Thyroid storm treated with intravenous methimazole in patients with gastrointestinal dysfunction

Introduction

Thyroid storm is a rare, often fatal, complication of thyrotoxicosis. Wartofsky (2002) has reported that thyroid storms can present as severe thyrotoxicosis, psychiatric syndromes, coma or as an acute abdomen. This is an emergency which should be diagnosed by clinical means as any delay in treatment results in a high mortality.

Discussion

Burch and Wartofsky (1993) have derived a severity scale for thyroid storm that uses precipitant history, cardiovascular, gastrointestinal, CNS and thermoregulatory dysfunction. A score >45 is highly suggestive of thyroid storm (the score for case 1 was 60, and for case 2 was 70). Known precipitants for thyroid storm in the first patient included infection and unstable diabetes, and in the second patient amiodarone therapy, infection and recent surgery were factors.

After treating the precipitating factors for a thyroid storm specific measures are required. Thionamides such as propylthiouracil (PTU) inhibit thyroid hormone synthesis, block peripheral conversion of thyroxine (T_4) to triiodothyronine (T_3) and may be given orally, by nasogastric tube, or rectally. These patients were unable to take medication by the nasogastric and rectal routes because of their abdominal dysfunction.

Inorganic iodine inhibits colloid proteolysis and release of T_4 and T_3 from the thyroid. Wu et al (1978) used oral ipodate as treatment for thyroid storms. Beta-blockers, especially propranolol, and corticosteroids reduce peripheral conversion of T_4 to T_3.

Newman et al (1998) have outlined the complex effects of amiodarone therapy. The high level of iodine in amiodarone may cause hyperthyroidism in patients who have a multinodular goitre, or incipient Graves disease. This is known as type 1 amiodarone-induced thyrotoxicosis and iodide treatment is unpredictable. Thyrotoxicosis may also be caused by drug-induced thyroid destruction (type 2

Case Report 1

A 27-year-old man, who had type 1 diabetes, presented with agitation, confusion, vomiting and faecal incontinence. There was an abscess on his right upper arm at an insulin injection site (temperature 38.5°C, pulse 140 per minute, and blood pressure 125/85 mmHg). Investigations included neutrophil count 13.6 x10^9/litre, glucose 26 mmol/litre, pH 7.4, free thyroxine (T_4) >77 pmol/litre (normal range (NR) 9–22.7), thyroid-stimulating hormone (TSH) <0.01 mu/litre (NR 0.35–5). After sedation with haloperidol 15 mg intramuscularly, he was rehydrated with physiological saline and treated with intravenous (IV) cefotaxime 3 g three times daily, IV dexamethazone 2 mg twice daily, IV methimazole 15 mg two doses 8 hours apart (Favistan injection solution, Temmler Pharma, Marburg, Germany), labetolol 120 mg (infused over 1 hour twice daily), and an insulin infusion using up to 4 u/hour.

After 24 hours there was a marked clinical improvement with resolution of his agitation and confusion and his pulse rate was normal (T_4 22 pmol/litre, TSH <0.05 mU/litre after 72 hours). He was discharged on carbimazole 60 mg daily and propranolol 20 mg four times daily, and had radio-iodine treatment (339 MBq) 6 months later. He is well on thyroxine 50 μg daily 2 years later.

Case Report 2

A 25-year-old man with a dilated cardiomyopathy became severely thyrotoxic (free thyroxine (T_4) >100 pmol/litre, thyroid-stimulating hormone (TSH) <0.02 mU/litre), on amiodarone therapy given for ventricular arrhythmias. He was treated with carbimazole 120 mg twice daily but required urgent surgical implantation of a left ventricular assist device (HeartMate1, Thoratec Corporation, Woburn, Mass).

Postoperatively he developed a thyroid storm with a right lower lobe pneumonia. He became extremely agitated, tremulous, with ventricular tachycardia, intractable vomiting and hypotension (temperature 39°C, pulse 160 beats per minute, blood pressure 90/50 mmHg, neutrophil count 24 000x10^9/litre). He had an acute abdomen. He was treated with intravenous co-amoxiclav 1.2 g three times daily, hydrocortisone 100 mg twice daily and intravenous esmolol 50 μg/kilo/min. He was also was given intravenous methimazole 40 mg three times daily for 48 hours. Twenty four hours later his tremor, anxiety, tachycardia and hypotension were much improved (T_4 29 pmol/litre after 48 hours). The vomiting gradually settled. He remained thyrotoxic on high doses of both propylthiouracil (600 mg/24 hours) and carbimazole (240 mg/24 hours) until potassium perchlorate (1 g/24 hours) was added.

After thyroid imaging (thyroid uptake scan showed some technetium uptake (1%), and a thyroid ultrasound showed several nodules) he received a large dose of radio-iodine (748 MBq). He is euthyroid on no thyroid medication 2 years later and has had a successful cardiac transplant.

Dr DJB Thomas *is Consultant Endocrinologist in the Department of Endocrinology, Hillingdon Hospital, Uxbridge UB8 3NN,* **Dr J Hardy** *is Senior House Officer,* **Dr R Sarwar** *is Senior House Officer and* **Dr NR Banner** *is Consultant Cardiologist in the Transplant Unit at Harefield and The Brompton Hospitals, Harefield,* **Dr S Mumani** *is Principal Pharmacist in the Department of Pharmacy, Hillingdon Hospital, Uxbridge,* **Dr K Lemon** *is Consultant Radiotherapist in the Radiotherapy Unit, Mount Vernon Hospital, Northwood, and* **Dr RM Hillson** *is Consultant Endocrinologist, Department of Endocrinology, Hillingdon Hospital, Uxbridge*

Correspondence to: Dr DJB Thomas

amiodarone-induced thyrotoxicosis). The patient in case 2 probably had type 1 amiodarone-induced thyrotoxicosis, but sometimes both forms occur together.

Uzzan et al (1991) have shown that plasmapheresis reduces both thyroxine and amiodarone levels, but this is unable to reduce the whole body amiodarone load fast enough. The patient in case 2 appeared resistant to high doses of thionamides but responded well to potassium perchlorate which Newnham et al (1988) suggest works by reducing iodide transport into the thyroid. Although thyroidectomy is well tolerated in this situation the patient chose radio-iodine therapy.

Conclusions

Gastrointestinal dysfunction was a common factor in both patients with thyroid storms. The availability of intravenous methimazole does not seem to be widely known and it appeared to be a valuable contribution in the management of this condition. It is now kept as a stock item in the authors' pharmacy. BJHM

Burch HB, Wartofsky L (1993) Life-threatening thyrotoxicosis. *Endocrin Metab Clin NA* **2:** 263–77

Newman CM, Price A, Davies DW, Gray TA, Weetman AP (1998) Amiodarone and the thyroid: a practical guide to the management of thyroid dysfunction induced by amiodarone therapy. *Heart* **79:** 121–7

Newnham HH, Topliss DJ, Le Grand BA, Chosich N, Harper RW, Stockigt JR (1988) Amiodarone-induced hyperthyroidism: assessment of the predictive value of biochemical testing and response to combined therapy using propylthiouracil and potassium perchlorate. *Aust NZ J Med* **18:** 37–44

Uzzan B, Pussard E, Leon A et al (1991) The effects of plasmapheresis on thyroid hormone and plasma drug concentrations in amiodarone induced thyrotoxicosis *Br J Clin Pharm* **31:** 371–2

Wartofsky L (2002) Thyroid storm. In: Wass JAH, Shalet SM, eds. *Oxford Textbook of Endocrinology and Diabetes.* Oxford University Press, Oxford: 481–5

Wu SY, Chopra IJ, Soloman DH, Bennett LR (1978) Changes in circulating iodothyronines in euthyroid and hyperthyroid subjects given Ipodate, an agent for oral cholecystography. *J Clin Endocrinol Metab* **46:** 61–7

Sky's surgical screwups

Rupert Murdoch has the ear of our politicians. Some think he has more than just the ear. Prime Minister Tony Blair flew off to address a News International conference. Murdoch thinks it unfair that the BBC levies a licence fee. These facts, plus a long day in the operating theatre, found me sitting in front of the television, idly flicking through the channels in a thoughtful way. I came across Sky One, one of Mr Murdoch's general entertainment channels. A coarse, ignorant, estuary-English front man was taking us through 'The 99 most bizarre surgical screwups' (Sky One, 27 July). To keep this rubbish at bay, we need the licence fee doubled, to give the BBC as much chance as it can get.

Not all BBC programmes about medical errors have been properly researched and presented, but nothing – except the occasional glance at OK! and Nuts – could have prepared me for this. OK! and similar magazines aimed at women delight in catching celebrities unaware of their dimpled thighs or underarm hair. Nuts and similar magazines aimed at men show lurid photographs of accident victims. This was the intellectual level of 'The 99 most bizarre…'

Most were not bizarre at all. They were just medical mistakes, presented sensationally, accusatorially, and without any attempt at explanation. No clinicians appeared on the programme, although unsurprisingly since all but two of the 'screwups' were American we heard a lot from attorneys.

A woman from Michigan described how she woke up during emergency hip surgery: 'Everyone's worst nightmare!' Her husband, who, like almost every patient and relative in the programme was obese, said his wife had not been the same since, and – truly bizarrely – there was 'expert' comment from a medical ethicist.

'Most screwups were not bizarre at all. They were just medical mistakes, presented sensationally, accusatorially, and without any attempt at explanation.'

It was similarly left to another medical ethicist to explain how another woman woke up during eye surgery because the anaesthetic drug had worn off before the paralytic drug, 'an experience far from unique'.

'But don't worry', said Mr Estuary Man before and after every commercial break, 'most operations are done without complications by dedicated and competent surgeons. But that's not what happened to…' and he slaveringly went on to the next group of screwups: misdiagnoses, drastic plastic, things left behind, fire in the operating room, rogue surgeons.

We didn't actually see all 99 screwups. We saw two or three under each heading, with a numbered credit list scrolling in the background. Drastic plastic included a man whose calf implants had gone wrong. Repeated debandment [sic] left him with almost no muscle in his lower legs. It quite turned me off from having the operation. There was also a woman unable to smile – which she found emotionally crippling because she was a happy person – because her silicone cheek implants had gone wrong.

The 'most bizarre of all', number 99 in the list, was a man whose penis had been cut off. But he did have carcinoma. A first operation had left him with a functional penis, but a second one left him only a stump. Had there been residual tumour? We were not told.

To borrow a phrase from the programme, 'And if you're not nervous already…', the rumour is that when Blair finally decides to leave number 10, Murdoch will offer him a directorship. BJHM

Dr Neville Goodman *is Consultant Anaesthetist at Southmead Hospital, Bristol*