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A Case Analysis of Hypothyroidism Complicated with Obesity in a Child

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Abstract

Objective: Through the analysis of a case of hypothyroidism complicated with obesity in a child, this study summarizes the clinical characteristics of such patients to provide a reference for clinical treatment.

Methods: The disease course and treatment process of the child were analyzed, and relevant literature was reviewed to summarize disease features.

Results: After one month of medication, the child's symptoms significantly improved. Follow-up after one year showed a reduction in body weight.

Conclusion: The analysis of hypothyroidism complicated with obesity in children can provide a basis for rational clinical medication and improve treatment outcomes.

Keywords: hypothyroidism; obesity; blood lipid levels; children

Introduction

Hypothyroidism is a metabolic disorder caused by reduced synthesis and secretion of thyroid hormones. The thyroid gland primarily produces thyroxine (T4) and triiodothyronine (T3). T4 is converted into the more active T3 in the thyroid and other organs. Free T4 (FT4) is the preferred measurement in diagnostic studies. Thyroid hormones increase oxygen consumption, stimulate protein synthesis, influence growth, and affect carbohydrate, lipid, and vitamin metabolism [1]. Hypothyroidism is associated with lipid metabolism disorders, and patients with overt or subclinical hypothyroidism often exhibit dyslipidemia. Hypothyroidism leads to weight gain, with TSH positively correlated with BMI and obesity [2]. This study analyzes a pediatric case of hypothyroidism complicated with obesity to explore the effects on blood lipid and thyroid hormone levels, providing a reference for clinical diagnosis and treatment.

Clinical Data

The patient was a 6-year-old girl admitted to our hospital due to "neck enlargement for six months and abnormal thyroid function detected two days prior." Six months before admission, her parents noticed neck swelling but did not seek medical attention. Two days before admission, an external hospital ultrasound revealed diffuse thyroid lesions and abnormal thyroid function. The child had a history of constipation (bowel movements every 5–7 days), occasional bloating, fatigue, and reduced physical activity. Her parents reported declining academic performance. She had no fever, cough, headache, dizziness, or blurred vision. There was no history of hepatitis, tuberculosis, or familial metabolic disorders. The child had been obese since infancy without excessive eating habits, occasionally snacking with a preference for meat. Despite parental efforts to control her weight, no improvement was observed.

Physical Examination

- Temperature: 36.3°C, Pulse: 79 bpm, Respiration: 20 bpm, Blood Pressure: 104/68 mmHg
- Height: 124 cm, Weight: 42 kg, Abdominal Circumference: 61 cm, BMI: 27.3 kg/m²
- General: Conscious but lethargic, expressionless, pale-yellow complexion, dry skin, dull hair, mild eyelid edema
- Thyroid: Grade I enlargement, smooth surface, no nodules or tenderness, no vascular murmurs
- Lungs: Clear breath sounds, no rales
- Heart: Regular rhythm, strong heart sounds, no pathological murmurs
- Abdomen: Soft and distended, no tenderness or rebound tenderness
- Tanner Stage: B1P1

Laboratory Findings

- Thyroid function: T3: 2.12 nmol/L, FT3: 5.36 pmol/L, T4: 59 nmol/L, FT4: 5.59 pmol/L, TSH > 48.9 mIU/L
- Thyroid antibodies: Negative
- Lipids: TG: 5.12 mmol/L, TC: 5.58 mmol/L
- Liver/kidney function: Normal
- Glucose: 4.66 mmol/L, HbA1c: 5.9%
- Cortisol: 534.1 nmol/L, ACTH: 17.89 pg/mL, C-peptide: 1.04 nmol/L, Insulin: 36.17 pmol/L
- Imaging: Chest X-ray normal, bone age 6 years 10 months, abdominal ultrasound indicated fatty liver

Diagnosis

1. Hypothyroidism
2. Hyperlipidemia
3. Severe obesity
4. Fatty liver

Methods

Treatment

- Levothyroxine sodium tablets: 25 μg orally once daily, adjusted based on thyroid function.
- Dietary and exercise guidance.

Observation Indicators:

Thyroid function, blood lipids, height, weight, and BMI were monitored at 1-, 3-, 6-, and 12-months post-treatment.

Results

After one month

- Thyroid function: T3: 2.58 nmol/L, FT3: 6.51 pmol/L, T4: 129.49 nmol/L, FT4: 10.28 pmol/L, TSH: 17.5 mIU/L
- Lipids: TG: 4.61 mmol/L, TC: 4.46 mmol/L
- Symptoms significantly improved.

After one year

- Thyroid function: T3: 2.1 nmol/L, FT3: 5.67 pmol/L, T4: 109.3 nmol/L, FT4: 18.01 pmol/L, TSH: 2.58 mIU/L
- Lipids: TG: 3.58 mmol/L, TC: 4.32 mmol/L
- Height: 129 cm, Weight: 39.9 kg, BMI: 24 kg/m^2 (reduced from 27.3 kg/m^2).

Case Analysis

Hypothyroidism reduces thyroid hormone secretion, leading to symptoms such as pallor, apathy, myxedema, cognitive decline, memory impairment, muscle weakness, and obesity. The etiology is complex, potentially involving autoimmunity and lifestyle factors. This child exhibited constipation, fatigue, poor academic performance, and physical signs of hypothyroidism. Laboratory results confirmed hypothyroidism, severe obesity (BMI 27.3 kg/m^2), and hyperlipidemia. The interplay between hypothyroidism and obesity exacerbated symptoms. Treatment with levothyroxine and lifestyle modifications improved thyroid function, lipid levels, and BMI over one year.

Discussion

Hypothyroidism is an endocrine disorder critical for childhood growth and development. Untreated, it can cause growth retardation, intellectual impairment, and permanent neurological damage [3]. Causes include congenital factors (e.g., maternal gestational diabetes) and acquired factors (e.g., autoimmune disease, iodine deficiency).

Obesity is a chronic metabolic disorder linked to endocrine complications [4]. Hypothyroidism elevates triglycerides (TG), which contribute to obesity. Thyroid hormones regulate cholesterol metabolism, and their deficiency slows lipid clearance, leading to fat accumulation [5]. Conversely, obesity increases hypothyroidism risk [6].

Levothyroxine is the standard treatment [7]. It restores thyroid-pituitary feedback, normalizing TSH levels [8]. Administered fasting, it ensures stable absorption [9]. This child responded well, with no developmental delays. Early diagnosis and treatment are crucial, as hypothyroidism can cause irreversible cognitive deficits. Parents must remain vigilant due to the subtle early symptoms.

Conclusion

Analyzing hypothyroidism complicated with obesity in children aids diagnosis and treatment, improving clinical outcomes.

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