COMMENT

Clinical management approaches in Bardet–Biedl syndrome

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Human health is greatly coordinated and complexified by several factors, including genetics and their impact. Genetic diseases or disorders which are negatively inherited can impinge on overall health and are often overlooked in terms of interpreting the standards of genetic counseling and updated disease management. Issues have arisen in modern medical sciences concerning the advancements in this field, and therefore recognition of broader aspects of genetics-related factors are starting to be considered in the diagnosis.

Bardet–Biedl syndrome (BBS) is acknowledged as a rare autosomal recessive genetic condition and is further associated with ciliary dysfunction often known as ciliopathy [1]. Ciliopathies consist of a wide array of disorders caused by abnormalities in ciliary structure and/or functions of either motile or non-motile (primary or sensory) cilia. Recently, ciliopathic diseases have increased in number, and have had an independent field established to investigate them in relation to human health. According to the literature, BBS is characterized as a major ciliopathic disorder, and its primary pathological conditions include retinal dystrophy (the most dominant feature detected, and found in almost 90–95% of cases), obesity or weight issues (between 70–90%), renal dysfunction and cognitive functional abnormalities (50% and 60%, respectively). Depending on the individual in question, other symptoms can be observed, such as developmental delays, speech deficits, dentals defects and ataxia. BBS is further linked to increased risk of diabetes, hypertension, and cardiovascular disease in some patients [2].

In this paper, Forsythe and Beales provide an insightful overview of BBS to help understand the limited amount of practical information concerning the disease [3]. As is widely known, BBS is a critical ciliopathic disorder and tightly linked to the cilium: a highly specialized sensory cellular organelle protruding from the cell surface of most vertebrate cells. Until now, more than 20 BBS genes have been identified. BBS' relationship with cilia have consequently been strengthened and become more well established. Some protein complexes are evidently localized at the base of the cilium and thus have been recognized as clinically significant in the diagnostic field. Of note, *BBS8* encoded proteins were first linked to dysfunction in cilia and BBS [4], and other several in-vivo findings subsequently established the phenomenon of BBS proteins involved in signaling pathways guided by primary cilia and of BBS connecting to cilia [5, 6]. Other ciliopathies, such as Meckel syndrome and Joubert syndrome, show genetic patterns overlapping with BBS-associated genes [7].

While it has been emphasized that initial clinical diagnoses in BBS patients is mostly confirmed by genetic screening of known genes related to the disease, *BBS1* and *BBS10* mutations are shown to be dominant and more prominent. Furthermore, the authors emphasize the need for appropriate early assessments and proper genetic counseling regarding BBS patients because associated complications can be broad and risky. They further recommend a systematic approach to disease management could be adopted on an individual basis to reduce health burdens. Clinical diagnosis is largely dependent on known genetic analysis associated with BBS genes, and therefore given importance in cases ranging from genetic counseling to disease management in patients [3].

The authors suggest comprehensive assessment approaches when managing BBS-related condition at the early stages of disease that depend on whether confirmed or suspected cases can be effectively treated. If BBS-associated genes are shown to be dysregulated or mutated, an intensive assessment approach may initially be required, which includes essential and regular physiological tests, renal performance, ophthalmological consultation, blood glucose monitoring and endocrinological review when necessary. Should it be required, further consultations must be taken into consideration for other associated risks factors such as behavioral changes, anxiety, hypertension, and any heart-related irregularities. To some extent, consistent monitoring of health conditions is the key to sufficiently managing the disease and helping to avoid any associated risks. Suspected BBS patients should be treated seriously and provided proper counseling to deal with this condition. Bearing this in mind, as the understanding of genetics involved grows, it might be possible that some other disorders may overlap with BBS phenotypes, so the need for early genetic counseling would be beneficial in reducing further risks to individuals.

In conclusion, this paper, alongside other publications, highlights the importance of genetic screening for disease-causing genes during the early stages. It subsequently emphasizes proper clinical approaches towards the disease through genetic counseling of BBS patients to improve diagnosis. It further suggests that emerging molecular and genetics testing studies will advance the in-depth understanding of BBS symptoms and behavior. This in turn will significantly improve clinical diagnostic methods and disease management. Hopefully, promising therapeutic solutions can be seen in the near future.

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