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A storm off the charts: A case of thyroid storm due to thyrotoxicosis factitia

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CLINICAL CASE:

A 39 year-old personal trainer and mother of two presented to the emergency department with one week of constitutional symptoms, dyspnoea and non-productive cough. She was gaunt, diaphoretic and drowsy with the following vitals: HR 160bpm, BP 180/60mmHg, RR 38bpm, SpO2 94% on 55L of high flow nasal prongs at FiO2 0.21 and febrile at 38.8ºC. An ECG revealed atrial fibrillation with rapid ventricular response. An elevated jugular venous pressure was noted and global wheeze and crepitations present on auscultation. Bilateral upper limb tremor, hyper-reflexia and proximal myopathy were elicited. A small, smooth thyroid gland was palpated with no bruit.

Past medical history was relevant for anxiety, depression and hypothyroidism diagnosed 3 years prior with the following: TSH 6.82 mU/L [0.5-4.0] and fT4 9.1pmol/L [10-19]. Admission medications included 100ug levothyroxine and 100mg desvenlafaxine.

Investigations confirmed respiratory syncytial viral infection and severe thyrotoxicosis: TSH <0.01 mU/L [0.35-4.95], fT4 > 64pmol/L [9-19] and fT3 >46.1pmol/L [2.6-5.7]. Positive anti-thyroid peroxidase and thyroglobulin antibodies and negative TSH-receptor antibodies supported Hashimoto's disease. Thyroglobulin was low at 0.38ug/L [3.5-77] in keeping with exogenous thyroxine. Cardiomegaly was apparent on chest X-ray and computed tomography revealed bi-basal consolidation, bi-atrial enlargement, splenomegaly and thymic hyperplasia. Cardiomyopathy was confirmed on echocardiogram with an estimated ejection fraction of 25%.

Further history revealed a year of sustained supratherapeutic levothyroxine (1200 micrograms daily) which had been self-increased to achieve weight loss from 102 to 52 kg, despite symptoms of heat intolerance, hyperphagia, hyper-defecation, mood disturbances, tremors and amenorrhoea.

With a Burch-Wartofsky score of 90[1], highly suggestive of thyroid storm, she received intensive care management with supportive measures, intravenous hydrocortisone, beta blockade and cholestyramine. Within days, her cardiorespiratory condition and hyperthyroxinaemia improved (see table 1.1) and she was discharged on a maintenance dose of 75 micrograms of levothyroxine daily with outpatient endocrinology and psychiatry follow up for a suspected body dysmorphic disorder.

Four weeks post discharge, an echocardiogram confirmed cardiovascular recovery (ejection fraction 50%) and spontaneous reversion to sinus rhythm. Thyroid function tests (TSH <0.01 mU/L, fT4 10.3 pmol/L, fT3 2.4 pmol/L) suggested ongoing pituitary thyrotroph suppression and a dual energy x-ray absorptiometry showed osteopaenia at the hip (Z-score -1.8) and osteoporosis at the radius (Z-score -3.3). She reported complete resolution of her symptoms.

DISCUSSION:

Thyrotoxicosis factitia is a rare form of hyperthyroidism more commonly seen in females[2] caused by excessive exogenous thyroid hormone. It requires a high index of suspicion to diagnose and mitigate chronic hyperthyroidism-related morbidity[3, 4]: amenorrhoea, atrial fibrillation, dilated cardiomyopathy, low bone density, splenomegaly and thymic hyperplasia, as with our patient.

Although levothyroxine is a commonly prescribed, unrestricted medication, the manner in which our patient gained access to an excessive supply was of great concern. She disclosed obtaining twelve prescriptions (200 tablets with 1 repeat) over the year, by presenting to different practitioners, apparently without being subject to clinical examination or biochemical assessment by prescribers. Appropriate clinical and biochemical assessment prior to supplying levothyroxine prescriptions may have prevented her life-threatening episode of thyrotoxicosis factitia.

TABLE 1.1: Trend of thyroid function tests and pharmacological therapy

	Day 0	Day 1	Day 2	Day 3	Day 4	Day 28
Thyroid function						
TSH *Reference [0.35-4.95 mU/L]*	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**	**<0.01**
fT3 *Reference [2.6-5.7 pmol/L]*	**>46.1**	**15.7**	**8.7**	4.9	3.9	**2.4**
fT4 *Reference [9.0-19.0 pmol/L]*	**>64.4**	**48.1**	**31.2**	**20.1**	16.6	10.3
Management						
Cholestyramine (oral)	-	4g, TDS	4g, TDS	4g, TDS	4g, TDS	-
Hydrocortisone (intravenous)	-	100mg, TDS	100mg, TDS	-	-	-
Propanolol (oral)	-	20mg, TDS	20mg, TDS	20mg, TDS	20mg, TDS	-
Levothyroxine (oral)	1200ug (prior to admission)	-	-	-	-	75ug

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