Clinical Insights into Bardet-Biedl Syndrome and Retinitis Pigmentosa: A Case Report”

Abstract:

Bardet–Biedl syndrome (BBS) is a rare autosomal recessive ciliopathy characterized by learning impairments, obesity, post-axial polydactyly, retinal dystrophy, and hypogonadism. Numerous related minor characteristics are crucial for the clinical management of BBS and can aid in the diagnosing process. In 80% of patients, sequencing known disease-causing genes can confirm the diagnosis, which is based on clinical symptoms. BBS genes encode proteins involved in cilia biogenesis and function that localize to the basal body and cilia. Defective cilia resulting from mutations partially explain the pleiotropic effects seen in BBS. We report the case of a 23-year-old patient referred to the nephrology department for progressive bilateral visual acuity loss.

Key words: Bardet-Biedl syndrome, ciliopathy, poly-malformative syndrome.

Introduction:

Bardet-Biedl syndrome is a rare multi-organ genetic disorder classified as a ciliopathy. The disease is inherited autosomal recessively, characterized by multivisceral impairment and intellectual deficit.

Clinical case:

This is a 23-year-old patient from a second-degree consanguineous marriage, with a history of visual impairment since childhood, obesity, intellectual difficulties, operated polydactyly, chronic renal failure at the hemodialysis stage (3 sessions per week), with a history of deafness, and gait abnormalities.

Ophthalmological examination was difficult because of nystagmus and photophobia, visual acuity was at near finger count in both eyes, anterior segment and tone examination was unremarkable, Fundus examination reveals the presence of bone spicule-shaped pigment deposits in the mid periphery, along with atrophy of the retina. Narrowing of the retinal vessels is evident and the optic disc is moderately pale(figure 1).

The electroretinogram showed severe retinal damage to both photopic and scotopic systems in both eyes (figure 2).Macular OCT objective bilateral degenerative macular edema (figure3).

A few precautions have been suggested to slow the progression of the disease, such as wearing protective lenses with filters, and wearing a hat with a visor. Unfortunately, to date, there is no curative treatment for retinitis pigmentosa. genetic advice has been offered to the parents,

Discussion:

Bardet-Biedl syndrome (BBS) is a rare autosomal recessive genetic disorder, characterized by heterogeneous clinical manifestations including primary features of the disease. It is a rare genetic disorder with severe multiorgan impairment. Its frequency in Europe and North America falls below 1:100,000 [1].

Bardet-Biedl syndrome is a ciliopathy due to a mutation identified on different chromosomes encoding 16 proteins, first described in 1920 by Bardet and then by Biedl in 1922.

There is a marked diversity in the clinical symptoms and their frequency both within and across families, and there are a variety of clinical manifestations of BBS [2,3]. This is brought on by the syndrome's genetic variability and varying degrees of expressivity. A number of basic and secondary

features have been established by certain writers in an attempt to categorize symptoms based on their relative prevalence in light of this variety [2].

These days, the syndrome is defined by six cardinal diagnostic criteria [4].

1-**Retinitis pigmentosa**: The most common (100%) ocular manifestation of BBS is typical retinitis pigmentosa, which is characterized by a severe and typically early-onset degeneration of photoreceptors in the retina. Although it can occasionally occur in the first decade of life, retinal pigmentosa is defined by a progressive loss of central and peripheral vision starting in the second decade of life [2,5]. The initial sign is night blindness, which usually results in total blindness and is linked to macular degeneration, poor color vision, and extra pigment deposits that are apparent on fundus examination [5].

2-Obesity: Obesity is the second most common characteristic, occurring in 72-196% of the patients. Obesity of the central kind, characterized by a distribution of adipose

tissue primarily found in the abdomen [2].

3-Polydactyly and other limb abnormalities: The most prevalent anomaly of the upper and lower limbs (50–80%) is postaxial polydactyly, however it is more common in the feet [4]. There may be other deformities such as partial syndactyly and/or brachydactyly [4]. This characteristic holds great significance in the clinical diagnosis of BBS.

4-Hypogonadism and other anomalies of the reproductive system: Hypogonadism is much more common in males than in women. Most female patients are fertile, while only two cases of affected men who have had children are known. In addition, women who are impacted may exhibit abnormalities in their uterus, fallopian tubes, ovaries, or urethral or vaginal orifices [2].

5-Intellectual disability/cognitive impairment: Nonetheless, most patients fall into the mild-to-moderate category of intellectual disability severity, which is divided into three categories: mild, moderate, and severe. Additionally, BBS patients have trouble speaking or moving, and almost one-third of them arrive with childhood hearing impairments that can be addressed with therapy in later life. Appropriate therapy can also help improve speech problems [6].

6-Renal abnormalities: Patients with BBS may exhibit several renal abnormalities, including glomerulonephritis or the development of renal cysts [4]. Obesity-related problems coupled with renal dysfunction can result in terminal renal failure, which is the leading cause of patient mortality at an early age.

Other less common signs can be detected in BBS patients, such as hepatic involvement, dental and palatal abnormalities, hearing loss, behavioral problems, characteristic facial features, short stature, cardiovascular problems, neurological, metabolic and endocrine abnormalities... [2,4,7].

The average age of SBB diagnosis is nine years. Diagnosis may be suspected before birth (polydactyly + hyperechoic kidneys) or in the first few months (polydactyly and early obesity), but is difficult to confirm until ERG abnormalities are present. Diagnosis is often delayed when key signs (obesity, polydactyly) are absent. The diagnosis remains a clinical one. In around three-quarters of cases, it can be confirmed on a molecular level.

Management is multidisciplinary, due to the multivisceral involvement present in SBB.

The ophthalmologist monitors the onset and evolution of RP [5]. Assessing vision in children of non-verbal age is difficult. Visual acuity scales are available from the age of two. In order to establish a

diagnosis of RP, it is essential to carry out various tests. The ERG is the most important diagnostic test. At present, there is no cure for RP. A few precautions can slow the progression of the disease. Wearing suitable protective and filtering lenses, or a hat with a visor to protect against brightness and ultraviolet rays, is recommended. Their main purpose is to reduce the sensation of glare.

Management of kidney damage includes regular monitoring of renal function. In cases of chronic end-stage renal failure, renal transplantation may be proposed in addition to dialysis. Arterial hypertension is also monitored [40].

In the case of obesity, dietary measures and patient education should be introduced at an early stage to prevent complications.

Hexadactylies or syndactylies, as well as certain genital malformations or cardiac malformations, can generally benefit from surgical treatment.

Delayed puberty and growth retardation can be treated with hormone replacement therapy.

In the event of serious learning difficulties, the child may be cared for in a medical-educational institute. Speech therapy is often required to improve language skills. Hearing screening is also important, and in the event of deafness, hearing aids can be fitted.

Genetic counseling is essential to explain to parents how the disease is transmitted, the risks to family members, the possibilities of prenatal screening and the treatment options available.

Conclusion:

Bardet Biedl syndrome is a rare and serious disease, whose functional prognosis is linked to visual impairment or blindness, mental retardation and obesity.

The vital prognosis is linked to renal impairment, which must be systematically detected.

Diagnosis is based on clinical criteria and confirmed by genetic counseling.

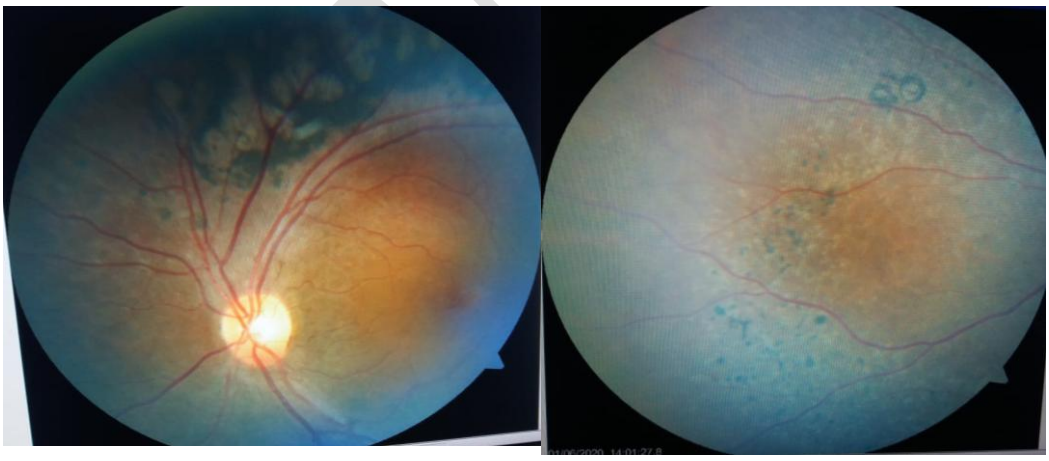

Figure 1: retinophoto showing pigmentary retinopathy bilaterally

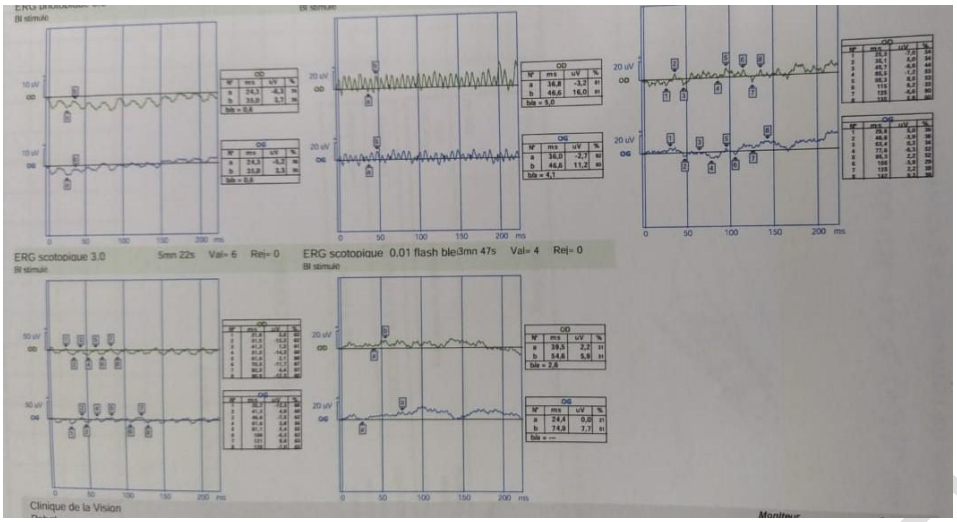

Figure2:electroretinogram image showing severe retinal damage due to retinitis pigmentosa.

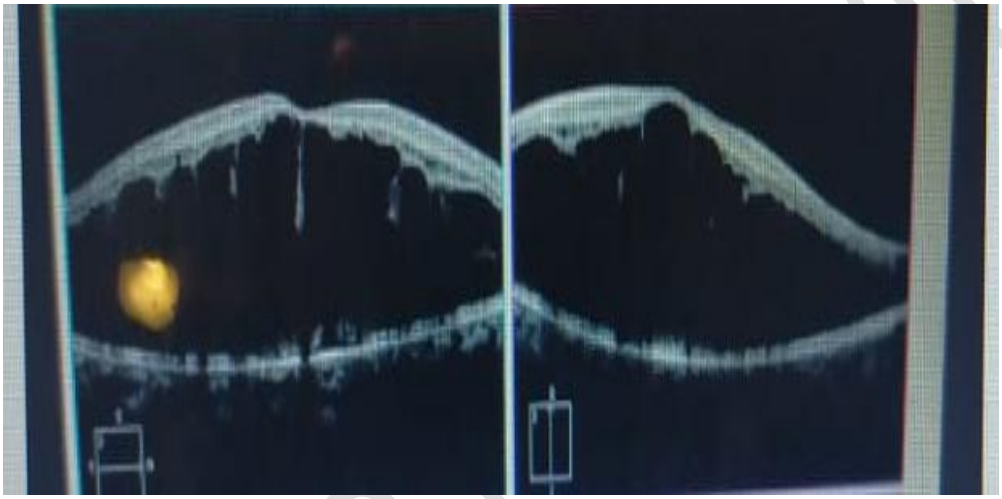

Figure3: Macular OCT showing macular edema

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