

## An Eight Month Old Male Child with Laurence-Moon-Bardet-Biedl Syndrome: A Case Report

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**Abstract:** Laurence-Moon-Bardet-Biedl syndrome (LMBBS) is an important entity among the paediatric syndromes. It is an autosomal recessively transmitted genetic disorder. LMBBS is characterized by obesity, retinal degeneration, extra digits on the hands and feet (polydactyly), intellectual impairment and hypogonadism. The syndrome has historic importance as initially it was known as the LMBBS and then it is recently subcategorized into the well famous Laurence-Moon Syndrome (LMS) and the well published Bardet-Biedl Syndrome (BBS). We present a case report of a eight month old male child with LMBBS.

**Keywords:** Laurence-Moon-Bardet-Biedl Syndrome (LMBBS), Obesity, Polydactyly, Mental retardation, Hypogonadism.

### INTRODUCTION

Laurence-Moon-Bardet-Biedl syndrome (LMBBS) or the adipogenital-retinitis pigmentosa syndrome is an autosomal recessively transmitted genetic disorder [1]. The syndrome has many synonyms such as Laurence-Moon-Biedl syndrome, Bardet-Biedl syndrome (BBS) and Laurence-Moon Syndrome (LMS) which were based on the research work and postulations done by four physicians in the field of medicine. They are Dr. John Zachariah Laurence, Dr. Robert Charles Moon, Dr. Georges Louis Bardet and Dr. Artur Biedel [2, 3]. The children with the LMBBS have the cardinal features such as postaxial polydactyly, mental retardation, hypogonadism, central obesity along with retinal degeneration. Other manifestations such as endocrinological abnormalities, diabetes mellitus, short stature, developmental delay, renal system dysfunction, hepatic fibrosis, pendular nystagmas are often seen [4]. A case report of a eight month old male child with LMBBS is presented here and discussed.

### CASE REPORT

A eight month day old male baby was seen in the outpatient with his parents complaining that he is increasingly gaining weight when compared to other children in the neighbourhood. The birth history revealed that he was born to a 32 year old mother at 37 weeks gestation via spontaneous vaginal delivery weighing 2.5 kg with normal apgar score. His parents were of non-consanguineously married. The antenatal

ultrasonogram done three times were revealed that he has polydactyly in the palms and feet.. His parents were informed about this anomaly. The baby cried immediately after birth. The baby passed urine and meconium soon after delivery. There were no complications such as exaggerated physiological jaundice, feeding difficulty, breathing difficulty, central cyanosis, abnormal movements or umbilical bleeding. Baby has received only breastmilk till the first 4 months. He had a weight of six kilogram by three months. Recently the parents noticed the increase in weight gain. He had a weight of 10.5 kg on examination and appeared obese (Fig. 1). His milestones of development were assessed and were found mildly delayed in all spheres of development such as gross motor, fine motor, language and social milestones. The baby was not rolling over and his parents attributed to probably increasing weight gain. He had attained neck holding steadily in the sitting position at the sixth month. The baby was maintaining eye contact and was playful. He was breastfed and was given weaning feeds such as rice, dal, ragi and vegetables often. The parents were middle class socio economic group and had not given any tin feeds or breast milk supplements. His weight was in the range of obesity according to the Body mass index calculated and according to the growth charts. He was immunized to date in the primary health centre according to the National immunization schedule. On general physical examination, baby had stable vitals. He was afebrile, heart rate 102/minute, respiratory rate

36/minute, anterior fontanelle was normal. His oxygen saturation was 100% at room air. All peripheral pulses were equally felt. Blood pressure was 94/57 mm Hg in right upper limb, 93/55 mm Hg in left upper limb. 93/56 mm Hg in right lower limb. 92/56 mm Hg in left lower limb. The head-foot examination revealed only anomaly such as extra digits on the hands and feet (polydactyly), short toes (brachydactyly) and fusion and webbing of the toes (syndactyly) in the feet (Fig. 1). His respiratory effort remained good and was active and at times crying vigorously. Abdominal examination did not reveal any mass in the abdomen and there was no hepatosplenomegaly. Genito-urinary system examination showed small penis and scrotum with left undescended testes. Cardiovascular system examination was normal. The central nervous examination did not reveal any neurological deficits. There are no similar clinical findings in the paternal or maternal families. As the child had obesity, polydactyly, brachydactyly and syndactyly in the hands and feet, features of hypogonadism (such as underdeveloped external genitalia) along with delay in milestones of development a possibility of LMBBS was considered. The well-published BBS was a strong possibility as the baby did not have spastic paraparesis and was decided to investigate. The investigation done such as hemogram, blood sugar levels, thyroid function tests, serum cholesterol, lipid profile levels and renal function tests were normal. Ophthalmologist examination of the fundus was done and was reported normal and the baby was advised to follow up. The parents were advised to review at the outpatient for further evaluation with an ultrasound examination of the abdomen, 2D Echocardiogram and a Magnetic Resonant Imaging of the brain and evaluation of the eye on follow up which they wish to delay due to personal reasons.



**Fig. 1: Clinical photograph showing child with Laurence-Moon-Bardet-Biedl Syndrome having**

## **polydactyly, brachydactyly, syndactyly, fusion of toes and obesity**

### **DISCUSSION**

Laurence-Moon-Bardet-Biedl syndrome (LMBBS) or the adipogenital-retinitis pigmentosa syndrome is a genetic disorder that has autosomal recessive inheritance [1]. Dr. John Zachariah Laurence (1829-1870) a British ophthalmologist and Dr. Robert Charles Moon (1844-1914) who was born in Brighton and qualified as ophthalmic surgeon in the late 1800's described four out of eight siblings who had short stature, poor intelligence, retinitis pigmentosa associated with spastic paraparesis, and hypogonadism in the males [2]. In 1920, Dr. Georges Louis Bardet a French physician born in 1885 presented work on hypothalamic obesity of a patient who had hexadactyly, retinitis pigmentosa, and obesity. Then, in 1922, Dr. Artur Biedel (1869-1933) an endocrinologist published a data on siblings with retinitis pigmentosa, polydactyly, and mental retardation [3]. The disorder was named LMBBS as the presentations were very similar [1-3].

Various population based studies have been found in the literature regarding the prevalence of the LMBBS. In most of North America and Europe, LMBBS, namely the BBS has a prevalence of 1 in 140,000 to 1 in 160,000 newborns. It is more often seen in the Arab population especially in the Bedouin population of Kuwait, affecting about 1 in 13,500 newborns and also on the island of Newfoundland (off the east coast of Canada), where the prevalence is 1 in 17,000 newborns [3, 5]. Larger studies in the Indian population are needed and the literature review has revealed only few cases. There is no history of similar findings in the family of the case presented.

There are four genes responsible for LMBBS and accordingly there are four types of the LMBBS. The type 1 LMBBS has gene on chromosome 11q13, type 2 LMBBS on the chromosome 16q21, type 3 LMBBS found on chromosome 3p12 and the type 4 LMBBS has gene on chromosome 15q22. The most common form of LMBBS is type 1 and the most rare form is type 3. In every autosomal recessive disorder, for the child to be affected, both parents must be carriers of the defective gene and both pass on the defect to their child. There is a 1 in 4 chance of having a child with the LMBBS if both parents carry the abnormal genes causing LMBBS [6].

A myriad of clinical findings can be encountered in a child with LMBBS. The eye manifestations of LMBBS include rod-cone dystrophy (retinitis pigmentosa), strabismus, pendular nystagmus, myopia, optic atrophy, macular dystrophy, glaucoma and cataracts. The anomalies seen in the hands and feet are polydactyly (extra fingers and toes), brachydactyly

(short, stubby fingers and toes), syndactyly (webbing of the toes) and fusion of the toes. The case presented had polydactyly, syndactyly, brachydactyly and fusion especially in the toes (Fig. 1). Obesity is a cardinal feature of LMBBS and usually the excess weight gain in a child begins around ages one to two years) and the eight month old baby presented was obese. The delay in developmental milestones is very characteristic and the delay is seen in sitting, standing and walking of the child. Learning disabilities, speech delay, behavioral abnormalities and mental retardation is a major association. The baby presented has developmental delay obesity predisposes to complications such as hypercholesterolemia, hypertension, and left ventricular hypertrophy. Endocrine abnormalities such as diabetes mellitus and hypothyroidism are seen. The baby had all normal values after doing investigations such as hemogram, blood sugar levels, thyroid function tests, serum cholesterol, cholesterol fraction levels and renal function tests. Hypogonadism is manifested as small penis, undescended testes and infertile in males is common. The child presented had features of hypogonadism. Renal abnormalities and hepatic fibrosis, are seen. Short stature, ataxic gaits, deep-set eyes and premature frontal balding in adult males and LMBBS in a case of hirschsprung disease have been reported [8]. Associated congenital heart diseases in the LMBBS include atrial septal defect, ventricular septal defect, aortic stenosis, hypertrophy of the interventricular septum and dilated cardiomyopathy [9]. The case presented clinically did not have any evidence of a congenital heart disease.

Recently the LMBBS is further classified as the LMS and the BBS. LMS is characterised by retinal pigmentary degeneration, mental retardation, hypogonadism in association with progressive spastic paraparesis and distal muscle weakness, but without polydactyly [1-8]. In contrast the well publishes and the commoner BBS is characterised by retinitis pigmentosa, postaxial polydactyly, central obesity, mental retardation, hypogonadism, and renal dysfunction [4]. One of the major features of BBS is loss of vision. Night vision is affected and becomes profound by mid-childhood, followed by development of blind spots and later tunnel vision. The children with BBS also develop blurred central vision (poor visual acuity) and can become blind by adolescence or early adulthood [9]. The renal abnormalities can be life-threatening. The other features of BBS can include impaired speech, delayed development of milestones especially the motor skills such as standing and walking. Behavioral problems such as emotional instability and poor coordination are seen in BBS. In few children with BBS facial dysmorphism, dental anomalies, short or fused fingers and/or toes, and a partial or complete anosmia have also been reported [1, 4, 7]. The case presented does not have spastic paraparesis and is

considered to have BBS as there are similarities in the manifestations and features of a child with BBS.

The diagnosis of the LMBBS is mainly clinical. A high degree of suspicion and enthusiasm on behalf of the medical personal based on the results in the antenatal period is necessary. Any baby born with polydactyly, brachydactyly or syndactyly should be the trigger to suspect a LMBBS. There are diagnostic criteria for the diagnosis of the commoner BBS [4]. Life expectancy of a child with LMBBS is lower than that of the general population due to the associated morbidities, especially the renal complications [10].

The management of a child with LMBBS requires multidisciplinary approach. As there is no cure for this genetic disorder the problems associated are corrected and parents counselled by the group involving paediatrician, ophthalmologists, obstetrician, plastic and paediatric surgeons, dietician, speech therapists, physiotherapists, nephrologists and endocrinologists. Vision aids and mobility training are beneficial for vision improvement. Obesity - A dietician can help in the diet as these children are prone for hypercholesterolemia. Speech therapy and exercise for the mobility of joints and stimulation can be done. Renal diseases and various organ dysfunctions should be expertly reviewed by the concerned specialists. Polydactyly can be corrected surgically and the skin tags can be tied off at birth. Proper counselling and encouragement to the parents and regular follow up can bring lot of change in the lives of children with LMBBS [1, 4, 7, 9, 10].

## CONCLUSION

This case study concludes that awareness of LMBBS among the paediatricians, obstetricians and treating physicians is very important. Every newborn with a polydactyly should be carefully examined keeping the possibility of a LMBBS. Follow up is very important in children with the LMBBS, especially the commoner BBS. Genetics studies must be done in a child with LMBBS if feasible. This will also help in the counselling of the parents about this rare syndrome and improve the newborn care.

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