Pituitary macroadenoma due to primary hypothyroidism in a 12-year-old girl

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Pituitary macroadenoma secondary to primary hypothyroidism (pituitary thyrotrophic hyperplasia) caused by unrecognised and untreated hypothyroidism is a rare condition occurring mainly in adults,[1,2] although there have been a few reports of this condition in children. Primary hypothyroidism can result in reactive enlargement of the pituitary gland which is indistinguishable from primary pituitary lesions on magnetic resonance imaging (MRI), and this results from the loss of thyroxine feedback inhibition and the subsequent over-production of thyroid-stimulating hormone (TSH).[3] Moreover, although not firmly established in humans, the occurrence of an autonomous TSH-producing pituitary adenoma in the context of pituitary hyperplasia remains theoretically possible.[4] The case presented here, involving thyroid disease, could cause the presenting symptoms as well as the apparent growth retardation and short stature.

A 12-year-old girl with normal cognitive development was referred for short stature and growth retardion, in addition to which she had dry and lifeless hair. Her previous medical history was unremarkable, as was that of her family (including antenatal and general medical history). Her weight was 28.1 kg, height 129.4 cm, and her vital signs were stable. Physical examination showed a short prepubertal female and systemic examinations were normal. There was no previous family history of short stature and growth failure.

Laboratory studies including complete blood count, erythrocyte sedimentation rate, electrolytes, liver and renal function tests were all within normal limits. Coeliac disease was ruled out by the absence of anti-gliadin and anti-endomysial antibodies. Follicle-stimulating hormone (FSH) and luteinising hormone (LH) levels were 1.36 and 0.3 miu/mL, respectively. Primary hypothyroidism was diagnosed (free T4: 0.27 ng/dL [normal range: 0.58–1.64]; TSH >150 miu/mL [normal range: 0.24–4]; TPO antibody titre: 31.2 IU/mL [normal range: 0–60]) and heterogeneous images were seen on thyroid ultrasound without enlargement. Cortisol and adrenocorticotrophic hormone (ACTH) levels were within normal limits but the patient had a high serum prolactin level (31.09). Growth hormone levels were reduced and failed to rise after clonidin stimulation.

X-ray showed that the patient's bone age was consistent with that of an eight-year-old child. An MRI scan of the brain revealed that the anterior lobe of the pituitary gland contained a mass (16 x 12 mm) consistent with a macroadenoma, with the lesion showing slight extension into the right suprasellar cisterns. Substitutional pharmocotherapy with levothyroxine sodium (LT4) was commenced (150 mg/day) and thyroid function tests performed three months later were within normal limits, and a repeat MRI scan showed a reduction in the size of the lesion.

This study describes a patient with pituitary macroadenoma due to primary hypothyroidism who presented with growht failure. Circulating thyroid hormones act through a negative feedback on the hypothalamic secretion of TSH. If secretion of thyroid hormones is inadequate, the serum TSH level will increase, eventually resulting in hyperplasia of thyrotrophin-producing cells, which correlates with TSH levels.[4]

Pituitary enlargement associated with hypothyroidism responds well to medical treatment, and complete regression of a pituitary mass can be confirmed by repeat MRI after thyroxine treatment. Traditional diagnostic criteria for pituitary macroadenoma include homogeneous enlargement of the gland greater than 10 mm, with or without erosion of the sellar floor, and deviation of the stalk.[5] While MRI alone is unable to differentiate reliably between tumour and hyperplasia, increased use in the evaluation of patients with amenorrhoea, galactorrhoea and hyperprolactinaemia, as well as those presenting with inappropriate secretion of TSH, may increase the detection of pituitary hyperplasia. This will result in the need to differentiate between pituitary adenoma and hyperplasia. Different pituitary enhancement patterns between tumour and hyperplasia on MRI have been described in some cases,[6] while midline prominence of a pituitary mass with smooth contours has been proposed as suggestive of pituitary hyperplasia.[7] In the case presented here, MRI scans demonstrated these features.

A literature search revealed a few case reports describing the co-ocurrence of short stature and pituitary hyperplasia secondary to primary hypothyroidism. The young girl described here showed improved thyroid function after pharmacological treatment and also a reduction in the size of her pituitary lesion. □

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