

PATIENT SAFETY WATCH



EDITION 1/15: Adrenal Insufficiency - Diagnostic & Management Dilemmas

WHAT SHOULD YOU DO

1. Include adrenal insufficiency in local clinical education programmes
2. Implement an effective alert system within the local eMR, including the actions required when a patient known to have adrenal insufficiency presents to the facility for any reason. Audit compliance with the recommended actions.
3. Ensure effective systems are in place for the follow up of highly abnormal investigation results, including cortisol levels.
4. Incorporate examples of delayed diagnosis and/or unsatisfactory management of patients with adrenal insufficiency in local processes for sharing lessons learned.

CASE 1

A 39 year old male presented to the Emergency Department with pain in the knee and ankle accompanied by abdominal discomfort, nausea and vomiting for three days. His initial blood pressure was slightly below the normal range at 97/61 mmHg and he had a pulse rate of 116 per minute. The patient had a low sodium level of 129nmol/L and slightly impaired renal function. Imaging of renal and urinary tracts was normal. Over the next few days, his pain decreased although mobility was still restricted. He had a previous diagnosis of insulin resistance, referred to by the patient as 'pre- diabetes'. His renal function improved but the sodium remained between 128 and 131mmol/L. The blood pressure continued to be slightly lower than normal. The diagnosis of adrenal insufficiency was considered and appropriate testing occurred prior to the patient's

discharge two days after admission. There was no documentation that the diagnosis of adrenal insufficiency was being considered or that a cortisol test had been ordered or performed. The discharge summary did not mention the test or the need for it to be followed up. There was no discussion with the patient about the significance of the potential diagnosis of adrenal insufficiency or the need for him to pursue the results. There was, therefore, no opportunity for him to understand that he should return to hospital if his condition deteriorated. The patient became unwell and lethargic again shortly after his arrival home and he was unable to maintain adequate oral intake. He suffered a cardiac arrest the following day from which he was unable to be resuscitated. The review that was undertaken at the hospital determined that the patient's cortisol level had

been extremely low but had not been followed up before or after discharge. A critically low cortisol result was not on the list of highly abnormal results that required notification by the pathology unit to the patient's treating clinician. The complexity of the laboratory process for validation of the abnormal result also contributed to the delay.

CASE 2

A 22 year old female presented to the ED with a history of fatigue, significant weight loss and Hashimoto's thyroiditis (which was being investigated by a general practitioner and physician). She complained of chest pain which was consistent with pericarditis. Other potential diagnoses such as pleurisy and pulmonary embolism were considered but discounted after investigation. The patient's initial BP was recorded as 82/63 mmHg and a subsequent assessment was 98/64 mmHg. She was discharged on ibuprofen with a diagnosis of viral pericarditis, for follow up with her GP. After discharge she continued to be unwell and was eating poorly. She suffered a cardiac arrest two weeks later at home and died. Cause of death was noted to be bacterial peri and myocarditis with idiopathic adrenocortical insufficiency and Schmidt's syndrome (Polyendocrine Deficiency Syndrome Type 2).

Adrenal Insufficiency

Adrenal insufficiency is a rare disorder with approximately five new cases occurring per million population each year, but left untreated it can be fatal. As highlighted by the previous two cases, it can be very difficult to diagnose. Adrenal insufficiency can be primary or secondary. Primary adrenal insufficiency, or Addison's disease, occurs when the adrenal glands are damaged and fail to produce enough cortisol and usually aldosterone. Most commonly, this occurs due to autoimmune destruction of the adrenal cortex. Secondary adrenal insufficiency occurs when the pituitary gland produces insufficient adrenocorticotrophin (ACTH), leading to a reduction in cortisol

secretion. This may occur for example after pituitary surgery or as a result of a pituitary tumour.

Symptoms and signs

Symptoms are usually gradual in onset and may include:

- Chronic, worsening fatigue
- Muscle weakness
- Loss of appetite
- Weight loss
- Recurrent abdominal pain
- Nausea and vomiting
- Diarrhoea
- Salt craving
- Postural hypotension

Hyperpigmentation is a sign which frequently occurs in primary but not in secondary adrenal insufficiency. This is most apparent on scars, pressure areas (such as the elbows, knees and knuckles), the lips and mucous membranes.

The symptoms often develop slowly, hence they are frequently ignored or overlooked until a stressful event such as an illness or trauma causes them to worsen, instigating an adrenal ('Addisonian') crisis. Symptoms of an adrenal crisis include:

- Severe vomiting and diarrhoea
- Dehydration
- Dizziness and hypotension
- Confusion
- Loss of consciousness
- Abdominal pain

Diagnosis and treatment

In its early stages, adrenal insufficiency can be difficult to diagnose as the symptoms may be vague. However, if adrenal insufficiency is suspected then urgent investigation is needed. Important biochemical pointers to the diagnosis may include hyponatraemia, hyperkalaemia and/or a raised urea. A morning plasma cortisol and paired ACTH measurement can be helpful. A morning (8-9am) cortisol concentration lower than

100 nmol/l is very suggestive of a diagnosis of adrenal insufficiency, whereas concentrations greater than 600 nmol/l exclude the diagnosis in almost all cases. However, cortisol measurements often do not fall into these diagnostic extremes and levels in between these values should be considered indeterminate. Abnormal results or ongoing clinical concern warrants urgent referral to an Endocrinologist for further investigation including an ACTH ('synacthen') stimulation test.

Ongoing Care

The challenges in providing care for patients suffering from adrenal insufficiency do not stop when the diagnosis has been made, as the following three cases depict. In adults presenting with a suspected adrenal crisis, treatment with parenteral hydrocortisone should begin immediately.

CASE 3

A 36 year old female was admitted for elective surgery for excision of a right suprarenal liposarcoma. The patient progressed to removal of the right adrenal gland because of the position of the lesion. She had previously undergone left adrenalectomy and right hemi-colectomy. The patient deteriorated and a Clinical Emergency Response System (CERS) call was made twenty four hours after the procedure. The surgical registrar commenced intravenous fluids and ordered a chest x-ray and checked the arterial blood gas status. Seven hours later, a medical registrar assessed the patient as being in adrenal crisis and prescribed intravenous hydrocortisone. The patient had bilateral pneumonia and was in respiratory acidosis. The anaesthetist had not provided any instruction about the need for hydrocortisone after the procedure. Upon investigation, there appeared to have been a significant breakdown in communication between the surgeon and the anaesthetist. Time out processes had not included a review of the patient's imaging. Such review may have alerted the team to the patient's previous adrenalectomy

and need for hydrocortisone therapy. The ward intern had clearly documented a history of the previous left adrenalectomy and that removal of right adrenal gland had occurred that day, but he did not identify the risk of adrenal crisis or need for hydrocortisone. Neither the reviewing surgical team nor the anaesthetic registrar was alert to the underlying issue. When a CERS call was made, the surgical registrar did not recognise adrenal crisis. However he did request a medical review which ultimately led to the diagnosis. Over a fifty six hour period, multiple medical and nursing staff did not recognise the condition of adrenal crisis in a patient with a clearly documented history of removal of both adrenal glands.

CASE 4

A 70 year old male patient with known adrenal insufficiency presented to the emergency department with renal stones requiring urgent surgery. His Medicalalert bracelet stated "adrenal insufficiency" but it was removed prior to transfer to the operating theatre because it was deemed by nursing staff to be 'jewellery'. During anaesthesia the patient developed hypotension. Cortisol deficiency was not considered, and therefore no hydrocortisone was administered. The patient's endocrinology team noted the patient's current admission by chance when following up a recent clinic blood test result. Stress doses of hydrocortisone were administered 81 hours after admission. Recovery was slow and the patient spent an additional four days in hospital over and above what was originally anticipated. The patient's ED record and anaesthetic chart both clearly stated a history of hypopituitarism and that he was on hydrocortisone acetate. The hospital had implemented an alert system within the electronic medical record which, at triage, identified the fact that the patient had adrenal insufficiency. It clearly set out the required actions to be taken but had been overlooked by staff.

CASE 5

An 80 year old male patient presented to the ED by ambulance feeling generally unwell. He had recently been diagnosed with hypopituitarism and secondary adrenal insufficiency. An alert had been set up in the eMR about his adrenal insufficiency and how to manage it. The alert does not pop up in the same manner as an allergy alert does and was not noted by ED staff. The recommended actions, set out below, were not taken:

“If admitted to the emergency department, ALL adrenal insufficiency patients require EACH of the following:

- Rapid assessment
- Immediate hydrocortisone 100mg administered either IV or IMI
- Rehydration with saline as appropriate
- Treatment of the presenting problem”

After spending the night in the ED, staff decided to send the patient home. At 7am, prior to his departure, and whilst still feeling unsure as to how to manage the situation in relation to his current illness, he initiated his own dose of Hysone (hydrocortisone).

*Any enquiries or comments about this publication, should be directed to: Dr Maree Bellamy
email: Maree.Bellamy@health.nsw.gov.au*