LAURENCE-MOON-BIEDL SYNDROME
A REVIEW OF FOUR CASES*

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The Laurence-Moon-Biedl syndrome is characterized by obesity, hypogenitalism, polydactylism, retinitis pigmentosa, and mental retardation. It was first reported by Laurence and Moon in 1866 in eight children of one family.[1] In 1922, Biedl pointed out the hereditary nature of the syndrome. Solis-Cohen and Weiss[2] conducted careful studies of the Laurence-Moon-Biedl syndrome as reported in the literature. Since Bardet suggested polydactylism as a criterion in the diagnosis of the syndrome, some authors have used the name Laurence-Moon-Bardet disease. The syndrome is said to be complete when all five of the deformities mentioned above are present. There are reports of incomplete Laurence-Moon-Biedl syndrome in the literature.

In 1932, Reilly and Lisser studied 77 reported cases of which 25 were complete, 10 were probably complete, and 26 were incomplete. Sixteen other cases were doubtful. In 1937, Warkany, Frauenberger and Mitchell[3] reported that only 24 of 102 cases were complete, the remainder being incomplete.

The etiology of this condition is not clear. Although it appears to be hereditary in nature it is reported that women with the syndrome have given birth to normal children. The principle genetic theories on the cause of the disease are:

1. A single recessive autosomal gene, similar to that which causes mongolism, causes the defect to form early in the embryo, bringing about changes in the ectodermal and mesodermal tissues. The abnormal gene itself may be the result of an enzyme defect.[4]
2. Modification of two or more recessive genes.[5]

Discussion

There have been many recent studies on the nature of chromosomes. Alstrom was able to demonstrate that the chromosomes of a male patient

* Paper presented at the Fifth National Pediatrics Congress, Hacettepe Children's Hospital, Ankara, October 1962.

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with Laurence-Moon-Biedl syndrome were of the female type. But neither Ciccarelli and Vesell [4] nor Harnden [6] confirmed any anomaly of the sex chromosomes.

There seems to be no conclusive evidence as to the comparative frequency of this syndrome in males and females, although there is reason to believe that it is more frequent among males.

Obesity is the most common characteristic of Laurence-Moon-Biedl syndrome and it is hypophysial in nature. There is some evidence to suggest that obesity can be controlled by diet and the use of thyroid extracts. Hypothyroid does not, however, seem to be a factor effecting obesity in this syndrome.

Defects of vision are seen as early as five years of age or as late as the middle years. Retinal degeneration is common. Pigmentation defects are varied and typical retinitis pigmentosa is not seen in all patients. Clay places the incidence of this particular condition at about 15 per cent.

Polydactylism is another common characteristic of the disease. The extra digit can be symmetrical or asymmetrical, and may appear on one or more extremities. The extra finger may be only a fibrous strip or it may be a completely formed finger with a bony structure. Polydactylism is not always present in the incomplete form of the syndrome. It may appear alone in other members of the family who are otherwise unaffected, as was the case with one of our patients.

Mental retardation, often evident in the early years of life, is seen in the majority of cases. The degree of retardation varies, and it can become evident even after a normal babyhood.

Genital hypoplasia is quite frequent and varies in degree.

Apart from the characteristics mentioned so far, astigmatism, strabismus, deafness, short skeletal structure, short and squared fingertips, scoliosis, malformation of the head, microcephalism, and congenital heart diseases may also accompany this disease.

In the past five years, five patients with this syndrome have been seen at our hospital. The first case has been previously described[2] and the four subsequent ones are presented here for the first time.

Case Reports

Case 1: A 10 year old girl was admitted to our clinic with complaints of vomiting and forgetfulness. She had been ill with a high fever for two months before coming to the clinic.

The twelfth child of the family, she had been mentally retarded since birth, though pregnancy and delivery were reported to be normal. Three sisters were normal, but the other children had died from various illnesses before the age of one year. The parents of the patient were related. No other anomalies were reported in the family.

The patient was stout and inattentive. Her blood pressure was 130/70 mm Hg. There was bleeding of the gums and tongue. Papillae were pale and atrophic and there was evidence of atypical retinitis pigmentosa. There was an extra toe on her right foot.

Blood test results were as follows: NPN: 297 mg per cent; CO_2: 5.38 mEq per liter; K 3: 1 mEq per liter; Cl: 110.5 mEq. per liter; I P: 11.8 mg per cent; Ca: 5.6 mg per cent. Urinalysis indicated a plus 3 protein. Microscopic examination showed 5 to 6 leucocytes in all fields, erythrocytes and granular casts.

Case 2: An 11 year old boy was brought to the clinic in 1962. He was polydactylic, had visual defects, and was mentally retarded. The visual defects had been evident since the age of 18 months. His mental backwardness (he was not successful in school) had drawn his parents' attention to his condition.

The patient's parents and four sisters were healthy and nomal. There was no family history of polydactylism or mental retardation.

Physical examination: Weight: 44.5 Kg (90th percentile); height: 144 cm (25th percentile). The patient was stout and had a good appetite. The obesity was hypophysial. Sibilant and sonorous rales were present in the lungs. The liver could be felt 2.5 cm below the right costal margin. Both the right hand and the left foot had one extra digit which were attached to the small digit in each case. Eye examination revealed myopathy and typical retinopathy pigmentation. Roentgen ray examination of the cranium showed that the sella turcica was normal. The patient was given the Standard Binet Intelligence test but did not progress beyond the two-year-old level. The test was discontinued when the patient became uncooperative.

Cases 3 and 4: These patients were brothers, eight years old and three and a half years old. The older boy was mentally retarded, had small genitals, and polydactylism of both feet, and could not see well at night. He had had nephritis two months prior to coming to our clinic, and had been treated with hormones. His appetite was said to be good.

This patient had a normal birth following a normal pregnancy. His parents, cousins, were 31 years old. Two sisters had died at the age of 12 and 18 months. The family history was otherwise normal.

Physical examination: Weight: 35.4 Kg (97th percentile); height: 123 cm (10th percentile); head perimeter: 52 cm (microcephalic). His obesity was hypophysial, and his actions resembled those of a small child. Sonorous and sibilant rales could be heard in the lungs. His genitals were small and the testes did not reach the scrotum. The extremities were short and squared, there was a sixth toe on the right foot, and a pes planus deformity of both feet. On funduscopy, degeneration in the area of the peripapillae, which decreased near the periphery, was apparent. No pigmentary retinopathy was seen. A Standard Binet Intelligence test was administered which resulted in an I. Q. of 28 (two years and five months). Cranial roentgenography, VDRL, Kahn, PPD, and urine tests were all within normal limits.

His brother, our fourth case, also had polydactylism of both feet and hands.

Physical examination: Weight: 19.6 Kg (97th percentile); height: 100 cm (50th percentile); head perimeter: 55 cm. His extremities were short and the fingers and toes were short and squared. Pes planus deformity was present in both feet. The genitals were small, and the testes did not reach the scrotum. His eyes were normal. His intelligence quotient could not be determined as the patient was not cooperative. Laboratory tests and roentgen ray examination of the cranium were normal.

Conclusion

These four patients present typical pictures of Laurence-Moon-Biedl syndrome. In the first and third cases degenerative changes in the retina and atypical retinitis were found. The second case showed typical retinitis pigmentosa and in the last case the eyes were normal. This patient is quite young however and it is felt that the visual defects will develop later in his life. For the present, this case was diagnosed as incomplete Laurence-Moon-Biedl syndrome.

The frequency of this syndrome in the male (three to one among our cases) is consistent with the reports in the literature. We also noted that in three of our four cases, the parents of the patient were related.

Summary

Four cases of Laurence-Moon-Biedl syndrome, three complete, one incomplete, are presented, with a discussion of the history and etiology of the condition.

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