Sixth Cardinal Feature of Bardet-Biedl Syndrome in a Child: Cystic Kidney Disease - Case Report

Özgür Pirgon, Mehmet Emre Atabek, Ahmet Sert

Summary

The cardinal manifestations of Bardet–Biedl Syndrome are described to include retinal dystrophy, obesity, polydactyly or dysmorphic extremities, mental retardation, and hypogonadism which especially affects boys. Renal involvement has been described as a sixth cardinal feature. Only in the last 20 years has a significant renal component been noted. The spectrum of renal involvement can range from calyceal clubbing or cysts to diffuse renal cortical loss. We present an 8-year-old girl with Bardet–Biedl Syndrome who had bilateral lobulated and multicystic kidneys. Follow up of these children is essential for renal involvement and also includes imaging.

Keywords: Bardet–Biedl Syndrome, child, cystic kidney, obesity

Introduction

Bardet–Biedl Syndrome (BBS), is a genetically heterogeneous autosomal recessive disorder now recognised to have the primary features of obesity, polydactyly, pigmentary retinopathy, hypogonadism and mental retardation [1]. Hypertrophy of the interventricular septum and dilated cardiomyopathy, insulin-resistant diabetes mellitus, empty sella, clinodactyly, and congenital hepatic fibrosis can also be found [2,3]. Although hypogonadism is rare in female patients, vaginal atresia, hypoplasia of uterus and ovaries, and ectopic urethra should be sought [4]. The onset of obesity usually occurs early in childhood and increases in severity with age. The retinal degeneration component of the phenotype usually leads to legal blindness before the age of 20 years. The associated mental retardation is often mild and some patients have only learning disabilities [5]. In recent years renal involvement has been described as a sixth cardinal feature and reported. We present a child with BBS involving renal multicystic lesions. **Case Presentation**

An 8-year-old girl was referred by her physician to the Department of Pediatric Endocrinology Unit, University Hospital Selcuk, because of

obesity (Figure 1). She was a product of a term gestation and born by a normal spontaneous vaginal delivery. The child was noted to have 6 fingers on right hand and 6 toes on each foot at birth (Figure 2). The parents were nonconsanguineous. There was no history of blindness and renal failure in her family. Figure 1: General appearance of the patient with markedly obesity and the sixth finger on the right hand. Figure 2: The patient's right hand with the sixth finger in details. At birth, she weighed 4 kg, and by 8 year of age, she weighed more than 36.1 kg, placing her above the 95th percentile for weight. Her body mass index was 24.3 kg/m2, and she was 122.4 cm in height. She was normotensive. Her mental status assessed quantitatively was retarded. Laboratory investigation revealed a serum creatinine of 0.7 mg/dl and blood urea nitrogen of 25 mg/dl; complete blood count, electrolytes, serum bicarbonate, calcium, phosphorus, alkaline phosphatase, uric acid, and liver function tests were normal. Urinalysis showed a specific gravity of 1015, pH 6, and no hematuria or proteinuria.

Ophthalmoscopic examination revealed bilateral retinal pigmentation and strabismus. There was no recordable cone or rod response with Ganzfeld stimulation on electroretinography. Renal evaluation by ultrasound showed bilateral renal enlargement and increased parenchymal echogenicity. With high-resolution ultrasonography, large (several sized 1 to 2 cm) and multi cysts were detected at the corticomedullary junction. Renal tomography showed the cysts and bilateral lobulated kidneys with details (Figure 3). Figure 3: Renal tomography of the patient revealed the cysts and bilateral lobulated kidneys with details.

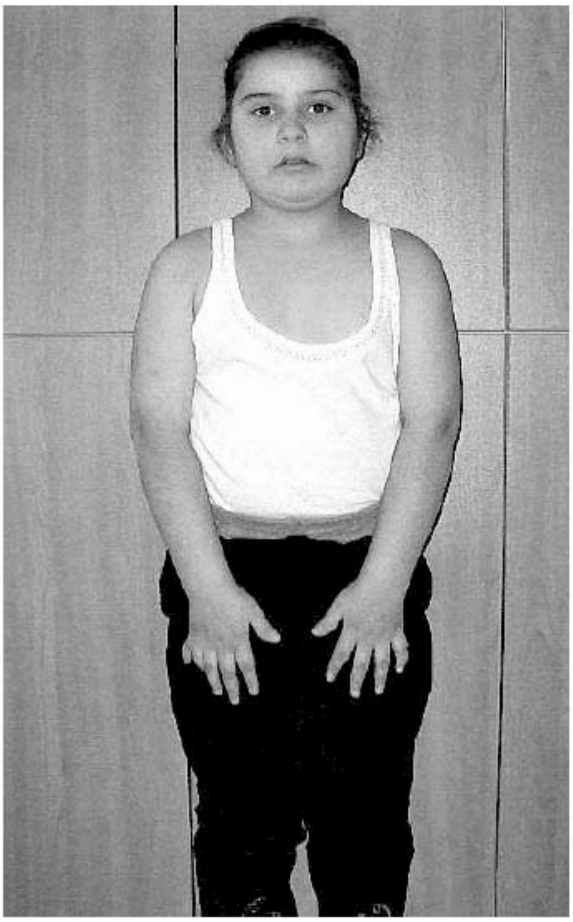

Figure 1. General appearance of the patient with markedly obesity and the sixth finger on the right hand.

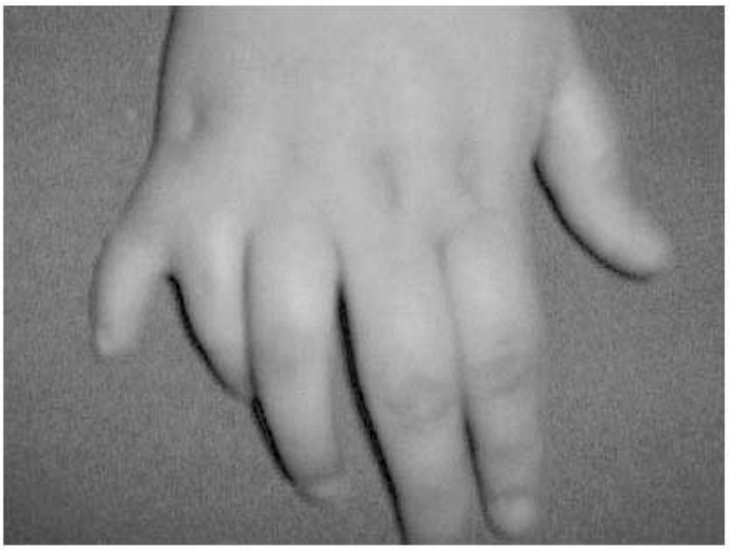

Figure 2. The patient's right hand with the sixth finger in details.

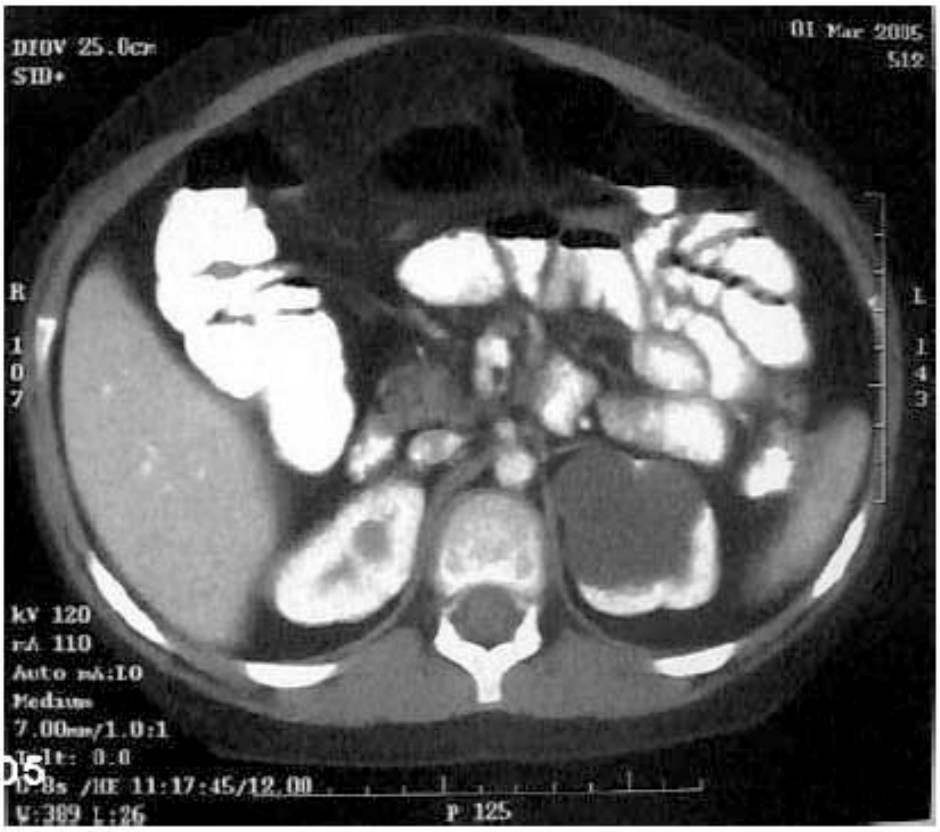

Figure 3. Renal tomography of the patient revealed the cysts and bilateral lobulated kidneys with details.

Discussion

BBS, a form of Laurence-Moon-Biedl syndrome, has five recognized features: retinal dystrophy, obesity, dysmorphic extremities, mental retardation and hypogonadism (in male patients). Polydactyly, syndactyly or brachydactyly may be seen. The degree of polydactyly, a prominent feature of this syndrome, varies from patient to patient, ranging from a wide fifth metatarsal or metacarpal to a complete sixth digit. Scores on tests of intelligence are usually low. Mental retardation, polydactyly and hypogonadism are not necessarily present in female patients [1]. Our case was diagnosed with having all the features of BBS, except hypogonadism. BBS is thought to be rare in the general population (<1/100,000), but is reported to have a 10-fold higher incidence in some isolated populations [1,5,6]. European studies from Switzerland and the Netherlands put the prevalence nearer 1 in 160,000. Recently a British study has estimated 1 in 125,000 may have BBS. Whatever the true value is, there is undoubtedly a major problem with under-diagnosis. Several females with BBS have given birth

successfully to healthy children. In Turkey there is no statistical study about BBS incidence, but most of the reported patients in the literature are from this population. Recently, renal anomalies also are mentioned among the cardinal signs of BBS. Structural and/or functional renal involvement has been reported in up to 90%–100% of patients in recent clinical studies [7]. The abnormalities can be divided loosely into structural and functional. A significant number of patients (30%) develop symptoms or signs of renal disease ranging from recurrent urinary tract infections (associated with reflux) to chronic renal failure. A minority (5%) develops end-stage renal failure and requires dialysis or transplantation [8]. The most-frequent renal functional abnormalities are due to tubular impairment of the urine concentrating and acidification aveibility and aminoaciduria. Structural renal abnormalities include small kidneys with blunting and clubbing of the calyces, fetal lobulation, cystic dysplasia, and diverticula. Renal abnormalities reflect a defect in maturation of the kidneys [7,9]. Our patient had normal serum creatinine values and estimated creatinine clearances and no a urine acidification defect, proteinuria, glycosuria, or hyperaminoaciduria. We found bilateral several sized cysts in our patient. The child had structural involvement without renal failure. Most patients reported in literature were detected the renal abnormalities after the symptoms of the renal impairment. In many syndromes and genetic disorders the kidneys are affected with or without cysts; these include Beckwith–Weideman syndrome, Opitz–Lemi syndrome, oto-brachial-digital syndrome, Meckel's syndrome, and Zellweger's syndrome among others [10]. Renal disease featuring fetal lobulation, calyceal clubbing, blunting, and cysts of diverticula is also characteristic of BBS patients, with renal impairment being a frequent and important cause of death [11]. The renal malformations in individuals with BBS has often been missed in childhood and should be looked for more systematically. Prenatal diagnosis of BBS may be made by ultrasound when large echogenic kidneys (which can mimic infantile polycystic kidneys) and polydactyly may be found. We wish to alert the clinician to all BBS cases with or without renal symptoms should be routinely evaluated for renal abnormalities.

References

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