 Paediatrica Indonesiana 20 : 130 — 138. May — June 1980.

CASE REPORT

Morquio's Disease

by

HARIARTI S. PRAMULJO, L.A. TAMAELA and W.T. KARYOMANGGOLO

(Department of Child Health, Medical School, University of Indonesia, Jakarta)

Abstract

Morquio's disease belongs to the group of muncopolysaccharidosis which causes deformities of the bones. The diagnosis is made by radiological examinations and others such as biochemical examination.

Four cases of Morquio's disease are presented, which are the first reported in the Indonesian literature. All cases are of Chinese origin.

Cervical fusion had been done in one of the cases to prevent the complication of neurologic sequelae and sudden death. The symptoms, diagnosis and therapeutic measures to prevent sequelae have been discussed.

Received 20th. August 1979.

Deformities of the vertebra, chest and extremities, which looked like severe rickets but were resistent to vitamin D were described by Morquio in 1929 (Tachdjian, 1972). After that Tachdjian (1972) collected ± 100 cases from the literature all over the world. Nowadays this disease is known as an inborn error of mucopolysaccharide metabolism which can be hereditary of origin. Tetra paresis, paraplegia and sudden death as a result of spinal cord compression are the complications of this disease. The authors report 4 cases of Morquio's disease, of which 3 are siblings, with the purpose to discuss the clinical symptoms, the radiological findings of the disease and the complications.

Case Reports

Case I : J, a 5 year-old girl of Chinese origin was hospitalized because she could not walk anymore. Since 3 years old there were deformities of her extremities, her elbows and ankles were swollen. One month before admittance she began to tremble on both legs and was fearful of falling when she walked. She was the 4th of 5 siblings, born spontaneousiy with a body weight of 3,8 kg, and a body length of 50 cm. There were no congenital anomalies. Motoric and mental development were normal. There was no consanguinity between her parents. One of her brothers with the same symptoms died suddenly at the age of 4½ years. No other member of the family suffered from the same disease.

Physical examination on admission: a small girl with a body weight of 12 kg and a body length of 85 cm, a relatively large head and a short neck. There were no abnormalities of the cranial nerves. The chest was grossly deformed — a pigeon chest — but there were no abnormalities of the heart and lungs. The liver was palpable 2 cm below the right costal margin. The extremities were short with stubby fingers and swollen joints. There were tetra paresis, increased physiological reflexes, clonus and a positive Babinsky reflex.

Radiological examination: Platyspondylia of the whole vertebral column, dysplasia of the odontoid, coxa valga and ossification disturbances of the lower extremity epiphyses. The metaphyses of the upper extremities had a V — form, the skull was within normal limits. Based on these X-ray findings the diagnosis of Morquio's disease was made. A biochemical examination of the urine ("Mucopolysaccharide such test") was done, with a positive result.

An operation was performed to immobilize the three upper cervical bodies and to relieve the compression of the spinal cord. After operation movement of the extremities improved. Nowadays the patient can move her arms and legs normally.

Case II : LCN, a 7 year — old Chinese girl was brought into the hospital with severe bone deformities. She was a dwarf and had difficulties in walking since early childhood. She was born full term, spontaneously.

Data concerning her developmental history was not clear. She was the 3rd child of the family with the same disease. (The otheys are cases III and IV).

On admittance she looked alert, active, and had a body weight of 11½ kg and a body length of 86 cm. The head was large with a short neck and the thoracic cage deformed: a pigeon chest. Both corneas were rather cloudy (with astigmatism), the fundus oculi appeared to be normal. Heart and lungs were within normal limits. The abdomen was supple and the liver was palpable 2 cm below the right costal margin.

Extremities were broad with stubby fingers and swollen joints. A bone survey revealed the same radiological changes as in case I. The diagnosis of Morquio's disease was made but no operation could be done yet.

Case III : LAN, a 16-year-old-girl, the elder sister of case II. She was paralysed since the age of 12 years. Born spontaneously with no congenital abnormalities. On admittance she looked alert, the head was enlarged with a short neck, the chest deformed. The eyes were myopic but the corneas were clear.

Heart and lungs were normal. The abdomen was supple, the liver not palpable. The extremities were broad with stubby fingers and swollen joints. The legs were hypotrophic and paralysed. The skeletal abnormalities were similar to those of the other cases.

Case IV : LPH, a 17-year-old girl. She was the eldest sister of case II and III. Born in 1960, spontaneously and at term, without congenital anomalies. The motoric development seemed rather slow.

Deformity of the legs was noted since the age of one year, a dwarflike appearance since 2 years of age. When she was brought into the hospital she looked alert and active.

The head was large with a short neck and a pigeon chest was also found. Her eyes were normal. There were no abnormalities of the heart and lungs. The abdomen was supple, the liver was palpable 3 cm below the right costal margin, but the spleen was not palpable. The extremities were short with stubby fingers, swollen joints and knock knees. The bone X-ray findings were similar to the other cases.

Discussion

Mucopolysaccharidosis is an inborn error of metabolism, one of a lysosomal disorder of carbohydrate metabolism (Tachdjian, 1972).

Disturbances in mucopolysaccharide metabolism are divided into six different types by Mc. Kusick and are delineated by their mode of inheritance, by the specific mucopolysaccharide involved and by their clinical and rontgenographic features (Tachdjian, 1972; Horton and Schimke, 1970). The classification is as follows: type I: Hurler Syndrome, type II: Hunter Syndrome, type III: Sanfillipo Syndrome, type IV: Mor-

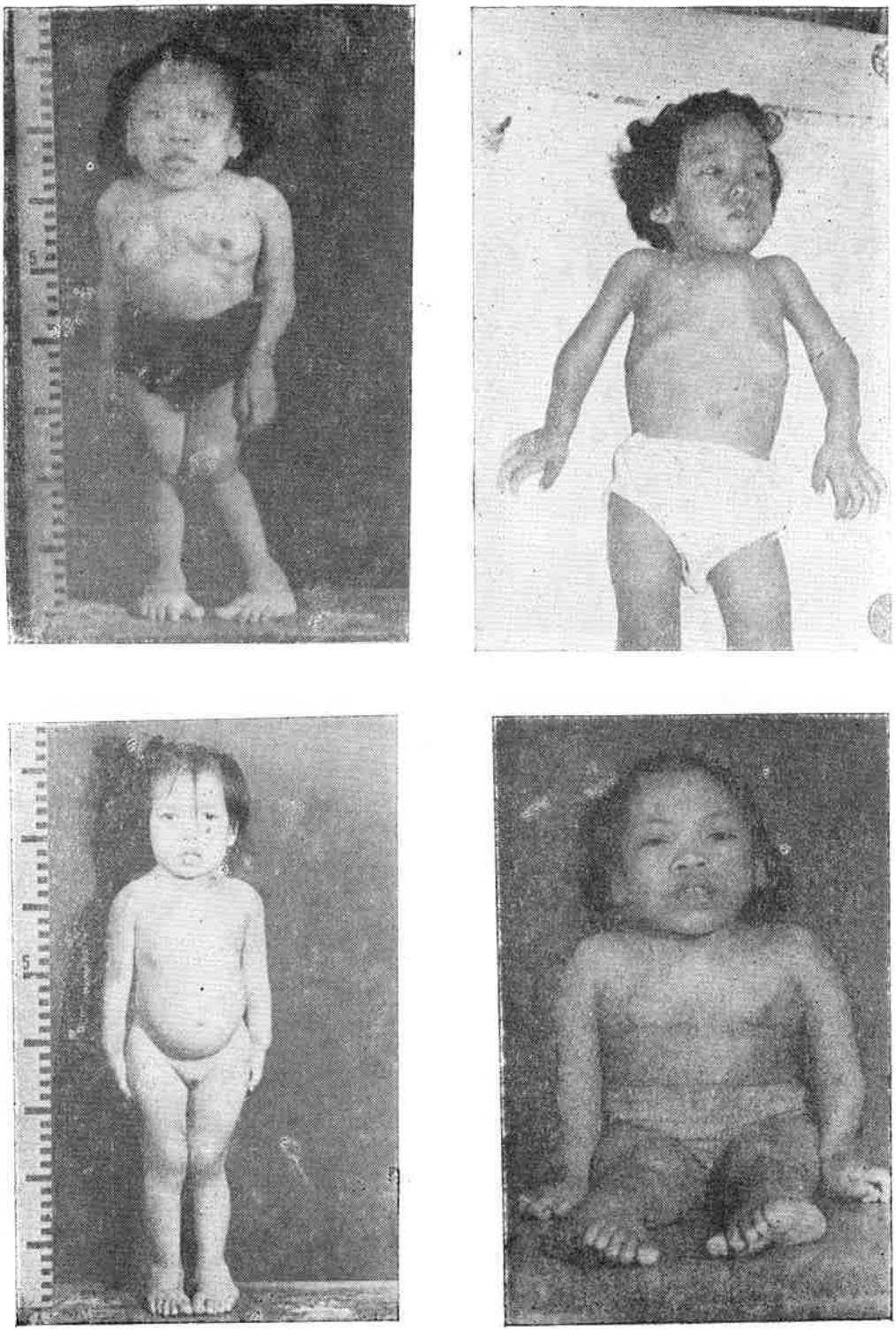

FIG. 1a, b, c, d : *Dwarflike appearance, shortness of the trunk, knock — knees, short neck with relative large head, pigeon chest and deformities of the extremities are clearly seen in all cases*

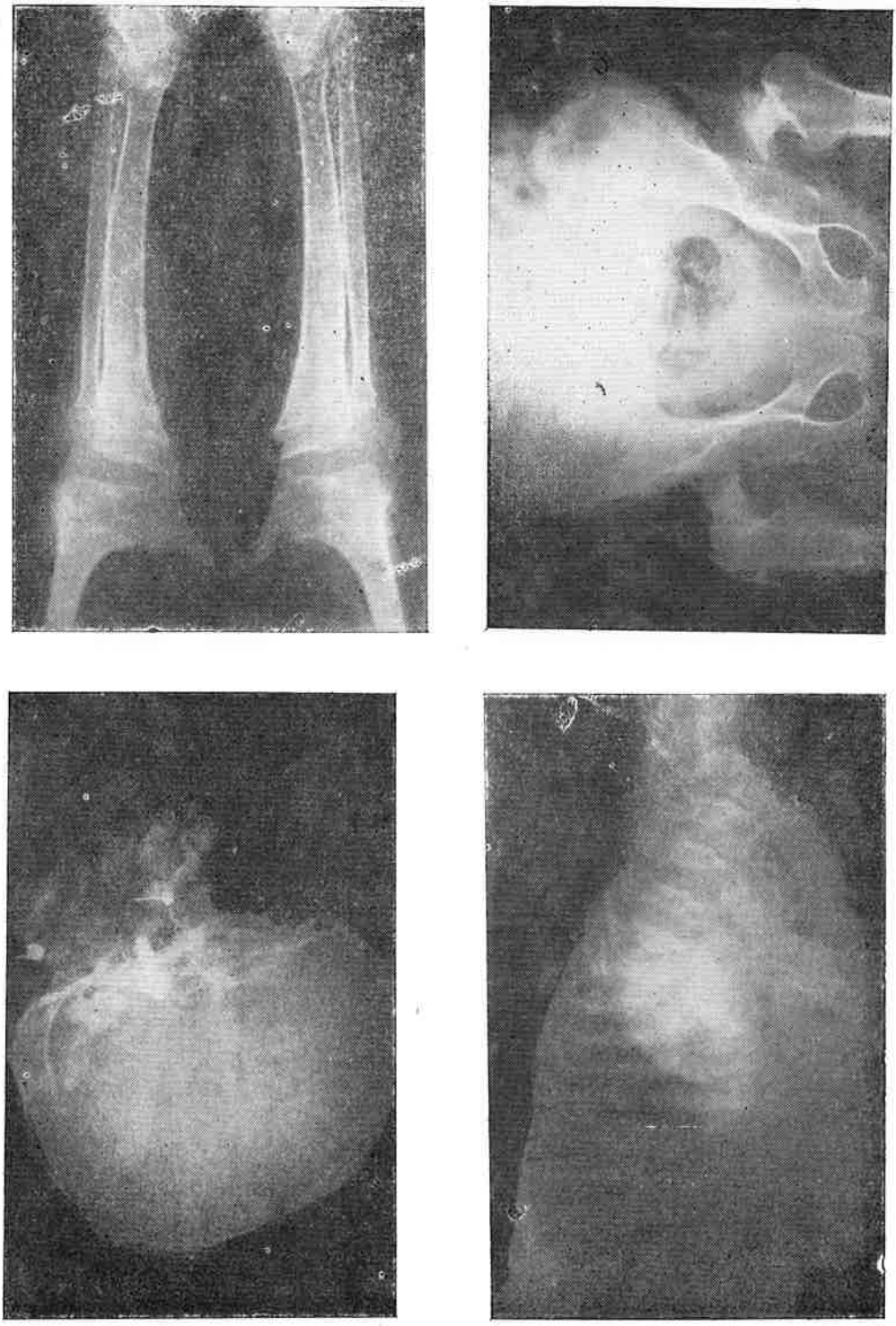

FIG. 2a, b, c, d : *Bone surveys revealed the same radiological findings in all cases: dysplasia of the odontoid process (Fig. 2a), flattening of the vertebral bodies with central tongue (Fig. 2b), hypertrophy of the metaphyses of the long bones (Fig. 2c) and Coxa Valga (Fig. 2d)*

quio Syndrome, type V: Sheie Syndrome, type VI: Maroteaux — Lamy Syndrome.

Morquio Syndrome, also known as Morquio's disease, spondylo-epiphyseal dysplasia, Brailford's disease and chondro-osteodystrophy, is a rare hereditary condition (Tachdjian, 1972). Until now we do not know any reported case in the Indonesian literature. The cause of this disease is unknown. Some authors suggest that consanguinity, a recessive mode of transmision, may play a role (Tachdjian, 1972 and Spranger et al., 1974). Sporadic cases do occur (Tachdjian, 1972).

The basic defect appears to be in the formation of articular cartilage and is due to disordered maturation of the epiphyseal chondroblasts. The chondrocytes in the epiphysis are arranged irregularly, showing zones of vacuolisation and loss of normal staining properties of ground substance. The epiphyseal plate is irregular, with islands of cartilage cells within the bony trabeculae of the metaphysis. The line of the provisional zone of calcification is interrupted and distorted (Tachdjian, 1972).

It is said that the developmental error is usually not apparent at birth and the affected infants are thought to be normal (Tachdjian, 1972).

All of our cases were born spontaneously with no congenital malformation. Features of the disease became apparent when they began to walk (case II and III) and later on the characteristic findings became increasingly evident. Similar to the findings of other authors (Tachdjian, 1972 and Spranger, 1974), in all of our cases the typical clinical features were established at the age of four years. It is said that the dorsolumbar kyphosis is usually the first deformity to attract the parents' attention. However in our cases all were brought to the hospital in a late stage, with general bone malformation and even paralysis (case I-III).

The dwarflike appearrance is due to shortness of the trunk and knock knees, although the limbs are relatively long. A number of generalized and symetrical deformities of the skeleton (Tachdjian, 1972) are clearly seen in all of our cases.

The neck is short and the patient stands with the knees and hips flexed in a crouched position, with the head thrust forward and sunk between the high shoulders. The size and shape of the head is normal, though it appears large because of the diminished growth of the trunk and limbs. The facies is relativelv normal.

The level of intelligence is within normal limits. The anteroposterior diameter of the chest is increased, with the sternum projecting forward (pectus carinatum-pigeon chest).

The joints especially of the knees, elbows, wrists and ankles, are enlarged, owing to hypertrophy of the bone ends and not of the soft tissues. (Tachdjian, 1972).

Limitation of motion, especially of extension of the knees due to the bony deformity of the epiphyses, as recorded in all of our cases. There was no hypermobility of the joints as stated by Tachdjian (1972). The hands and feet were short, with broad digits. The gait was waddling (case I, II and IV).

The distinctive rontgenographic features of Morquio's disease are due to defective conversion of cartilage to mature bone and are manifested as deformities of the spine and the epiphyses of long bones.

The vertebral bodies in the thoracic and lumbar regions are flattened (platy spondylia) with irregular and defective upper and lower surfaces, which tend to approximate each other anteriorly, forming a central projection or tongue (Kozlowski, 1974). The intervertebral discs are narrower than normal, although, in early cases, they may appear widened. There is odontoid hypoplasia and signs of atlanto-occipital instability (Spranger et al., 1974 and Lipson 1977).

All of our cases have platyspondylia and odontoid hypoplasia. Diagnostic measures include radiograms of the cervical spine in flexion, neutral position and extension. Lateral rontgenogram of the cervical spine in neutral position, an antero-posterior projection of the skull and the upper cervical spine-Water's projection with open mouth-failed to show the odontoid process in all cases.

It was said that the epiphyses of the long tubular bones are irregularly ossified, with the centre of ossification appearing as tripple foci that gradually fuse. As a result, they are broad and flattened (Tachdjian, 1972). There are conically shaped bases of the second through fifth metacarpals (Spranger, 1974).

As was said before, changes in the skull, if any, are minimal, and the facial bones develop normally.

The possibility of antenatal diagnosis by amnio-centesis, fetoscopy or ultra sound should be remembered (Kozlowski, 1976).

Elevated urinary excretion of keratan-sulphate and chondroitin-6-sulphate in children has a diagnostic value (Spranger et al., 1974; Spranger and German, 1967). There is also abnormally coarse inclusion in peripheral granulocytes (Spranger et al., 1974).

We did the Mucopolysaccharide such-test as Spranger and German (1976) did, to show the quantitative mucopolysaccharide in the urine. It is a modification of the Barry and Spinager method. Some tests which demonstrate the increased keratan sulphate excretion in Morquio's disease was done by Pedrini ,Pennoch, Di Ferrante , Robertson and Harry with different methods (Spranger and German, 1967).

Patients may reach their sixties. They frequently die from cardiopulmonary

causes or from complications of spinal cord compression, resulting from atlanto — axial dislocation or thoracic kyphosis (Spranger et al., 1974).

Progression of the deformities is usually arrested as growth is completed; however, with age, degenerative changes and arthritis in the joints might develop.

There is no specific treatment. Surgical correction of deformity should be undertaken only after careful evaluation and analysis. Pain and difficulty in walking should be the only indications for operative intervention (Tachdjian, 1972).

However Spranger et al. (1974) and Lipson (1977) suggest fusion of the posterior upper cervical spine as a routine procedure in patients with Morquio's disease to correct the atlanto-occipital instability resulting from hypoplasia of the odontoid process and ligamentous laxity. In this way the compression of the spinal cord may be prevented.

Lipson (1977) reviewed 11 cases of Morquio's disease and found that they were at risk for acute traumatic quadriparesis, chronic myelopathy of a variable and often rapid rate of progression, and sudden death by respiratory arrest.

To our opinion fatigue and trembling of the extremities are the early signs of compression of the spinal cord and are already indications for operation. Two of our cases were already paralysed; the one with tetraparesis had been operated upon and a posterior cervical fusion was made resulting in improvement of the paresis.

Acknowledgement

The authors are grateful to Padmo Santjojo M.D. from the Department of Neurosurgery, Oen Liang Hie, M.D. from the Department of Biochemistry and Chehab Rukmi Hilmi M.D.., from the Department of Orthopedic Surgery for their close cooperation and generous assistance in managing these cases.

REFERENCES

1. HORTON, W.A. and SCIMKE, R.N. : A new mucopolysaccharidosis. J. Pediatr. 77 : 252 - 258 (1970).

2. KOZLOWSKI, K. : Platyspondyly in children. Paediatr. Radiol. 2:81-88 (1974). Bone dysplasia in Radiographic diagnosis Paediatr. Radiol. 4 : 66 - 68 (1976).

3. LIPSON, S.J. : Dysplasia of the Odontoid process in Morquio's Syndrome causing quadriparesis. J. Bone. Joint Surgery 59a : 340 (1977).

4. PENNOCK, C.A. : A review and selection of simple laboratory methods used for the study of glycosaminoglycan ex-

cretion and the diagnosis of the mucopolysaccharidosis. J. Clin. Path. 29 : 111 - 123 (1976).

5. SPRANGER, J. und GERMAN, R.V. : Mucopolisaccharide — suchtest. Pediatr. Prax. 6 : 659 - 660 (1967).

6. SPRANGER, J.; LANGER, L.O. and WIEDEMAN, H.R. : Bone dysplasia. An atlas of constitutional disorders of skeletal development. (Saunders, Philadelphia/Toronto 1974).

7. TACHDJIAN, M.O. : Pediatric Orthopaedics, p. 287 - 301. (Saunders. Philadelphia/London/Toronto 1972).