lesson of the month

FA Mir
BSc MBBS MRCP,
Specialist Registrar

MJ Brown
MA MSc MD FRCP,
Professor,
Clinical
Pharmacology Unit

DS Appleton
MA FRCR,
Consultant
Radiologist

Addenbrooke's
Hospital,
Cambridge

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Lessons in the diagnosis and management of Conn's syndrome

Classically, Conn's syndrome is diagnosed in hypertensive patients with:

- **typical plasma biochemistry (high aldosterone, sodium and bicarbonate; low renin and potassium)**
- **computed tomography or magnetic resonance imaging evidence of a unilateral adrenal adenoma**
- **a therapeutic response to spironolactone (or amiloride)**
- **differential adrenal venous sampling confirming lateralisation of aldosterone secretion to the adrenal gland with the adenoma**

Diagnosis and management can be complicated, however, by various confounding factors, which are illustrated in the case below.

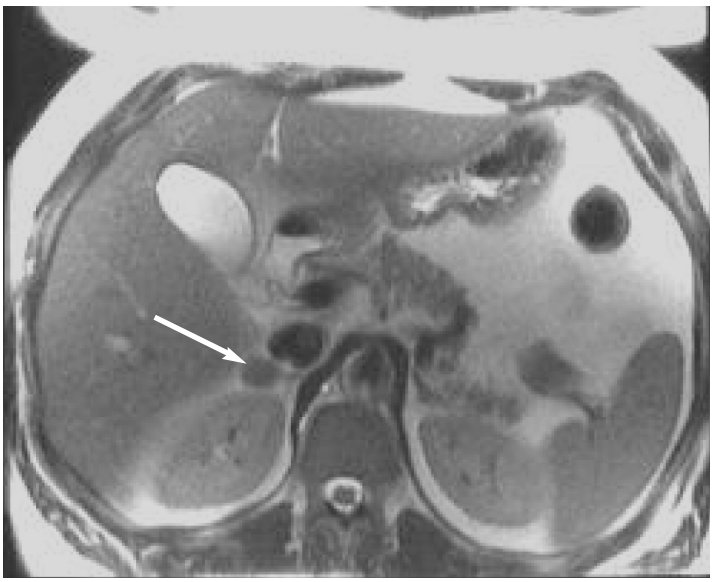

Fig 1. Magnetic resonance imaging scan of adrenals showing a 2 cm right-sided adenoma (arrow).

Lesson

A 49-year-old man with hypertension participated in a research study comparing patients' response to different diuretics. His blood pressure responded best to bendroflumethiazide, on which his plasma potassium level was 3.1 mmol/l. On follow-up, his blood pressure was 160/110 mmHg on 5 mg amlodipine. His blood results showed:

Na+	135	(135–145 mmol/l)
K+	3.4	(3.4–5.0 mmol/l)
Creatinine	90	(35–125 µmol/l)
Renin activity	0.4	(0.22–4.3 pmol/ml/hr)
Aldosterone	290	(100–450 pmol/l)

The amlodipine dose was increased to 10 mg and in view of the low serum renin, spironolactone was added. This was not tolerated, however, because of gynaecomastia.

The patient re-presented four years later post-myocardial infarction with a blood pressure of 143/91 mmHg on 10 mg amlodipine, aspirin and simvastatin. Plasma biochemistry revealed:

Na+	146	(135–145 mmol/l)
K+	2.8	(3.4–5.0 mmol/l)
Creatinine	98	(35–125 µmol/l)
Renin	2	(5–97 mU/l)
Aldosterone	1,126	(100–450 pmol/l)

A magnetic resonance imaging scan of the adrenal glands was performed, revealing a 2 cm nodule in the right gland (Fig 1). Addition of amiloride (10 mg) normalised plasma potassium and lowered blood pressure to 134/82 mmHg.

The patient proceeded to selective adrenal venous sampling for aldosterone and cortisol. This showed a 10-fold difference in the aldosterone/cortisol ratio between the two sides (Table 1). A laparoscopic adrenalectomy was therefore performed at which a 1.9 cm adenoma was removed (Fig 2).

Two months later, the patient's blood pressure was 142/96 mmHg on 5 mg of amiloride and 5 mg amlodipine. Repeat blood tests showed:

Na+	141	(135–145 mmol/l)
K+	4.4	(3.4–5.0 mmol/l)
Creatinine	75	(35–125 µmol)
Renin	13	(5–97 mU/l))
Aldosterone	564	(100–450 pmol/l)

Table 1. Differential adrenal venous sampling results.

Vein	Aldosterone (pmol/l)	Cortisol (nmol/l)	Ratio
Right adrenal	882,500	38,770	22.76
Left adrenal	50,500	20,241	2.49
Inferior vena cava	1,180	475	2.48

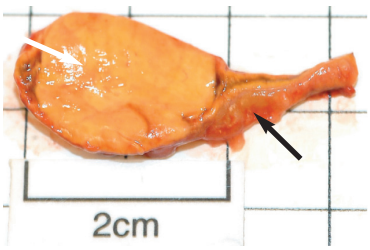

Fig 2. Cut section macroscopic appearance of surgical specimen. The glistening yellow tumour (white arrow) is well-demarcated from the adjacent normal adrenal, including the core of reddish adrenal medulla best seen in the lower right corner (black arrow).

Conclusions

- Administration of calcium channel blockers can suppress aldosterone secretion from the adrenals and cause plasma potassium levels to rise in people with a Conn's adenoma, thereby masking diagnosis.[1]
- Patients with Conn's syndrome may respond therapeutically to thiazide diuretics. The development of significant hypokalaemia on low-dose thiazide is a pointer towards, not against, the diagnosis.
- Surgical cure of hypokalaemia secondary to Conn's adenomas is more predictable than that of hypertension. Indeed, delay in diagnosis due to 'masking' by calcium channel blockers may contribute to development of irreversible hypertension.

References

1 Brown MJ, Hopper RV. Calcium-channel blockade can mask the diagnosis of Conn's syndrome. *Postgrad Med J* 1999;75:235–23.

Cleanliness and cross infection

Dear Dr Charlotte – We met recently and decided to compare your experience as a newly-qualified doctor with mine from an earlier era and agreed to adopt the format of an open letter. The first letter considered teamworking. This, the second, compares our experience on the important topic of cross infection.

Cleanliness and cross infection: the 1960s experience

Pre-clinical medical students looked similar to all other undergraduates but they were keenly aware of the changes expected of them in their transition to clinical studies. Clinical students were smartly dressed and always wore a clean white coat. Those not adhering to this code were commonly dismissed from teaching rounds. Doctors of all grades, except consultants, wore white coats. Consultants were well dressed with shirt, tie and often a flower in their lapel. It was only somewhat later that they also adopted the white coat.

The nursing staff were always extremely smart wearing dresses (colour coded to their seniority), aprons and caps. Regular inspections were held to maintain high standards. The ward sister was authoritative and in charge. Any lapse in standards for any one on the ward, regardless of rank, was immediately identified and corrected.

The domestic staff were also under her eagle eye but were included as part of the team and commonly gave many years of devoted service to 'their ward and their sister'. The entire ward, including the bathrooms and sluice, was spotless. Cleaning was a major part of the student nurse's responsibility.

Procedures on the ward were carried out to a high standard. Blood sampling included the use of a sterile pack for swabbing the arm and the area was surrounded by a sterile towel. The pack contained a glass syringe and reusable metal needles. Intravenous infusions or catheterisations were carried out by a doctor and nurse who wore sterile gloves after thorough hand washing. All the equipment, including the reusable metal cannulae, was provided in a sterile pack. Lumbar punctures were carried out using masks and gowns in addition.

Whether these measures minimised cross infection is uncertain. The pattern of care was so different. The range of available antibiotics was limited. Immuno-compromised patients were rare. There were no transplant programmes and little chemotherapy. The surgical wards were mainly filled by fit young patients having surgery for hernias, varicose veins or piles. The older patients were usually looked after in separate wards.

I expect that there will be a wide gulf between your experience and mine. I look forward to hearing of your time as an F1 doctor.

The Editor