Hyperthyroidism in an 84-year-old patient with cardiovascular disease

Commentary by **DUNCAN TOPLISS** MB BS(Hons), MD, FRACP, FACE

How can this elderly patient with an unexpected finding of hyperthyroidism be helped?

Case scenario

A generally fit 84-year-old man has a background of cardiovascular disease (coronary artery bypass graft three years ago) and dyslipidaemia. He is currently taking a statin and aspirin.

Thyroid function tests were performed in response to reports of statin-associated myopathy. Surprisingly, the results showed hyperthyroidism: thyroid stimulating hormone (TSH), 0.005 mIU/L (normal range, 0.5 to 4.0 mIU/L); free thyroxine (T4), 13.0 pmol/L (normal range, 10 to 20 pmol/L); free triiodothyronine (T3), 8 pmol/L (normal range, 2.5 to 5.3 pmol/L). On examination, he has a nontender nodule above the medial aspect of his right clavicle. An ultrasound has been ordered.

What is the next step and what is likely to be the cause? What guidelines would you suggest for the monitoring of TSH levels in patients taking statins?

Commentary

The case is of an elderly man with ischaemic heart disease and statin-treated hyperlipidaemia. We are not told if he had symptoms but perhaps he had muscle aches and his GP, aware that muscle aches occur with hypothyroidism, performed *in vitro* thyroid function testing but found instead results suggestive of hyperthyroidism rather than hypothyroidism.

The patient certainly has thyroid function test results indicative of hyperthyroidism, with suppressed TSH and high free T3 (8 pmol/L) but normal free T4 (13 pmol/L) – that is, T3-toxicosis. The laboratory should not have reported the machine readout for TSH of 0.005 mIU/L, as this value is well below the functional sensitivity of current third generation TSH assays (0.01 mIU/L), but this does not affect the clinical interpretation.

The next step, as this was a surprising finding, would be to review the history and physical findings with hyperthyroidism in mind. Apart from subtle symptoms and signs of thyroid hormone excess, a history of iodine ingestion (such as amiodarone, radiological contrast, kelp tablets, vitamin tablets or herbal preparations) should be sought. The patient has a neck lump, which might be a thyroid nodule, so careful examination for goitre, obstructive signs (for example, Pemberton's sign) and lymphadenopathy should be performed.

I would also verify the *in vitro* TFT results with another sample. A chest radiograph and an ECG are also warranted.

Radionuclide scanning

Although the ordered thyroid ultrasound could well give anatomical information, it may not give functional information. (Colour flow Doppler ultrasound, however, can sometimes be helpful; for example, in suspected amiodarone-induced hyperthyroidism, where absence of flow correlates with unresponsiveness to antithyroid drug therapy [carbimazole or propylthiouracil] and suggests possible response to prednisolone).

I would obtain a radionuclide thyroid scan – the standard technetium-99m (99mTc pertechnetate) scan should be satisfactory – to determine whether the palpated nodule is a solitary 'hot' or 'toxic' nodule or part of a toxic multinodular goitre. (A hot nodule would appear as an area of increased uptake with suppression of uptake in the rest of the gland, and a toxic multinodular goitre as multiple areas of variously increased and decreased uptake throughout the gland – see Figures 1 and 2.) This information will guide selection of an appropriate radioiodine therapy dose. Higher radioiodine doses can be used without increasing the risk of induction of hypothyroidism for the ablation of a hot nodule than for the treatment of hyperthyroidism from Graves' disease with equivalent uptake and size of thyroid.

Absence of radionuclide uptake into the thyroid would suggest aetiology (for example, iodine load or thyroiditis) and also preclude radioiodine therapy.

Treatment

This patient, even though his hyperthyroidism is apparently clinically mild, merits treatment because of the increased risk of atrial fibrillation, cardiac failure and unstable angina conferred by the hyperthyroidism. In any event, the clinical effect of hyperthyroidism in the elderly can be underestimated until restoration of euthyroidism as these patients are more likely to develop so-called apathetic hyperthyroidism than younger patients.

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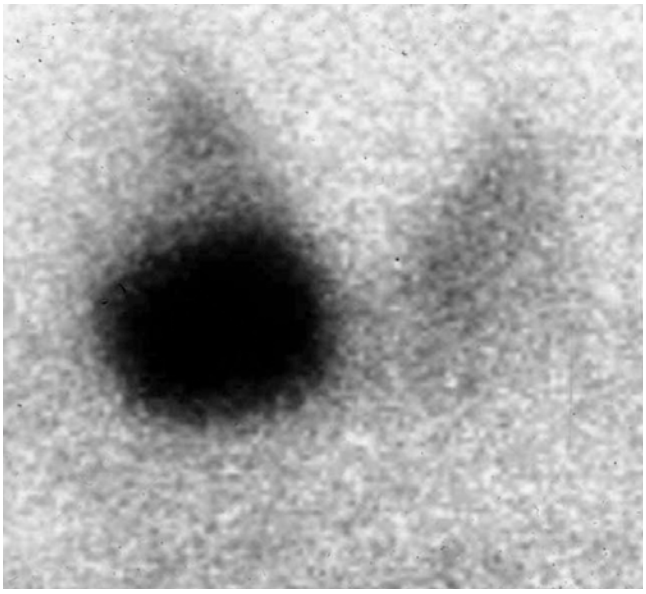

Figure 1. A thyroid scan showing a hot nodule.

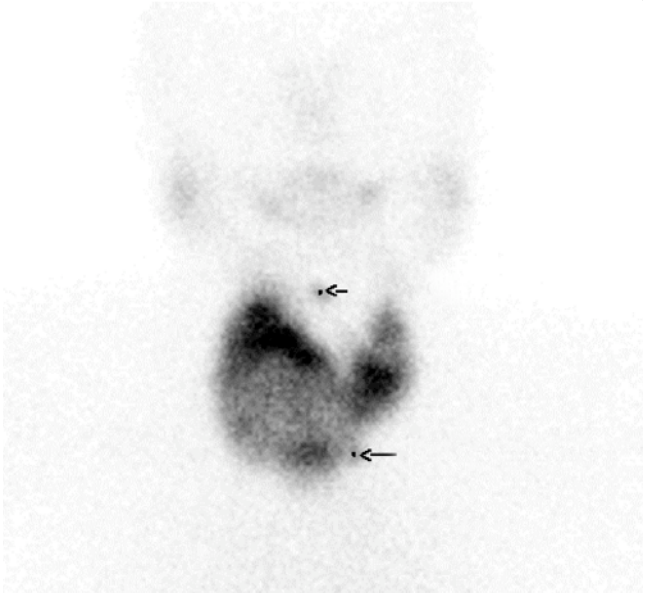

Figure 2. A thyroid scan showing a hyperfunctioning multinodular goitre. The upper arrow indicates the chin; the lower arrow, the level of the sternal notch.

The treatment regimen for a toxic nodule or a toxic multinodular goitre could be either primary radioiodine (Sodium Iodide [131I] Capsules/Solution) therapy then commencement of antithyroid medication (carbimazole [Neo-Mercazole] or propylthiouracil), or antithyroid drug treatment until euthyroidism then radioiodine therapy. I would favour the latter to minimise any risk of radiation thyroiditis and exacerbation of the hyperthyroid state. However, it would be important not to prolong the antithyroid drug treatment and allow TSH to recover if the diagnosis is a hot nodule rather than a toxic multinodular goitre, as this will increase radioiodine exposure of suppressed thyroid tissue and the risk of hypothyroidism.

Follow up

Routine monitoring of TSH after radioiodine therapy should be yearly. There can be a transient hypothyroidism in the first six months after a radioiodine dose. TSH alone cannot be used to monitor initial response to treatment of hyperthyroidism as it can remain suppressed for months after hyperthyroidism has been controlled.

In general, I suggest always requesting thyroid function tests (fT4 as well as TSH) rather than just TSH, to allow reflexive determination of fT4 on the same specimen by the laboratory if the TSH level is raised.

Statins and TSH monitoring

Regarding statins and TSH monitoring, both statins and hypothyroidism can cause muscle aches and raised creatine kinase levels. Statins raise the level of creatine kinase by causing myositis but hypothyroidism raises the level by impairing its clearance. It is important to distinguish the causes by excluding hypothyroidism before commencing a statin or if pain or raised creatine kinase develop during statin therapy. MT

Further reading

1. Topliss DJ, Eastman CJ. Diagnosis and management of hyperthyroidism and hypothyroidism. Med J Aust 2004; 180: 186-193.
2. Wong R, Cheung W, Stockigt JR, Topliss DJ. Heterogeneity of amiodarone-induced thyrotoxicosis: evaluation of colour-flow Doppler sonography in predicting therapeutic response. Intern Med J 2003; 33: 420-426.
3. Rando LP, Cording SA, Newnham HH. Successful reintroduction of statin therapy after myositis: was there another cause? Med J Aust 2004; 180: 472-473.

DECLARATION OF INTEREST: None.