Case Report

A Tragic Maternal Death Due to a Common Endocrine Disease: A Case Report

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Abstract
Hypothyroidism, a common endocrine disorder worldwide, results from an inadequacy of thyroid hormone. Myxedema coma, an infrequent and life-threatening complication of uncontrolled hypothyroidism, is associated with high morbidity and mortality. Here, we report a case of myxedema coma in a 19-year-old pregnant woman who presented in labor and opted for a lower-segment cesarean section. In the postoperative period, she developed recurrent hypoglycemic attacks, polyserositis, and anuria. Management included repeated dextrose infusions, administration of thyroxine (100 mcg) via a Ryle's tube, and eventual intubation. Despite these interventions, she succumbed in the AICU on postoperative day 2. This case highlights the lethal nature of overt hypothyroidism, which can be as severe as hyperthyroidism in terms of systemic impact. The lack of awareness and prompt management of hypothyroid crises, particularly in the context of multisystem involvement, can result in fatal outcomes.

Introduction

Hypothyroidism is a very common endocrine disease seen in both the general population and in pregnancy. Thyroid function is altered in pregnancy due to various factors as, transient increase in human chorionic gonadotropin (hCG), which weakly stimulates thyroid-stimulating hormone receptor (TSH-R), a rise in estrogen-induced Thyroid Binding Globulin, alteration in the immune system leading to onset, exacerbation, or amelioration of an underlying autoimmune thyroid disease, increased thyroid hormone metabolism by placental type III deiodinase, and increased iodide excretion. The life-threatening complication of uncontrolled hypothyroidism is myxedema coma, exhibiting as mental instability, lethargy, delirium, stupor, coma, and multiorgan dysfunction. Infection, illness, drugs, labor, and delivery precipitate the condition by weakening the compensatory mechanism. It is rare among young and more so in pregnant women (< 40 cases reported) and laboring women (Turhan et al., 2004).

Case Report

A 19-year-old primigravida at 40 weeks of gestation presented with labor pains. In the course of her regular antenatal check-ups, she was diagnosed with anemia and overt hypothyroidism. She belonged to a low socioeconomic background and was noncompliant with antenatal advice and prescribed medications. On physical examination, she was pale and normotensive. Other systemic examinations were unremarkable. Per-abdominal examination demonstrated a single viable pregnancy with a cephalic presentation with adequate contraction, while a per-vaginal examination revealed cephalopelvic disproportion in the active stage of labor.

Her antenatal investigations revealed severe

anemia with a hemoglobin level of 6.8 g/dL, characterized as microcytic hypochromic anemia. She had an elevated TSH level of 92 µIU/mL and low free thyroxine (FT4). All other investigations, including kidney and liver function tests, were within normal limits.

She underwent an emergency lower-segment cesarean section (LSCS) under spinal anesthesia, delivering a healthy male baby weighing 2.3 kg. Within a few postoperative hours (2 hours), she developed anuria, followed by a gradual deterioration of her vitals, including tachycardia (heart rate: 126 bpm), tachypnea, and hypotension (systolic blood pressure: 70 mmHg), along with altered sensorium.

Operative complications, such as intra-peritoneal hemorrhage, postpartum hemorrhage, anaphylactic reactions, and prolonged hypotension due to regional anesthesia, were ruled out. Resuscitation efforts normalized her blood pressure; however, tachycardia and anuria persisted.

She experienced recurrent episodes of hypoglycemia within 24 hours postoperatively, with the lowest capillary blood glucose (CBG) recorded at 10 mg/dL, despite intravenous administration of 25% dextrose. She also had two episodes of convulsions. Additionally, she progressively developed scleral and vulvar edema without evidence of volume overload.

Laboratory parameters showed progressive derangements:

Date	POD 1	POD 2
Hemoglobin	7.3 g/dL	6 g/dL
Urea	25 mg/dL	25 mg/dL
Creatinine	1.4 mg/dL	-
Bilirubin	-	6.8 mg/dL
ALT	253 U/L	1888 U/L
AST	732 U/L	4031 U/L
Serum Amylase	-	484 U/L
Serum Lipase	-	145 U/L
Sodium	128-135 mmol/L	138 mmol/L
Potassium	3.5 mmol/L	5.8 mmol/L

Radiological imaging revealed polyserositis, including ascites, pleural effusion, and pericardial effusion. Arterial blood gas (ABG) analysis indicated severe metabolic acidosis, with a pH of 6.8 and a bicarbonate level of 1.9 mmol/L. Echocardiography showed global hypokinesia, a left ventricular ejection fraction (LVEF) of 20-25%, and mild pericardial effusion.

Based on clinical findings and antenatal TSH levels, a diagnosis of myxedema coma secondary to severe hypothyroidism was established. Levothyroxine 100 micrograms was given via Ryle's tube, followed by 8 hourly doses to a total of 900 micrograms. Sustained low-efficiency dialysis (SLED) was planned for acute kidney injury but could not be initiated due to persistently low mean arterial pressure (MAP). Over the following hours, the patient's condition deteriorated into multi-organ dysfunction, and she ultimately succumbed.

Discussion

Diagnosis of myxedema coma is difficult due to its rarity and insidious onset. It has very high mortality (30-50%). It is featured by hypothermia, altered sensorium, hypotension, bradycardia, hypoventilation, and diffuse non-pitting edema. Hypothyroidism reduces growth hormone by acting on the hypothalamus and pituitary. This suboptimal growth hormone response prevents counterregulatory responses and prolongs recovery from hypoglycemia (Katz et al., 1969). Hypothyroid patients have a blunted hypothalamic-pituitary-adrenal response, leading to lower cortisol levels (Kamilaris et al., 1987). The reduced cortisol level impairs glucose recovery from insulin-induced hypoglycemia.

Gluconeogenesis and glycogenolysis are impaired in hypothyroidism, resulting in delayed recovery from hypoglycemia. Other abnormalities include reduced glucagon secretion, reduced glucagon effect on hepatocytes, and slowed insulin clearance (McCulloch et al., 1983; McDaniel et al., 1977; Clausen et al., 1986). Contributory factors include the effect of hypothyroidism on the gastrointestinal (GI) system. It slows gastric emptying and decreases intestinal glucose

absorption and portal venous flow (Holdsworth & Besser, 1968). In hypothyroidism, polyserositis is less common. The absence of thyroid hormones either triggers the release of histamine by mast cells or exerts a direct effect on the capillary endothelial layers, leading to increased vascular permeability to albumin (Parving et al., 1979; Maddali et al., 2020). Extravasation of mucopolysaccharides and inappropriate secretion of antidiuretic hormone (ADH) also play a role (Iwamoto et al., 2022; Sachdev & Hall, 1975).

The fluid is commonly exudative, but it may exhibit features intermediate between transudates and exudates (Iwamoto et al., 2022; Gottehrer et al., 1990). Hypothyroidism causing acute kidney injury (AKI) is a rarely reported phenomenon. Rhabdomyolysis occurs in hypothyroidism because of changes in muscle fibre from fast-twitching type II to slow-twitching type I due to deposition of glycosaminoglycan (GAG), low myosin ATPase activity, and low Adenosine triphosphate (ATP) turnover in skeletal tissues (Wiles et al., 1979). Moreover, mitochondrial activity in muscle cells is inhibited, and many metabolic pathways, such as the Krebs cycle, fatty acid catabolism, and glycolytic energy production, are dysregulated (Thompson et al., 2003). Because of these metabolic abnormalities, rhabdomyolysis occurs in patients with hypothyroidism, more so in the presence of precipitating factors. While hypothyroidism is a definite cause of rhabdomyolysis, cases of AKI due to hypothyroidism-induced rhabdomyolysis are isolated.

In our patient, although there is no recent thyroid profile report, the clinical and radiological findings were similar to those in previous case reports. From those findings, we arrived at the conclusion that she succumbed to multi-organ dysfunction with myxedema coma due to overt hypothyroidism.

References

Clausen, N., Lins, P. E., Adamson, U., Hamberger, B., & Efendić, S. (1986). Counterregulation of insulin-induced hypoglycaemia in primary hypothyroidism. *Acta Endocrinologica*, *111*(4), 516–521. https://doi.org/10.1530/acta.0.1110516

Gottehrer, A., Roa, J., Stanford, G. G., Chernow, B., & Sahn, S. A. (1990). Hypothyroidism and pleural effusions. *Chest*, *98*(5), 1130–1132. https://doi.org/10.1378/chest.98.5.1130

Holdsworth, C. D., & Besser, G. M. (1968). Influence of gastric emptying-rate and of insulin response on oral glucose tolerance in thyroid disease. *Lancet (London, England)*, *2*(7570), 700–702. https://doi.org/10.1016/s0140-6736(68)90747-2

Iwamoto, Y., Tatsumi, F., Katakura, Y., Dan, K., Wamata, R., Kimura, T., Shimoda, M., Nakanishi, S., Kaku, K., Mune, T., & Kaneto, H. (2022). Sudden extensive bloody pleural and pericardial effusion in a subject with untreated known hypothyroidism after total thyroidectomy, triggered by pneumonia. *BMC Endocrine Disorders*, *22*(1), 233. https://doi.org/10.1186/s12902-022-01146-9

Kamilaris, T. C., DeBold, C. R., Pavlou, S. N., Island, D. P., Hoursanidis, A., & Orth, D. N. (1987). Effect of altered thyroid hormone levels on hypothalamic-pituitary-adrenal function. *The Journal of Clinical Endocrinology and Metabolism*, *65*(5), 994–999. https://doi.org/10.1210/jcem-65-5-994

Katz, H. P., Youlton, R., Kaplan, S. L., & Grumbach, M. M. (1969). Growth and growth hormone. 3. Growth hormone release in children with primary hypothyroidism and thyrotoxicosis. *The Journal of Clinical Endocrinology and Metabolism*, *29*(3), 346–351. https://doi.org/10.1210/jcem-29-3-346

Maddali, V. R., Miryala, S., Bellamkonda, Y. S., & Nagula, P. (2020). Cardiac tamponade due to primary hypothyroidism: acute management and approach to prevent recurrence-a case report. *European heart journal. Case Reports*, *4*(3), 1–5. https://doi.org/10.1093/ehjcr/ytaa071

McCulloch, A. J., Johnston, D. G., Baylis, P. H., Kendall-Taylor, P., Clark, F., Young, E. T., & Alberti, K. G. (1983). Evidence that thyroid hormones regulate gluconeogenesis from glycerol in man. *Clinical Endocrinology*, *19*(1), 67–76. https://doi.org/10.1111/j.1365-2265.1983.tb00744.x

McDaniel, H. G., Pittman, C. S., Oh, S. J., & DiMauro, S. (1977). Carbohydrate metabolism in hypothyroid myopathy. *Metabolism: Clinical and Experimental*, *26*(8), 867–873. https://doi.org/10.1016/0026-0495(77)90005-1

Parving, H. H., Hansen, J. M., Nielsen, S. L., Rossing, N., Munck, O., & Lassen, N. A. (1979). Mechanisms of edema formation in myxedema--increased protein extravasation and relatively slow lymphatic drainage. *The New England Journal of Medicine*, *301*(9), 460–465. https://doi.org/10.1056/NEJM197908303010902

Sachdev, Y., & Hall, R. (1975). Effusions into body cavities in hypothyroidism. *Lancet (London, England)*, *1*(7906), 564–566. https://doi.org/10.1016/s0140-6736(75)91571-8

Thompson, P. D., Clarkson, P., & Karas, R. H. (2003). Statin-associated myopathy. *JAMA*, *289*(13), 1681–1690.

Turhan, N. O., Koçkar, M. C., & Inegöl, I. (2004). Myxedematous coma in a laboring woman suggested a pre-eclamptic coma: a case report. *Acta Obstetricia et Gynecologica Scandinavica*, *83*(11), 1089–1091. https://doi.org/10.1111/j.0001-6349.2004.0122a.x

Wiles, C. M., Young, A., Jones, D. A., & Edwards, R. H. (1979). Muscle relaxation rate, fibre-type composition and energy turnover in hyper- and hypo-thyroid patients. *Clinical Science (London, England : 1979)*, *57*(4), 375–384.