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Bardet-Biedl Syndrome Associated With Brachial Amyotrophy and Cerebral and Cerebellar Atrophy: A Case Report

Brakiyal Amyotrofi, Serebral ve Serebellar Atrofi ile İlişkili Bardet-Biedl Sendromu: Bir Olgu Sunumu

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Summary

Bardet-Biedl syndrome is an autosomal recessive disorder characterized by rod-cone dystrophy of the retina, mental retardation, obesity, polydactyly and hypogonadism, as well as renal abnormalities. Laurence-Moon syndrome, as a distinct entity, is rare and the features include spastic paraplegia in the absence of polydactyly, obesity, and renal involvement, though cranial symptoms are very unusual. We aimed to report a patient who exhibited characteristic features of Bardet-Biedl syndrome in addition to brachial amyotrophy, and cerebellar and cerebral cortical atrophy. *Turk J Phys Med Rehab 2011;57 Suppl 2: 345-7.*

Key Words: Bardet-Biedl syndrome, brachial amyotrophy, cerebellar and cerebral cortical atrophy

Özet

Bardet-Biedl sendromu, retinada çubuk-koni distrofisi, mental retardasyon, obezite, polidaktili, hipogonadizm ve renal bozukluklarla karakterize otozomal resesif bir hastalıktır. Laurence-Moon sendromu ayrı bir antite olarak daha nadirdir ve özelliklerinde spastik parapleji mevcuttur ve polidaktili, obezite ve renal tutulum yoktur, bununla birlikte kraniyal semptomlar nadirdir. Biz Bardet-Biedl sendromu'nun karakteristik özelliklerini sergileyen ek olarak brakiyal amyotrofi, serebellar ve serebral kortikal atrofisi olan bir olguyu sunmayı amaçladık. *Türk Fiz Tıp Rehab Derg 2011;57 Özel Sayı 2: 345-7.*

Anahtar Kelimeler: Bardet-Biedl sendromu, brakiyal amiyotrofi, serebellar ve serebral kortikal atrofi

Introduction

Bardet-Biedl syndrome (BBS) is a rare, autosomal recessive disorder characterized by cardinal features including rod-cone dystrophy of the retina (sometimes called retinitis pigmentosa), mental retardation, obesity, polydactyly, hypogonadism (in males only), and renal abnormalities. In addition, disordered speech or speech delay, syndactyly, brachydactyly, cataracts, astigmatism, strabismus, developmental delay, nephrogenic diabetes insipidus, ataxia, mild spasticity, diabetes mellitus, dental crowding, hypodontia, and high arched palate can be seen as secondary features. For the diagnosis, 4 primary or 3 primary and 2 secondary criteria are required (1). Formerly, BBS was grouped with Lawrence-Moon syndrome, which includes spastic paraparesis, but not obesity and polydactyly, though they are now considered separate entities (2). A review of the literature revealed only a few scattered reports of cerebellar vermis hypoplasia, and temporal and parietal hypoplasia. In this case report, we described a patient with features of BBS who exhibited brachial amyotrophy, and cerebellar and temporal lobe hypoplasia.

Case Presentation

A 34-year-old male patient presented to our outpatient clinic because of weakness and numbness in his left arm that began one month earlier. One week before presentation, his complaints were

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accompanied by shoulder, elbow, and wrist pain. The patient's history revealed an extra digit on his right foot, poor vision, and mental retardation since birth. He was the ninth child of second-degree consanguineous parents. The family history showed that his mother had two stillbirths and that a brother died from leukemia at the age of 44 years. His living 45-year-old brother had obesity, retinitis pigmentosa, polydactyly, and infertility problems. Additionally, the patient had four healthy sisters and two healthy brothers. Because of socioeconomic problems, we could not examine his brother with the history of obesity, retinitis pigmentosa, polydactyly, and infertility problems.

On physical examination of the patient, obesity, strabismus, poor vision, micrognathia, facial dysmorphism, dental anomalies (high arched palate, hypodontia, small teeth), and polydactyly were observed. He was not able to fixate on or visually follow objects, and there was only a blink response to direct light during his ocular examination. Moderate mental retardation was noted.

Neuromuscular examination revealed motor deficits. Shoulder and elbow 4/5, wrist 3/5, flexion of fingers 3/5, extension of fingers 2/5, and abduction and adduction of fingers were 1/5 in his left arm. No motor deficit was detected in the other three extremities. Tendon reflexes of the upper extremities were brisker on the left side than on the right. In the lower extremities, bilateral patella reflexes were absent and Achilles reflexes were normal. Plantar response was extensor in the left lower limb. Severe sensory impairment (touch and pinprick) of the left upper extremity, such as hypoesthesia in C6 and T1, anesthesia in C7, and C8 dermatomes, was observed. In the other three extremities, sensory examination was normal. In all extremities proprioceptive sensory joint movement and position was unaffected. Atrophy of the thenar and hypothenar eminence muscles was noted. At the cerebellar system examination, horizontal nystagmus was positive. There was no asymmetry in pupillary size, but both pupils were unresponsive to light. Moreover, bilateral loss of vision and absence of palatal reflexes were observed on cranial nerve examination.

There was no pathological finding of the genitourinary system, except for hypospadias.

Laboratory analysis included a complete blood cell count, and measurement of electrolytes, serum glucose, and lipid levels, renal and liver function tests, and gonadal hormone tests, all of which were within normal limits, except for high blood triglyceride level. Upper and lower abdominal ultrasonography (US) showed normal kidneys and normal findings, except grade II hepatosteatosis.

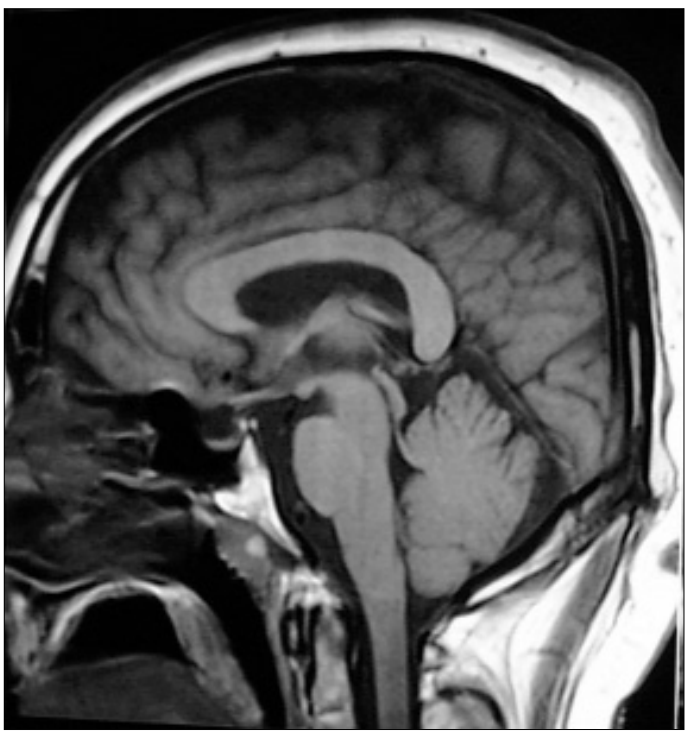

Figure 1. Sagittal T1-weighted image demonstrating atrophy in the cerebellar vermis.

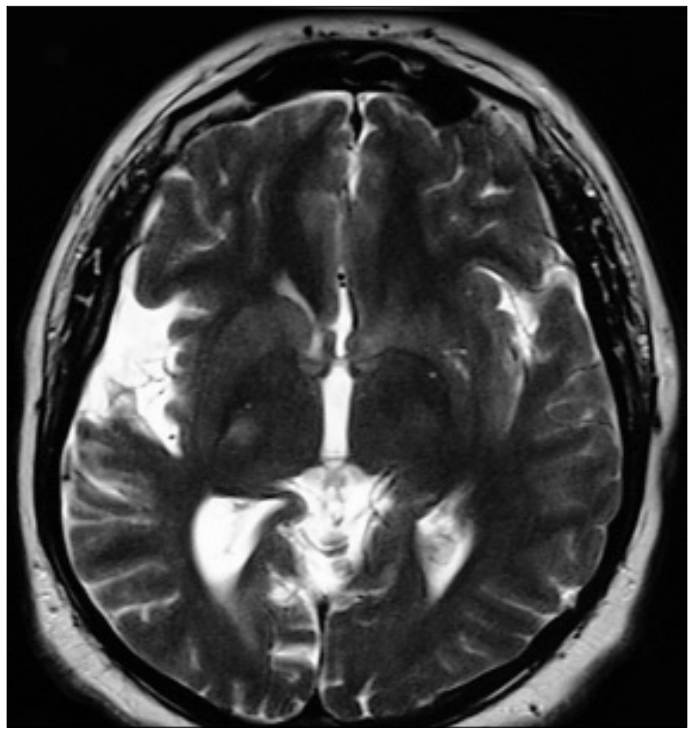

Figure 2. Transverse T2-weighted image showing peripheral sulcal dilation (according to cortical atrophy in the temporo-fronto-parietal lobes of the right cerebral hemisphere).

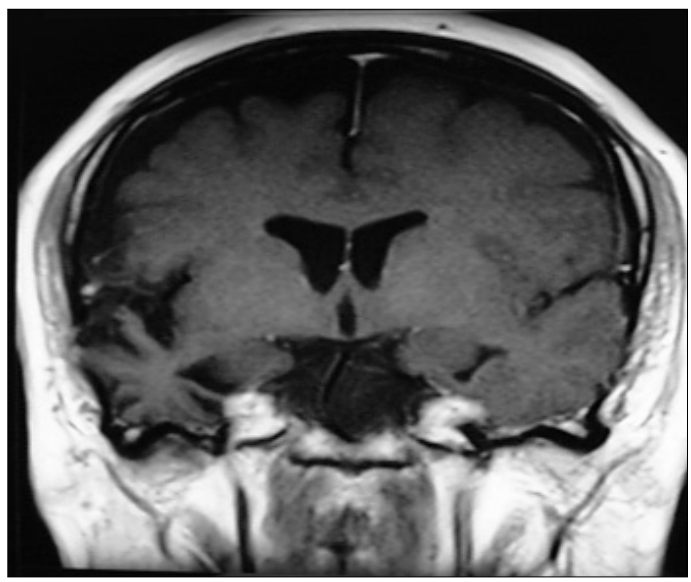

Figure 3. T1-weighted frontal image revealed atrophy in the right temporal lobe.

Electroneuromyography (ENMG) of the left upper limb revealed severe partial degeneration and regeneration of the inferior trunks, and mild axonal degeneration of the superior and middle trunks of the brachial plexus. Brain magnetic resonance imaging (MRI) showed atrophy in the cerebellar vermis (Figure 1), chronic lacunar infarct in the inferior part of the right cerebellar hemisphere, peripheral sulcal dilation (according to cortical atrophy in the temporo-fronto-parietal lobes of the right cerebral hemisphere) (Figure 2), contrast enhanced cortical and subcortical two lesions (2.5 and 5 cm in diameters) in a gyral pattern in the right occipitoparietal lobe, and atrophy in the right temporal lobe (Figure 3).

Because of strabismus and poor vision, which we diagnosed in our examination, we asked for ophthalmology consultation and bilateral loss of vision and retinitis pigmentosa also diagnosed by ophthalmologists.

After taking all these findings into consideration, a diagnosis of BBS seemed likely. Brachial amyotrophy was suggested by ENMG findings, and cerebellar and cerebral cortical atrophy was suggested by neurological examination and MRI.

Discussion

BBS is a rare, autosomal recessive disorder characterized by clinical and genetic heterogeneity. Polydactyly is most frequently seen as a supernumerary digit on the hands and/or feet, and our patient exhibited polydactyly on the right foot (3,4).

Our patient presented with the primary features of BBS; obesity, polydactyly, learning difficulties, hypogonadism, and retinitis pigmentosa, as well as secondary features, such as speech delay, strabismus, hypodontia and high arched palate. However, he also exhibited neurological findings, which included cerebellar atrophy and cortical atrophy in the temporo-fronto-parietal lobes. There are only a few case reports in the literature documenting cerebellar atrophy in association with either the Bardet-Biedl or Laurence-Moon-Bardet-Biedl (LMBB) phenotype (5,6). The other neuroimaging findings reported in the literature in patients with LMBB include cerebral cortical atrophy, and hypo thalamic and pituitary abnormalities (7,8).

Our patient had weakness, numbness, and motor and sensory deficits in his left arm, and ENMG studies showed brachial amyotrophy, findings, which have not been previously reported in the literature. This work, therefore, is the first to report brachial amyotrophy in a BBS patient.

The clinical findings in families of individuals affected by BBS are highly variable, and there are no consistent phenotypic features. BBS is rather rare, but it is considered that the syndrome is often misdiagnosed or undiagnosed and there are cases that have been diagnosed after the age of 50 years (9). In a review, Lannello and co-workers (9) mentioned that in addition to well-recognized features of this disorder (i.e. obesity, retinal dystrophy with compromised visual acuity, mental retardation, polydactyly and brachydactyly, and moderate renal failure), also some alterations have been occasionally described in homozygous BBS patients, such as insulin-resistant type 2 diabetes mellitus and hypertension, as well as additional disorders, such as hyperfibrinogenemia, hyperuricemia, thrombophilia and/or increased vascular risk. They also suggested these factors to be included as possible other characteristics of BBS. In our opinion, all these factors which increase the vascular risk, can cause cerebrovascular diseases in patients with BBS and the management of these patients should contain neurological evaluation.

In conclusion, although very rare, neurological involvement can be seen in patients with BBS. Therefore these patients require neurological examination and rehabilitation of those problems. This study is also the first to report brachial amyotrophy in a BBS patient.

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