CLINICAL VIGNETTE

Recurrent Goiter and Hyperthyroidism after Total Thyroidectomy

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Case Presentation

A 28-year-old male with Graves' disease presents to endocrine to establish care. He was diagnosed with Graves' disease 8 years prior, with weight loss, tremor, goiter and eye bulging. He was initially treated with methimazole but due to a large goiter (which on ultrasound measured 9.3x4.6x3.6cm on right and 8.9x4.2x3.4cm on left) and thyroid eye disease, he underwent total thyroidectomy. After surgery he was started on daily levothyroxine 112mcg for post-op hypothyroidism. Unfortunately, he was lost to follow up but remained on the same levothyroxine dose for years without monitoring. One year prior to presentation, he noted fatigue, heat intolerance, tremor, anxiety and worsening eye disease. He saw an ophthalmologist for worsening proptosis and was referred to endocrine.

On exam, the patient's blood pressure was 119/67 mmHg and pulse 89 bpm. He appeared hyperactive and anxious. He had bilateral proptosis, a large well healed anterior neck scar and a large palpable mass in the right thyroid bed. His heart rate was regular in rate and rhythm and his lungs were clear to auscultation. His extremities were well perfused and his skin was warm and moist. He had a fine tremor on outstretched hands.

Thyroid labs showed hyperthyroidism with elevated anti-thyroid antibody titers (see Table 1). Levothyroxine was discontinued and he was started on methimazole 10mg daily. After 3 months, his symptoms and labs improved and methimazole dose was decreased.

Neck ultrasound showed 3 nodular tissues in the thyroid bed, measuring 97mm on right, 36mm on the left and 25mm on isthmic region. The glandular tissue was heterogenous and hyperemia was noted on color doppler, suggesting thyroiditis (see Figure 1).

The patient was diagnosed with recurrent hyperthyroidism due to remnant growth secondary to Graves' disease. Given the size of the goiter and the presence of thyroid eye disease, completion thyroidectomy was recommended.

Table 1. Laboratory Testing Results

	Presentation	Follow up
TSH (0.3 - 4.7 mcIU/mL)	<0.02 (L)	7.4 (H)
Free T3 Index (78.0 - 162.0)	825.0 (H)	
T3, Total (85 - 185 ng/dL)	330 (H)	
Free T4 (0.80 - 1.70 ng/dL)	5.60 (H)	
Free T4 Index (4.5 - 10.5)	42.8 (H)	
T4, Total (4.90 - 11.40 mcg/dL)	17.10 (H)	
Thyroid Peroxidase Antibody (<=20 IU/mL)	564 (H)	
Thyroglobulin Antibody (<4.0 IU/mL)	5.8 (H)	
Thyroid Stimulating Immunoglobin (<=0.54 IU/L)	>40.00 (H)	
Thyrotropin Binding Inhib Immu (<= 2.00 IU/L)	>40.00 (H)	

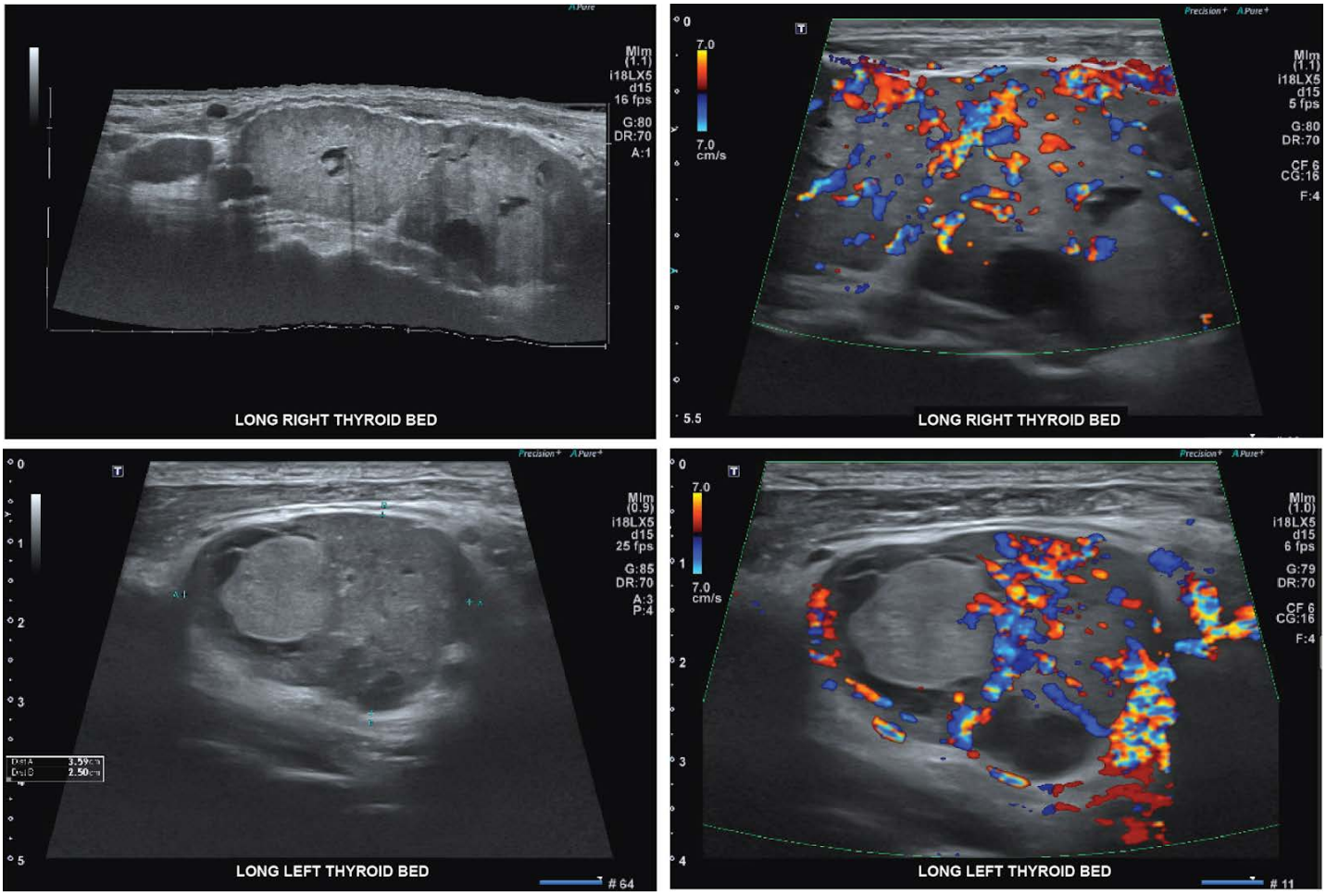

Figure 1. Thyroid Ultrasound Images

Discussion

Treatment options for Graves' hyperthyroidism include medical management with anti-thyroid drugs, radioactive iodine ablation and surgical removal of thyroid gland. While anti-thyroid drugs can achieve fast control of hyperthyroidism, patients with Graves' disease with large goiters often have low initial cure rates and high recurrence rates. Radioactive iodine treatment provides cure for nearly 80% of patients with Graves' disease,[1] but may exacerbate thyroid eye disease.[2] Surgical management can provide prompt and definitive cure of hyperthyroidism as well as relief of compressive symptoms from goiter.[2]

In the past, subtotal thyroidectomy (leaving <7g remnant thyroid tissue) was frequently performed to preserve thyroid function to the euthyroid state. However, subtotal thyroidectomy results in recurrent or persistent hyperthyroidism in about 8% of patients, while total thyroidectomy has a near 0% recurrence rate.[2,3] Thus, near-total thyroidectomy (<1g thyroid remnant on each side) or total thyroidectomy (complete macroscopic resection of thyroid tissue) are the currently recommended surgical treatments for Graves' hyperthyroidism.[2,4] Some surgeons prefer near-total thyroidectomy over total thyroidectomy to avoid complications such as laryngeal nerve injury and hypoparathyroidism.[4] Some thyroid remnants persist after total thyroidectomy despite the radical surgical intent. One study reported 34 of 102 patients with post-total thyroidectomy had remnant thyroid tissues visible on ultrasound after total thyroidectomy.[5]

While rare, remnant thyroid tissue after post-thyroidectomy may become hyperfunctioning and grow dramatically under the immune stimulation of Graves' disease. Recurrence of hyperthyroidism in Graves' disease has been reported after total thyroidectomy and near-total thyroidectomy due to ectopic tissue in the lateral neck and mediastinum and thyroglossal duct remnants.[6,7]

After total thyroidectomy or near-total thyroidectomy, patients are started on thyroid hormone replacement. If a patient with a history of curative treatment for Graves' disease on thyroid

hormone replacement becomes hyperthyroid, thyroid hormone should be reduced to rule out iatrogenic hyperthyroidism. Graves' auto-antibodies should also be checked to investigate diagnosis of recurrent hyperthyroidism. Recurrent thyrotoxicosis from Graves' disease can be treated with anti-thyroid drugs, radioactive iodine as well as surgical removal of thyroid tissues. CT scan with contrast may exacerbate hyperthyroidism for patients not on anti-thyroid drugs, and neck ultrasound is the imaging study of choice. Ultrasound and radioactive iodine uptake scan (especially if ectopic location is suspected) may help locate presence of hyperfunctioning thyroid tissue.

This case illustrates the importance of long-term motoring of thyroid disease for patients with Graves' disease, as despite curative intent, hyperthyroidism may recur after thyroidectomy.

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