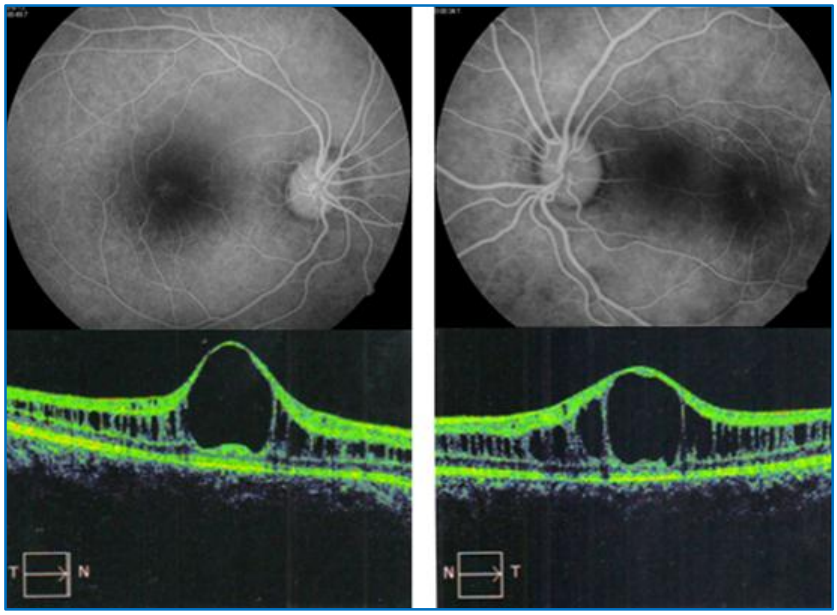

Fig. 7 & 8

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Date of Submission: 28/03/2015.
Date of Peer Review: 29/03/2015.
Date of Acceptance: 05/04/2015.
Date of Publishing: 20/04/2015.