

Denouement and Discussion

Primary Hypothyroidism

A radiograph of the left hip (Figure 1) showed an irregular and fragmented left capital femoral epiphysis. A hand radiograph showed bone age delayed at 2 years and poorly ossified epiphyses of the phalanges, metacarpals, radius, and ulna (Figure 2A). A skeletal survey showed flattened and fragmented epiphyses of the tubular bones, predominantly at the hips and knees (Figure 2B), and varying degrees of flattening of the vertebral bodies (Figure 2C). These changes were suggestive of multiple epiphyseal dysplasia (MED). A lateral radiograph of the skull showed an enlarged sella turcica (Figure 2D).

Hypothyroidism has been reported as a differential for MED.^{1,2} In light of the patient's clinical features, thyroid function testing was done. It showed a free thyroxine level of 0.45 ng/dL (reference range, 0.80-2.00 ng/dL; to convert to picomoles per liter, multiply by 12.871) and a thyroid-stimulating hormone level of 402 mIU/L (reference range, 0.50-4.50 mIU/L), indicative of profound primary hypothyroidism. Based on the clinical and biochemical findings, he began thyroid replacement therapy.

Ultrasonography of his neck demonstrated a hypoplastic thyroid gland. His underdeveloped thyroid gland is likely to be congenital, which possibly accounts for his long-standing symptoms and clinical presentation.

Congenital hypothyroidism is the commonest treatable cause of intellectual disability. The incidence of congenital hypothyroidism is approximately 1 in 4000 live births.³ With nationwide neonatal thyroid screening programs, early diagnosis and treatment prevent long-term neurodevelopmental and physical problems associated with congenital hypothyroidism.^{4,5} Delay in diagnosis can be related to a false-negative screening result⁶ or absence of a neonatal screening program. Although using thyroid-stimulating hormone measurements is shown to be more specific in the diagnosis of congenital hypothyroidism, free thyroxine measurement is more sensitive for detection in newborns, especially those with rare central hypothyroidism secondary to hypopituitarism. Neonatal thyroid screening programs using thyroid-stimulating hormone testing as a primary screening modality may miss such cases.

Characteristic features for hypothyroidism include growth failure, lethargy, poor concentration, and mental retardation. Skeletal features associated with hypothyroidism were often present in the past⁷ but are uncommonly seen now mainly owing to the success of newborn screening programs. The epiphyseal dysgenesis in hypothyroidism appears as irregular islets of calcification representing multiple ossification centers. As these islets grow, they coalesce to form irregular epiphyseal margins. These features appear similar to Perthes disease. Perthes disease usually develops in a young child with normal skeletal maturation. It usually affects 1 hip joint, although it can occur on both sides. By contrast,

hypothyroidism-related epiphyseal dysgenesis is nearly always bilateral² and is associated with delayed bone age. Dysgenesis is commonly seen in the femoral and humeral head, but other epiphyseal centers may be involved. Other skeletal abnormalities include flattened vertebrae with spinal deformities, short metacarpals, thickened cortex of the long bones, enlarged sella turcica, and delay in skeletal maturation.¹

Although the epiphyseal changes seen in both MED and hypothyroidism appear similar, hypothyroidism may be associated with symptoms including lethargy, poor concentration, constipation, and developmental delay and/or with signs including round facies, coarse hair, dry skin, hoarse or low-pitched voice, bradycardia, macroorchidism, and delayed reflexes. As these signs and symptoms may be subtle, thyroid function tests should be performed in any child presenting with MED. In patients with hypothyroidism, thyroid hormone replacement improves their skeletal changes and growth.^{1,2}

This case highlights the importance of considering an uncommon presentation (MED) of a relatively common and treatable disease (hypothyroidism).

Accepted for Publication: September 1, 2011.

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Author Contributions: Study concept and design: Liew, Lek, and Lim. Acquisition of data: Lek and Lim. Analysis and interpretation of data: Lek and Jamuar. Drafting of the manuscript: Liew, Lek, and Lim. Critical revision of the manuscript for important intellectual content: Lek, Jamuar, and Lim. Administrative, technical, and material support: Liew and Jamuar. Study supervision: Lek and Lim.

Financial Disclosure: None reported.

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