Adrenal Insufficiency

Sharon H. Chou, MD

KEYWORDS

• Adrenal insufficiency • Acute adrenal crisis • Corticotropin
• Steroids

HOSPITAL MEDICINE CLINICS CHECKLIST

1. Consider a diagnosis of adrenal insufficiency in patients on chronic glucocorticoid therapy (all routes of administration) and patients with other endocrine autoimmune disorders
2. Review medication lists, as many drugs can precipitate adrenal insufficiency
3. Confirm adrenal insufficiency with an adrenocorticotropic hormone (ACTH; corticotropin) stimulation test in most cases
4. Treat the patient empirically in emergent cases of adrenal insufficiency but remember to draw cortisol and ACTH levels before administering glucocorticoid therapy
5. Recognize that patients with primary adrenal insufficiency usually require both glucocorticoid and mineralocorticoid replacement
6. Increase the dose of chronic steroids in the setting of illness or planned procedures to prevent an adrenal crisis

DEFINITIONS

1. What is the definition of adrenal insufficiency and how is it classified?

Adrenal insufficiency is the lack of adrenal production of glucocorticoids or mineralocorticoids, due to either the destruction or dysfunction of the adrenal cortex (primary) or deficient pituitary ACTH secretion (secondary). In secondary adrenal insufficiency, mineralocorticoid secretion is preserved, as this is controlled by the renin-angiotensin system.

Relative adrenal insufficiency has been recently referred to as critical illness–related corticosteroid insufficiency and is defined by inadequate glucocorticoid activity for the severity of the illness, usually seen in conditions of sepsis and septic shock.[1]

Section of Adult & Pediatric Endocrinology, Diabetes & Metabolism, The University of Chicago, 5841 South Maryland Avenue, MC 1027, Chicago, IL 60637, USA
E-mail address: Sharon.chou@uchospitals.edu

Hosp Med Clin 1 (2012) e97–e108
doi:10.1016/j.ehmc.2011.11.005
2211-5943/12/$ – see front matter

2. What is an acute adrenal crisis?

Acute adrenal crisis is a state of acute adrenocortical insufficiency in patients with primary adrenal insufficiency in the stressful setting of infection, trauma, surgery, or dehydration.

EPIDEMIOLOGY

1. What is the prevalence of adrenal insufficiency?

Chronic primary adrenal insufficiency has a prevalence of 93 to 140 per million in white populations and secondary adrenal insufficiency has an estimated prevalence of 150 to 280 per million, with the most common cause likely being chronic glucocorticoid therapy.[2] In a national insurance-based study of hospitalized patients in Taiwan in 2007, the prevalence of all causes of adrenal insufficiency was 208 per million.[3] In a small cohort study on septic patients, adrenal insufficiency was identified in 60%.[4]

2. What are the most common causes of adrenal insufficiency?

In developed countries, 80% to 90% of patients with primary adrenal insufficiency have autoimmune adrenalitis; in developing countries, tuberculosis adrenalitis remains a major factor.[2] The most frequent cause of secondary adrenal insufficiency, excluding exogenous glucocorticoid therapy, is a tumor of the hypothalamic-pituitary region, usually associated with panhypopituitarism.[2,5]

3. What are other causes of adrenal insufficiency?

In addition to autoimmune adrenalitis (in developed countries) and tuberculosis adrenalitis (in developing countries), there are numerous additional causes of primary adrenal insufficiency (**Table 1**). There are also numerous additional causes of secondary adrenal insufficiency (**Table 2**).

4. What are the predisposing risk factors for adrenal insufficiency?

Risk factors include congenital abnormalities, endocrine autoimmune disorders, trauma, chronic steroid use, infectious diseases, coagulation disorders, liver disease, tumors, infiltrative diseases, and mental disorders, which can lead to hypothalamic-pituitary-adrenal (HPA) axis dysregulation.[5] In particular, patients with liver disease have been found to have a high incidence of relative adrenal insufficiency; it is seen in 33% of patients with acute liver failure, in 65% of patients with chronic liver disease and sepsis, and in 61% to 92% in liver-transplantation patients.[6]

In addition to steroids, there are other various drugs that can result in primary or secondary adrenal insufficiency through several mechanisms (**Table 3**).

HISTORY AND EXAMINATION

1. What are the most common clinical features of adrenal insufficiency?

Because of the constellation of nonspecific symptoms, adrenal insufficiency often has a delayed diagnosis. In a cross-sectional German study, fewer than 50% of patients were diagnosed with adrenal insufficiency within the first year of onset of symptoms.[7] These symptoms are summarized in **Table 4**.