In the -odine of the Thyroid Storm

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Introduction

Thyroid storm is a rare, life-threatening condition that manifests with symptoms and signs of thyrotoxicosis.

Case Description

A 62-year-old woman with untreated hyperthyroidism presented to an outside hospital with chest pain, progressive dyspnea, diaphoresis, and palpitations.

EXAM: Acute distress, tachypneic, tachycardic, irregularly irregular rhythm, elevated JVP, bibasilar rales, and pedal edema.

INITIAL LABS:
- UDS: + methamphetamines
- TSH: undetectable
- Free T4: Elevated at 3.43 ng/dL
- Total T3 was normal at 1.82 ng/mL

Her Burch-Wartofsky-Score was 80—consistent with thyrotoxicosis complicated by atrial fibrillation with RVR and acute decompensated heart failure.

IMAGING:
CT Chest/Abdomen/Pelvis with intravenous contrast: Negative for acute findings

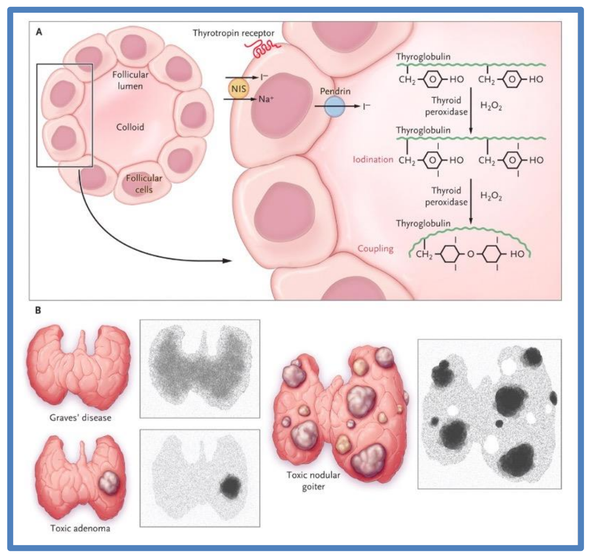
FOLLOW UP LABS:
- Free T4 rose to 4.97 ng/dL
- TSH receptor antibody: elevated at 12.84 IU/mL
- Thyroid peroxidase antibody: elevated at >6500 IU/mL

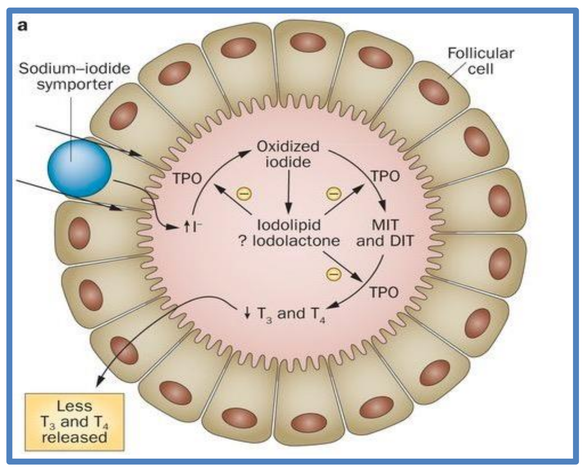
She subsequently developed fever and acute encephalopathy requiring intubation to protect her airway.

Clinical Course

Initial Treatment	Revised Treatment	Mechanism
Esmolol	Propranolol	Rate control and reduce peripheral conversion of T4 to T3
Hydrocortisone	Prednisone	Reduce peripheral conversion of T4 to T3
Propylthiouracil	*Discontinued due to hepatoxicity	Inhibit thyroid hormone production and reduce peripheral conversion of T4 to T3
	Cholestyramine	Reduce enterohepatic recycling of thyroid hormones

Free T4 decreased to 1.3 ng/mL, and the patient received total thyroidectomy prior to discharge. A diagnosis of Grave disease with escalation to thyroid storm secondary to methamphetamine use and radiocontrast iodine was considered most likely.





Iodinated Thyroid Dysfunction

Jöd-Basedow Phenomenon:
Hyperthyroidism following administration of iodine[3]

Wolff-Chaikoff Effect:
Excess iodine eventually inhibits thyroid hormone formation[3]

This is the reason excess iodine is often given prior to thyroidectomy.

Thyroidectomy should be performed within 7-14 days of receiving iodine as most patients will escape this inhibition and return to a hyperthyroid state.

Discussion

This case illustrates the complications associated with thyrotoxicosis, the effect of methamphetamines and radiocontrast iodine on hyperthyroidism, and options for definitive therapy.

Our patient presented in decompensated heart failure and atrial fibrillation with RVR secondary to thyrotoxicosis.

Methamphetamines induce excessive adrenergic stimulation and have been shown to directly increase free T4 levels.[1]

Elevated free T4 can lead to hypersensitivity to catecholamines, which may be further provoked by methamphetamine use, and thus trigger succession into thyroid storm.[2]

In our patient, the exogenous radiocontrast iodine load precluded her from radioiodine therapy and thionamides were contraindicated due to hepatotoxicity, thus thyroidectomy became the only viable definitive therapy.

Teaching Points

Methamphetamine use should be included in the differential diagnosis for patients presenting with symptoms of thyrotoxicosis.

In hyperthyroid patients, a thionamide should be initiated prior to iodine administration to inhibit the stimulation of new thyroid hormone synthesis

References

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