

Gestational Transient Thyrotoxicosis Can Lead to Hypokalemic Periodic Paralysis

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While the differential diagnosis of thyrotoxicosis in early pregnancy includes any cause that can be observed in a non-pregnant patient, it's essential to consider β -human chorionic gonadotrophin (β -hCG)-mediated hyperthyroidism.

A 39-year-old woman, 14 weeks pregnant with twins, was admitted to the emergency department with upper and lower extremity paralysis. She was a primipara and did not have any significant past medical history nor family history of thyroid disease. She had suffered from severe morning sickness since the 10 weeks of pregnancy mark. Her vitals included a blood pressure of 120/80 mmHg, heart rate of 123 beats per minute, respiratory rate of 16 per minute, and temperature of 36.7°C. Physical examination showed upper and lower extremity motor weakness of grades 4+/5 and 3/5, respectively, without sensory deficit. There was no lesion tenderness of the thyroid gland.

Laboratory tests showed thyrotoxicosis (thyroid-stimulating hormone [TSH] < 0.01 μ IU/mL, reference range: 0.35-4.94; triiodothyronine [T3]=336.84 ng/dL, reference range: 58-159; free thyroxine [FT4]=3.26 ng/dL, reference range: 0.70-1.48). Serum potassium level was 1.9 mEq/L (reference range: 3.5-5.5), and the β -hCG level was 253,890 mIU/mL (reference range in the first trimester of singleton pregnancy: 13,950-62,530). Serum BUN level was 12.3

mg/dL (reference range: 8-20), creatinine level was 0.41 mg/dL (reference range: 0.4-0.9), sodium level was 133 mEq/L (reference range: 135-150), calcium level was 9.7 mg/dL (reference range: 8.4-10.2), magnesium level was 1.8 mg/dL (reference range: 1.5-2.6), and phosphorous level was 1.8 mg/dL (reference range 2.5-4.5). The arterial blood gas analysis showed primary respiratory alkalosis (pH=7.482, reference range: 7.36-7.41; PaCO₂=25.5 mmHg, reference range: 32-45; PaO₂=110 mmHg, reference range: 83-108; HCO₃=19.0 mmol/L, reference range: 18-23). In the urinalysis, urine sodium level was 7 mEq/L, urine potassium level was 20 mEq/L, urine creatinine level was 187.98 mg/dL, and fraction excretion of sodium (FENa) was about 0.01. Urine potassium to creatinine ratio was about 10.63 mEq/g. Thyroid autoantibodies (thyroid peroxidase antibody and TSH receptor antibody) were not present. There were no specific findings on thyroid ultrasonography.

The diagnosis of hypokalemic periodic paralysis induced by gestational transient thyrotoxicosis was made and we administered a propranolol and potassium supplement. After 7 days of hospitalization, as β -hCG level decreased to 76,677 mIU/mL, the T3 level decreased to 127.49 ng/dL, and the FT4 level decreased to 0.97 ng/dL (Fig. 1). The serum potassium level recovered to 4.4 mEq/L. The motor abilities progressively recovered after maintaining normal

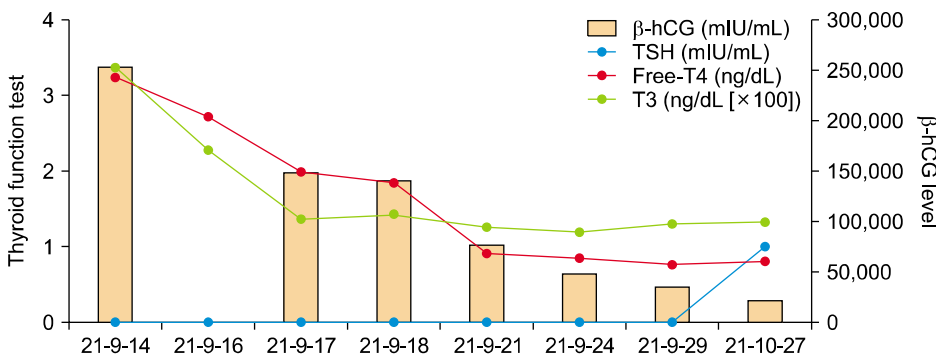


FIG. 1. The change of thyroid hormones level according to β -hCG level.

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potassium levels.

The alpha subunit of β -hCG shares structural homology with thyroid TSH; therefore, β -hCG can weakly stimulate the TSH receptor, increasing thyroid hormone production.¹ A frequent cause of hyperthyroidism during pregnancy is transient gestational thyrotoxicosis which affects 1% to 3% of pregnancies in the first half of pregnancy and is related to elevated β -hCG levels.² Hyperthyroidism can be developed when β -hCG levels $>200,000$ mIU/mL are sustained for several weeks.³ Although it is unknown what the prevalence of hyperthyroidism is in twin pregnancies, they are associated with higher and more prolonged β -hCG increase than singleton pregnancies.⁴

On the other hand, although propranolol may be used for controlling hypermetabolic symptoms in thyrotoxicosis in pregnancy, long-term treatment with β -blockers has been associated with intrauterine growth restriction, fetal bradycardia, and neonatal hypoglycemia.⁵ Therefore, caution is needed when using propranolol during pregnancy.

When a pregnant woman has symptoms of hyperemesis gravidarum, it is difficult to differentiate it from clinically meaningful thyrotoxicosis. Pregnant women with twins or more who were expected high β -hCG levels should be considered to be checked for proper thyroid function, particularly in the early trimester.

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CONFLICT OF INTEREST STATEMENT

None declared.

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