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Thyroid Evaluation in a Patient with Thyrotoxicosis with Bedside Ultrasound

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A 37-year-old man presented to the emergency department (ED) for palpitations, anxiety, and weight loss. Physical examination revealed a pulse of 104 beats/min, blood pressure 140/92 mmHg, respirations 12 breaths/min, and oral temperature 99 F. Neck examination was notable for a diffusely enlarged thyroid without discrete nodules. Bedside emergency ultrasound (EUS) was performed with a high frequency 10 MHz linear array probe. This demonstrated an enlarged thyroid with a heterogeneous appearance, but no discrete nodules or masses. Color flow Doppler ultrasound showed profoundly increased blood flow to the thyroid (Video). These sonographic findings are consistent with a hyperthyroid state, most commonly due to Graves' disease.^{1,2} Serum thyroid studies revealed a very suppressed TSH and an elevated free T3/T4. Based on the patient's ultrasound and laboratory testing, he was diagnosed with thyrotoxicosis. Treatment with propranolol and methimazole was initiated from the ED in consultation with Endocrinology. He was discharged with close clinic follow up.

In the ED it is important to diagnose thyrotoxicosis early in its course, since it can potentially progress to thyroid storm. While relatively uncommon and affecting only 10% of patients hospitalized for thyrotoxicosis, thyroid storm carries a mortality rate of 20-30%.^{3,4} Furthermore, untreated thyrotoxicosis can cause or worsen hypertension, congestive heart failure, atrial fibrillation, metabolic disorders, osteoporosis and neuropsychiatric disorders.

Thyroid ultrasound is best performed using a high frequency probe, scanning through the gland in both transverse and vertical orientations. The normal thyroid appears homogenous, with a characteristic echogenicity. Color Doppler ultrasound is then used to estimate thyroid blood flow.

This case demonstrates how EUS can be used as a rapid and helpful tool in the diagnosis of thyrotoxicosis. An enlarged thyroid gland with hypervascular flow on Doppler ultrasound can corroborate clinical data and lead to the correct diagnosis in a timelier manner.

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