CASE REPORT

Bone Abnormalities in Mucopolysaccharide Syndrome Type 2 (Hunter's Syndrome): A Case Report

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ABSTRACT

Hunter's syndrome (MPS II) is a rare X-linked recessive disorder caused by a deficiency of the lysosomal enzyme iduronate-2-sulfatase, with an estimated incidence of 1 in 162,000 live male births. It affects only males due to its inheritance pattern and leads to glycosaminoglycan (GAG) accumulation in various organs, resulting in clinical manifestations including severe bone abnormalities. Complications may include hydrocephalus, short stature, and cardiomyopathy. We report a 15-year-old male with MPS II presenting with limited joint mobility, bone deformity, and growth delay. Symptoms began at age 1, but diagnosis was delayed until age 4 due to limited resources. Radiological evaluation showed dysostosis multiplex, including coarse facial features, widened sella, and J-shaped sella turcica. The patient is currently receiving calcium and vitamin D3 supplementation. This case highlights the importance of early recognition of skeletal abnormalities and the role of multidisciplinary care in improving outcomes in MPS II.
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INTRODUCTION

Hunter syndrome, or Mucopolysaccharidosis type II (MPS II), is a rare X-linked recessive lysosomal storage disorder caused by deficiency of iduronate-2-sulfatase (I2S), leading to accumulation of glycosaminoglycans (GAGs) and progressive, irreversible disease (1,2). It predominantly affects males and has an incidence of approximately 1 in 162,000 live male births (1,3). The condition results from mutations in the IDS gene, which is expressed in most cell types, leading to multisystem involvement with variable severity. Clinical features include coarse facial features, short stature, skeletal deformities, joint stiffness, hernias, respiratory and cardiac complications, ENT manifestations, organomegaly, and neurological involvement in about two-thirds of cases (4).

Clinically, MPS II is classified into severe and attenuated forms. The severe type presents before age two with significant cognitive and behavioral impairment, while the attenuated type shows slower progression with near-normal cognition. No clear genotype–phenotype correlation has been established, and the variability in neurological involvement remains unclear (4). Delayed diagnosis and treatment remain major challenges, often resulting in irreversible organ damage and reduced quality of life (1,5). In developing countries such as Indonesia, limited access to diagnostic tools and high treatment costs contribute to underdiagnosis and suboptimal management, highlighting the importance of case reporting to improve awareness (4).

CASE REPORT

A 15-year-old boy was admitted to a regional general hospital for respiratory problems due to swollen tonsils for a week and progressive feeding difficulties for three days. He was born at 42 weeks of gestation via caesarean section, weighing 2900 grams. He was exclusively breastfed for one month but was switched to formula milk due to poor maternal milk flow. Complementary feeding started at 6 months. At the age of 1 year, his parents noted abnormal facial features (Figure 1) and skeletal deformities including coarse facial features, thickened skin, enlarged jaw, crooked hands, and curved fingers.

At age 4, he presented to the pediatric clinic with a febrile illness and was found to have valvular heart disease. He was referred to a national referral hospital for regular follow-up in the pediatric endocrine department, where

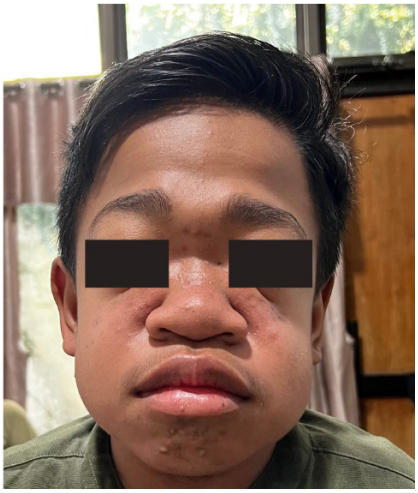

Figure 1: Coarse facial appearance. Absence of a smooth appearance. Sharply visible on the eyebrows, nose, lips, mouth, and chin

auditory and visual functions, bone x-rays, and blood tests were performed (Figure 2). Laboratory findings showed alkaline phosphatase at 214 U/L and total vitamin D 25-OH at 17.1 ng/mL. These findings are consistent with vitamin D deficiency with low age-appropriate ALP. His physical growth was delayed. At age 8, his height was 140 cm and increased slowly to 144 cm at age 15. He had normal developmental milestones and started preschool at age 4, primary school at 6, and junior high school at age 12. His academic and social performance was reportedly good.

On admission at age 15, physical examination revealed frontal bossing, caput quadratum, low-set ears, depressed nasal bridge, prominent tongue, short neck, short stubby fingers, and joint stiffness with slightly flexed elbows (Figure 3). He had inspiratory stridor, central cyanosis, tachypnea, and an umbilical hernia. Cardiovascular examination revealed a hyperactive precordium, apex beat displaced 5.2 cm lateral to the midclavicular line,

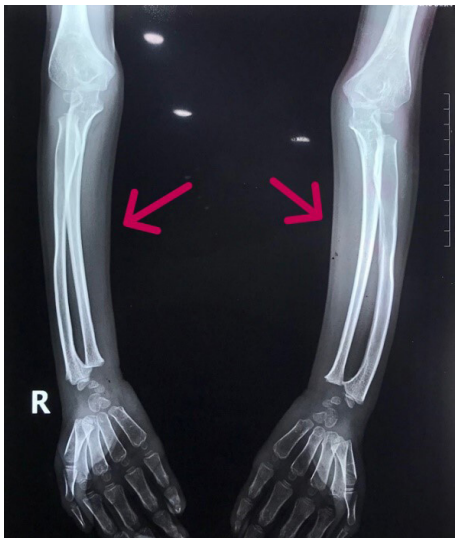

Figure 2: Antebrachii X-ray. There was bowing of the radius, bilateral ulna, and bilateral human phalanx accompanied by thinning of the cortex and widening of the medulla.

Figure 3: Clinical appearance of the extremities. Short and stubby fingers.

tachycardia, and a grade 3 pansystolic murmur at the apex radiating to the axilla. Abdominal examination showed signs of ascites without hepatosplenomegaly.

Laboratory results showed WBC 3.3x10^9/L with 43.3% lymphocytes, 48.8% neutrophils, normocytosis, normochromia, and anisopoikilocytosis. Serum electrolytes were within normal range. A lateral skull X-ray demonstrated a J-shaped sella turcica (Figure 4). Echocardiography revealed moderate mitral regurgitation due to anterior mitral leaflet prolapse with a peak pressure gradient of 110.2 mmHg.

DISCUSSION

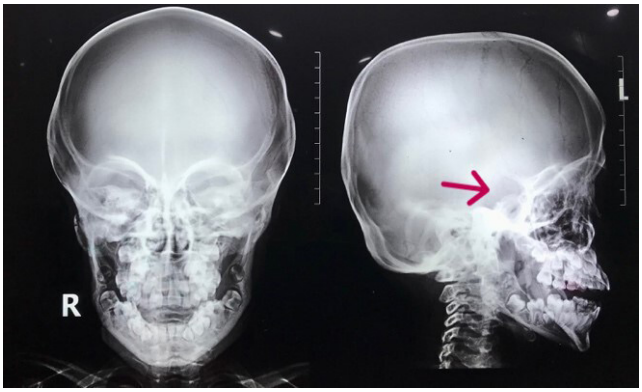

Figure 4: Lateral head X-ray. Widened and J-shaped sella. Mesocephalic or Brachiocephalic.

The development of bone abnormalities in patients with Mucopolysaccharide Syndrome Type 2 (MPS II) begins in childhood and continues into adulthood. In early life, infants with MPS II may appear normal. Over time, accumulation of glycosaminoglycans (GAGs) in bones and tissues leads to progressive bone deformities. These changes become more pronounced at three to five years of age, with the appearance of physical features such as facial coarsening, joint stiffness and skeletal abnormalities. The progression of skeletal deformities continues, leading to a variety of significant musculoskeletal problems.

Skeletal abnormalities in MPS II patients include various bones, especially the spine, long bones such as femur

and tibia, and ribs. In the spine, the most common abnormalities are oval-shaped vertebrae and deformities such as kyphosis or lordosis. Long bones have widening at the base and abnormal growth, while ribs can be notched and short. In addition, deformities of the hands and feet are common, characterised by short and curved fingers.

Clinical manifestations of bone abnormalities in MPS II patients vary and include chronic joint pain, limitation of motion, and muscle weakness. The limitation of joint motion is due to thickening of the tissues around the joint leading to contractures, resulting in progressively limited mobility. Progressive skeletal deformities also lead to postural problems such as thoracic gibus and lumbar lordosis, which interfere with daily activities. In young patients, delayed gross motor development is common.

Bone growth in MPS II patients usually stops earlier than in children without the condition. Most patients reach their maximum height in their teens, after which bone growth slows down or stops altogether. This is due to disruption of the bone growth plates due to GAG accumulation. Overall, patients with MPS II tend to have a shorter height compared to the general population.

This case report has several limitations. First, as it describes a single patient's clinical course, the findings cannot be generalized to the population. Second, without a control group, it is not possible to establish a causal relationship between the observed findings and clinical outcomes. The last one is that the data was collected retrospectively from medical records, which may be incomplete or lack detailed documentation. Nevertheless, acknowledging these limitations is essential, as it provides transparency and allows readers to critically assess the strength of the evidence presented. Despite its limitations, this case contributes to evidence-based medicine by enriching clinical understanding of the skeletal manifestations of MPS II, especially in resource-limited settings where early diagnosis and management remain a challenge.

CONCLUSION

Mucopolysaccharide syndrome type 2 (MPS II) is a genetic disorder on the X chromosome that results in a deficiency of the lysosomal enzyme iduronate-2-sulfatase. There is accumulation of Glycosaminoglycans (GAGs) in body tissues causes a variety of clinical manifestations, ec. limited joint mobility, bone deformity, and delayed physical development. MPS II is the most common mucopolysaccharidosis and almost always occurs in males due to X-linked recessive inheritance.

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