

Thyroid Emergencies

Prompt recognition of thyroid emergencies is critical to decrease complications and mortality. Management requires both medical and supportive treatment provided in the critical care setting.

Myxedema Coma

Myxedema coma is a severe, life-threatening emergency that can occur in long-standing, untreated hypothyroidism. Diagnosis is based on clinical manifestations such as altered mental status and hypoventilation associated with slowing of functions of multiple organs. Laboratory studies confirming a diagnosis of hypothyroidism include elevated thyroid stimulating hormone (TSH, above 4.2 mIU/L in adults) and low Free T4 levels (less than 5.0 µg/dL), along with possible thyroid antibodies to indicate an autoimmune cause. Treatment should be started promptly given the increased risk of mortality.

Signs and Symptoms of Myxedema Coma

- Extreme lethargy and diminished mental status
- Hypothermia
- Hypotension
- Hypoventilation
- Hypercapnia
- Hypoglycemia
- Hyponatremia
- Bradycardia
- Pericardial effusion

Treatment of Myxedema Coma

- Thyroid hormone replacement with T4 and/or T3, usually intravenous (IV)
- Glucocorticoids, until coexisting adrenal insufficiency is ruled out
- IV fluids for electrolyte replacement
- Warming blankets
- Supportive care including mechanical ventilation as required

Nursing Considerations

- IV hormone replacement should be administered only as IV push through a syringe, rather than through infusion tubing due to high concentrations lost from adherence to polypropylene tubing.
- Improvements in free T3 and free T4 concentrations may be seen before the normalization of serum TSH concentrations, and serum thyroid function tests should be obtained every one to two days during treatment.
- Improvements in clinical cardiovascular, renal, pulmonary, and metabolic parameters may take as long as a week.

Thyroid Storm

Thyroid storm refers to elevated thyroid hormone concentrations; thyroid storm is a rare diagnosis and results from a precipitating factor such as untreated hyperthyroidism, abrupt cessation of antithyroid medication, or from thyroid or nonthyroidal surgery, trauma, infection, or an acute iodine load. Diagnosis of thyroid storm is made using biochemical laboratory tests confirming thyrotoxicosis in a patient displaying the severe, life-threatening symptoms of hyperthyroidism. Thyroid function tests usually show high free T4 and free T3 and low or undetectable TSH (less than 0.4 mIU/L in adults). It is not necessary to have a very high level of thyroid hormone to cause a thyroid storm. Other lab abnormalities may include hypercalcemia, hyperglycemia (due to inhibition of insulin release and increased glycogenolysis), abnormal LFTs, and high or low white blood cell (WBC) count. Treatment should be initiated while waiting for lab results.

Signs and Symptoms of Thyroid Storm

Clinical manifestations include exaggeration of common hyperthyroid symptoms:

- Anxiety
- Fatigue
- Diaphoresis
- Heat intolerance
- Tremors
- Palpitations
- Tachycardia
- Weight loss
- Hyperreflexia
- Warm and moist skin
- Menstrual abnormalities

The following life-threatening signs may also be present:

- Hyperpyrexia (fever greater than 106 degrees Fahrenheit)
- Congestive heart failure
- Vomiting
- Impaired mental status

Treatment of Thyroid Storm

- Beta-blocker to control heart rate
- Methimazole or propylthiouracil to decrease production of thyroid hormone
- Iodine solution to inhibit thyroid hormone release
- Glucocorticoids to decrease the conversion of T4 to T3
- Supportive measures include:
 - IV fluids
 - Oxygen
 - Cooling
 - Treatment of any precipitating causes
- Plasmapheresis when traditional therapy is unsuccessful

Nursing Considerations

- Thyroid storm can occur in patients with or without preexisting hyperthyroidism.
- Patients with known severe hyperthyroidism who are noncompliant with prescribed antithyroid medications may develop thyroid storm.

References:

Leung, A. M. (September/October 2016). Thyroid emergencies. *Journal of Infusion Nursing*, 39(5), 281-286.
<https://www.doi.org/10.1097/NAN.000000000000186>

Mccaron, K. C. (2009). Deciphering diagnostics: deciphering thyroid function testing. *Nursing Made Incredibly Easy!*, 7(5), 11-14.
<https://www.doi.org/10.1097/01.NME.0000359665.59666.14>

Ross, D. (2024, May 9). Myxedema coma. *UpToDate*. <https://www.uptodate.com/contents/myxedema-coma>

Ross, D. (2024, July 5). Thyroid storm. *UpToDate*. <https://www.uptodate.com/contents/thyroid-storm>