False diagnosis of a catecholamine-secreting paraganglioma in a patient with hypertension and depression

Glyn Thomas, Peter Winocour

INTRODUCTION

Paragangliomas are uncommon tumours which originate from extra-adrenal chromaffin tissue and account for approximately 10% of all catecholamine-secreting tumours. The investigation of choice for locating catecholamine-secreting tumours is radiolabelled metaiodobenzylguanidine (^{123}I-MIBG/^{131}I-MIBG) scan which, as shown by Shapiro et al (1985), has a high sensitivity (87.4%) and specificity (98.9%). We report a case whose history and investigation findings were highly suggestive of a catecholamine-secreting paraganglioma, which was subsequently disproven.

DISCUSSION

Catecholamine-secreting tumours have been shown to account for 0.1–1.0% of all hypertensive patients (Van Heerden et al, 1982), with typical symptoms as in the present case. The first-line investigation of a hypertensive patient with a suspected catecholamine-secreting tumour would be the demonstration of elevated catecholamine levels. The level of circulating catecholamine in normal individuals has been found to vary significantly, both at different times of the day in the same individual (Levin et al, 1979), and in response to stimuli such as psychological stress (Goldstein et al, 1982) and caffeine (Robertson et al, 1979). In addition, an abnormal elevation of urinary noradrenaline has been observed in young hypertensive subjects in response to psychological stress (Goldstein, 1983).

Prescribed medications may also modulate plasma catecholamine levels. Imipramine, a tricyclic antidepressant, works by competitively inhibiting the uptake of noradrenaline by the nerve terminals, with the effect of increasing the peripheral concentration. This alone may result in a 1- or 2-fold increase in urinary catecholamines. In the present case, the combination of these factors was probably responsible for the misleading noradrenaline elevation.

The process of locating neuroendocrine tumours has been greatly simplified by the introduction of the I-MIBG scan. Radiolabelled MIBG is preferentially absorbed and taken up into vesicles by peripheral sympathetic autonomic nerves, via the high energy, sodium-dependent type 1 uptake mechanism. Primary intrathyroidal (Brownlee and Shockley, 1992) and parathyroidal paragangliomas (McCluggage et al, 1996) have been reported previously in the literature. A handful of false positive scans involving the thyroid gland have been documented.

CASE REPORT

A 48-year-old man was referred to the accident and emergency department. He had been suffering from intermittent episodes of headaches, palpitations and sweating with 'flushing' for the past 2 years. On the day of presentation he had suffered a typical 'attack' while at work, and was found to be hypertensive (blood pressure 160/120 mmHg). He denied any intense anxiety associated with these symptoms, but had been receiving treatment with imipramine (150–225 mg daily) for depression over the past 12 months. There was no significant past medical history.

On examination he was slightly obese and mildly tachycardic (rate 100 beats per minute) with normal heart sounds. Radial pulses were present and equal, with no radio-femoral delay. Fundoscopy revealed healthy discs and normal retinal vasculature. The remainder of the examination was unremarkable. Baseline renal function was normal with a serum creatinine of 96 μmol/litre, and urinary albumin:creatinine ratio of 0.5. Measurement of urinary catecholamine excretion revealed persistent elevation of noradrenaline on three subsequent samples, at 749, 764, and 1008 nmol/24 hours (reference range <590 nmol/24 hours). Values for adrenaline and dopamine, however, were well within normal limits at 48, 49, 88 nmol/24 hours (reference range <190 nmol/24 hours) and 2301, 2432, 2619 nmol/24 hours (reference range <3279 nmol/24 hours), respectively.

On the basis of this clinical picture, a presumptive diagnosis of hypertension caused by a catecholamine-secreting tumour was made. Imipramine was stopped, and antihypertensive medication commenced. An attempt to locate the neuroendocrine tumour using both computed tomography and magnetic resonance imaging failed to locate any mass lesion in either the adrenal glands, retroperitoneum, mediastinum, abdomen or bladder.

An ^{123}I-MIBG scan was then performed (potassium perchlorate 400 mg once daily for 3 days beforehand, then 398 MBq of ^{123}I-MIBG and 79 MBq of ^{99}Tc^{m} mercaptoacetyltriglycine (MAG3)), which revealed an isolated focal high uptake in the region of the lower pole of the left thyroid lobe (*Figure 1*). The presence of a 1.2 x 1.5 cm lesion at this site was confirmed on magnetic resonance imaging (*Figure 2*) and ultrasonography. An ultrasound-guided fine needle aspiration was performed on the lesion, before anticipated surgical intervention. This revealed simple cystic changes in a degenerative thyroid nodule, with no evidence to suggest the presence of a neuroendocrine tumour. Repeat measurement of both blood pressure and catecholamine excretion had returned to within the normal range.

Dr Glyn Thomas is House Physician and **Dr Peter Winocour** is Consultant Physician, Queen Elizabeth II Hospital, Howlands, Welwyn Garden City, Hertfordshire AL7 4HQ

Correspondence to: Dr P Winocour

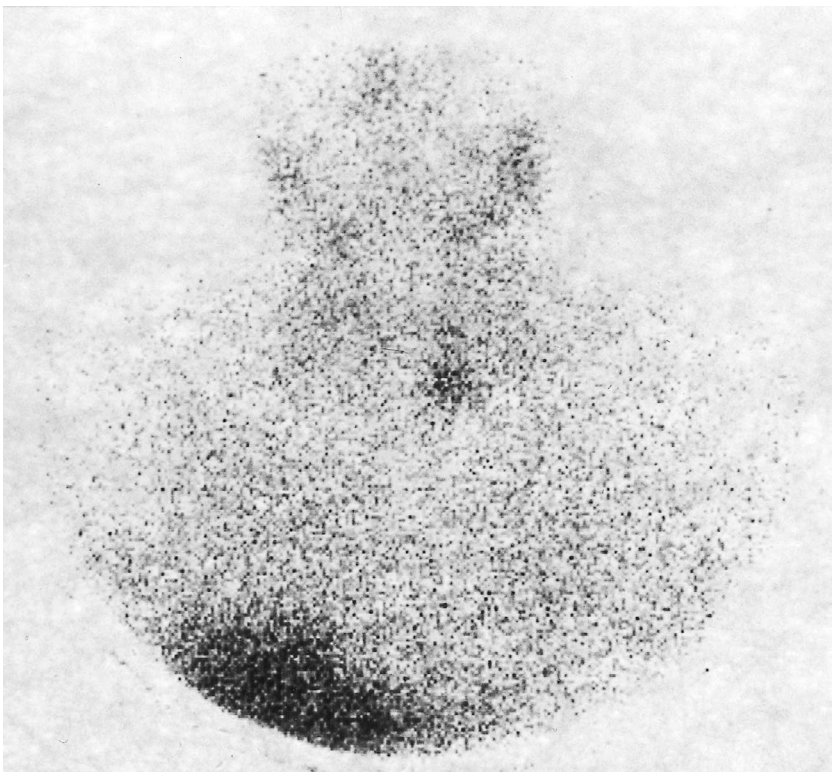

Figure 1. 123 I-metaiodobenzylguanidine scan. A focal area of high uptake in the region of the lower pole of the left thyroid lobe is demonstrated.

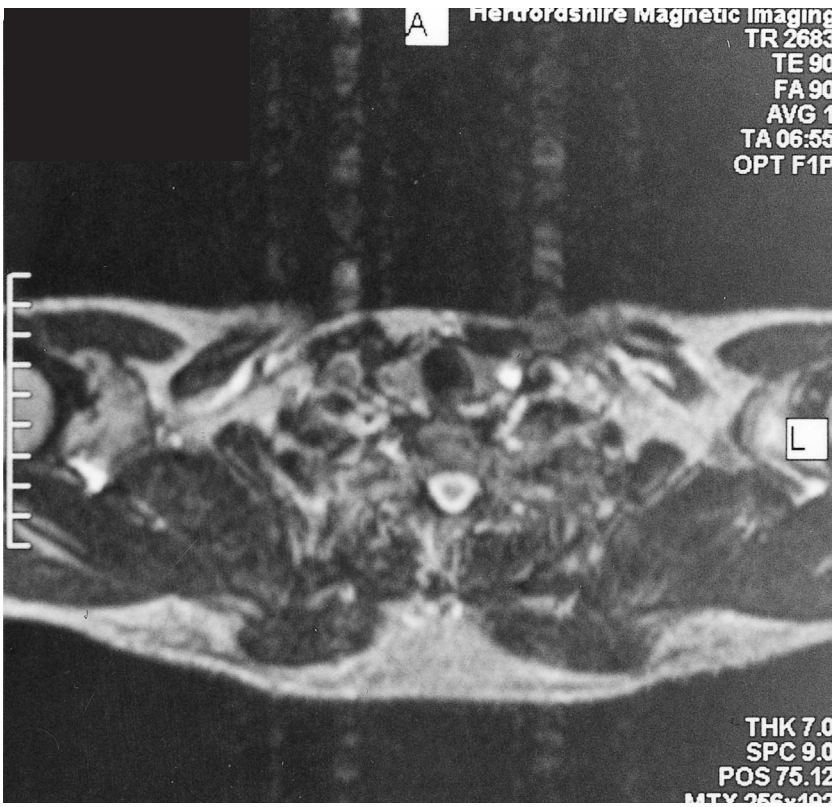

Figure 2. Magnetic resonance imaging scan of the brachial plexus. A 1.5 cm high signal lesion is situated in the lateral part of the left thyroid lobe.

Although medullary carcinoma of the thyroid has been shown to accumulate ^{131}I-MIBG (Sone et al, 1985), the most common cause of thyroidal accumulation in the absence of a neuroendocrine tumour is the inadequate or inadvertent omission of a blocking agent, such as iodide or perchlorate. These compounds prevent the uptake of free radioiodine liberated by in vivo deiodination (Shapiro and Bouloux, 1993).

CONCLUSION

The effect of anxiety and imipramine presumably caused an abnormal elevation in noradrenaline, which led to the incidental detection of a functioning thyroid nodule, which after MIBG scintigraphy was falsely suspected of neuroendocrine activity, as a consequence of inadequate blockade. This case illustrates the numerous factors that may influence the significance of investigation results in the diagnosis of catecholamine-secreting tumours. **HM**

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