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Microcardia in a Marasmic child with Rubinstein-Taybi Syndrome

Ghulam Nabi, MD, Omar Nabi Siraj, MBBS, Ashraf Abdul Alim Younis, MSc, MRCP

Introduction: Generally speaking microcardia occurs with or without cardiac atrophy. Microcardia with cardiac atrophy occurs in association with chronic wasting disease or under nutrition. Without cardiac atrophy is seen in rapid decrease in blood volume and correction of the underlying disease by appropriate therapy and restores the heart size to normal[1]. American physician Jack Herbert Rubinstein and Iranian-American Physician Hooshang Taybi, who gave their names to the syndrome. Rubinstein-Taybi syndrome (RTS) is a condition characterized by short stature, moderate to severe intellectual disability, distinctive facial features, and broad thumbs and first toes. This condition is uncommon. This condition is considered to have an autosomal dominant pattern of inheritance. Most cases result from new mutations in the gene and occur in people with no history of the disorder in their family.

Keywords: Microcardia in Rubinstein-Taybi syndrome.

Case Report: Five years old female Palestinian child was admitted in our hospital with severe respiratory tract infection with respiratory failure. She was managed aggressively and showed marked improvement and was discharged in stable condition after one week. This child was dysmorphic, severely undernourished (Marasmus), emaciated, generalized hypotonia; growth parameters below tenth centile (weight 5 kilogram. length 68 cm; head circumference 36 cm).

Figure 1: *Rubinstein-Taybi syndrome with evident features.*

Figure 2: Broad thumb in Rubinstein-Taybi syndrome.

She had microcephaly, mental retardation, hypertelorism, long eye lashes, epicanthic fold, maxillary hypoplasia micrognathia, triangular face, lower left ear with deformed left pinna, peak nose with low filtrum, high arched palate, broad thumbs and big thumbs and toes (See Figure 1 and 2). Antenatal history not significant. No history of consanguinity, similar family history. The patient had five sisters and one brother. The patient is the youngest among them. In the neonatal period, clinical and echocardiography revealed small ASD (atrial septal defect), VSD (ventricular septal defect), and PDA (patent ductus arteriosis). These defects closed without treatment. X-ray chest showed microcardia (See Figure 3). Chromosomal analysis and CT scan brain could not be done. It was a normal vaginal delivery with birth weight 2.5 kg. Soon after birth mother noticed that the baby had feeble movements and feeding difficulty.

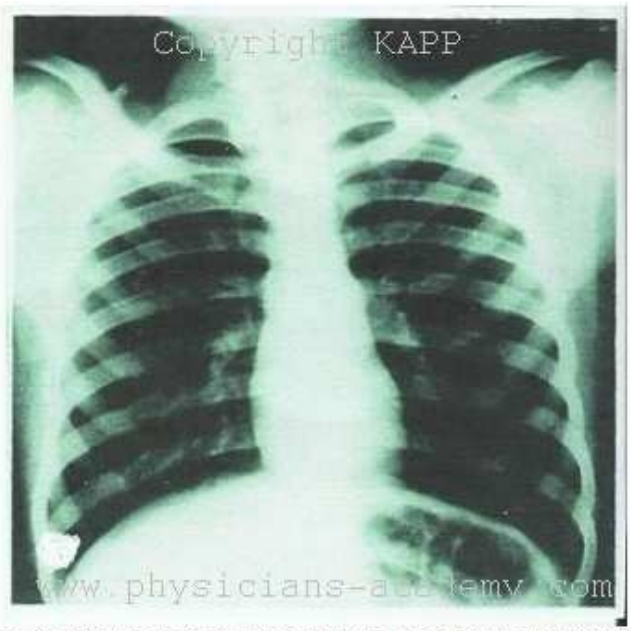

Figure 3: Microcardia is present due to severe malnutrition.

Discussion: X-ray chest showed the cardiac silhouette to be abnormally small and it was believed that this represented microcardia with cardiac atrophy secondary to severe malnutrition[2]. Characteristically if the cardiac silhouette is small and the pulmonary vascularity decreased, chest seems somewhat over-aereated. Apparently microcardia can be the result of stretching of the mediastinum and can be seen with conditions

leading to severe air trapping (Bronchiolitis, Asthma). In the neonate it can be part of the Adrenogenital syndrome. Microcardia with actual loss of muscle bulk (atrophy) can be seen with chronic debilitating infection, severe malnutrition or end stage malignancy[3]. Microcardia is a diagnostic problem and is certainly less frequently encountered than cardiac enlargement. However when it is seen, a pediatrician must consider variety of causative disorders. Generally speaking this condition with atrophy occurs in wasting diseases including malnutrition as in our case. Microcardia without atrophy is usually seen secondary in blood volume loss, severe dehydration (vomiting, diarrhea) or massive hemorrhage. Correction of the underlying disease by appropriate therapy restores the heart size normal. Microcardia is sometimes also seen with adrenal insufficiency (Addison's disease)[1]. Rubinstein-Taybi Syndrome (RTS) also known as Broad Thumb-Hallux syndrome is frequently recognized at birth or in infancy because of the striking facial features and characteristic hand and foot findings[2]. RTS is a genetic disorder of unknown cause. This condition is considered to have an autosomal dominant pattern of inheritance. RTS is related to chromosome 16. About 25% patients have been found with micro deletion of chromosome 16 but most patients have normal karyotype. Mutations in the CREBBP gene are responsible for some cases of Rubinstein-Taybi syndrome. The CREBBP gene provides instructions for making a protein that helps control the activity of many other genes[4]. Prenatal growth is often normal, height, weight, and head circumference percentiles rapidly drop in the first few months of life. Short stature is typical in adulthood. Obesity may occur in childhood or adolescence. Mental retardation is common**,** the average IQ ranges between 35 and 50; however developmental outcome varies considerably. A few individuals have been reported with IQs in the 70s[5]. Prenatal diagnosis and preimplantation genetic diagnosis (PGD) for at-risk pregnancies require prior identification of the disease-causing mutation in the family. Eye findings include strabismus, refractory errors, ptosis, nasolacrimal duct obstruction, cataracts, coloboma, nystagmus, glaucoma, and corneal abnormalities. Approximately one-third of affected individuals have a variety of congenital heart defects[6]. Renal abnormalities are very common and almost all boys have undescended testes. Orthopedic issues include dislocated patella, lax joints, spine curvatures, Legg-Perthes disease, slipped capital femoral epiphysis, and cervical vertebral abnormalities.
Obstructive sleep apnea syndrome is often a considerable problem and may be caused by the combination of a narrow palate, micrognathia, hypotonic, obesity, and easy collapsibility of the laryngeal walls. Keloids may occur with only minimal trauma to the skin. Dental problems include crowding of teeth, malocclusion, multiple caries, hypodontia, hyperdontia, natal teeth, and talon cusps on the upper incisors of the secondary dentition. Tumors reported in individuals with RTS include meningioma, Pilomatrixomas, rhabdomyosarcoma, pheochromocytoma, neuroblastoma, medulloblastoma, oligodendroglioma, leioyosarcoma, seminoma, odontoma, choristomaand leukemia[7]. Although prenatal growth is usually normal, parameters for height weight and head Circumference fall below the fifth percentile during infancy. Males often become overweight during childhood while females become overweight during adolescence. Average height for adult males is 153.1 cm and for adult females is 146.7 cm[8]. Multidisciplinary developmental evaluation includes assessment of gross and fine motor skills, speech/language, cognitive abilities, and vocational skills. Hearing evaluation includes using auditory brain stem evoked response to diagnose deafness and hereditary hearing loss. Dental and orthodontic evaluations. Echocardiogram or evaluation by cardiologist for structural heart defects. Assessment for gastroesophageal reflux as warranted. Assessment for constipation. Renal ultrasound examination. Assessment for presence of cryptorchidism in males. Orthopedic assessment of thumbs and halluxes, joints and spine[9,10]. Early intervention programs, special education, vocational training to address developmental disabilities and referral to behavioral specialists/psychologists and support groups. Monitoring of growth and feeding, especially in the first year of life; annual eye and hearing evaluations; and routine monitoring for cardiac, dental, and renal anomalies[11,12].

Conclusion: Microcardia with cardiac atrophy occurs in severe malnutrition as in our case. Rubinstein-Taybi syndrome is a condition characterized by short stature, moderate to severe intellectual disability, distinctive facial features broad thumbs and first toes. Other name for this condition is Broad Thumb-Hallux Syndrome. RTS is uncommon; it occurs in an estimated 1 in 100,000 to 125,000 newborns[13]. Rarely this syndrome can involve serious complications such as a failure to gain weight (failure to thrive) and life-threatening infections. Life expectancy generally does not seem to be affected except in children with complex cardiac defects. Cancers and respiratory infections are the most common cause of death. Survival rate in general is good and there are many reports of adults with Rubinstein-Taybi syndrome[14]. To the best of our knowledge, this is the first case of Microcardia in a Marasmic child with Rubinstein-Taybi Syndrome to be reported from the Middle East.

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Author Information: Dr. Ghulam Nabi, MD is Pediatric Consultant and Neonatologist at the Bugshan Hospital, Jeddah, Kingdom of Saudi Arabia. Dr. Omar Nabi Siraj, MBBS is Head of the Patient Affairs Department, Thumbay Hospital, Ajman, United Arab Emirates. E-mail: omarsiraj@gmail.com Dr. Ashraf Abdul Alim Younis, Msc, MRCP is Pediatric Consultant at the Dr. Irfan and Bagedo General Hospital, Jeddah, Kingdom of Saudi Arabia.
Corresponding Author: Dr. Ghulam Nabi, MD. PO Box: 5860 Jeddah 21432. Saudi Arabia. Mobile. 00966 502310661. Email: drgnabi2@gmail.com