CONDITION

Acute adrenal crisis

Learn how acute adrenal crisis affects the body, which symptoms need emergency care, and how treatment and prevention plans help reduce future risk.

WHAT IT IS
Medical emergency caused by severe cortisol shortage

BODY SYSTEM
Hormone system

MAIN SYMPTOMS
Severe weakness, fainting, repeated vomiting, confusion

WHAT CAUSES IT
Cortisol shortage from adrenal insufficiency

HOW IT IS DIAGNOSED
Clinical assessment, cortisol and ACTH testing

MAIN TREATMENT
Injected corticosteroids and intravenous fluids

CAN IT BE CURED?
Yes, prompt emergency treatment is effective

IS IT AN EMERGENCY?
Yes, suspected crisis requires immediate treatment

LONG-TERM OUTLOOK
Prompt improvement typical, with recurrence and death possible

Overview

Acute adrenal crisis is a medical emergency caused by a severe shortage of cortisol. Cortisol is a hormone made by the adrenal glands, which sit above the kidneys. It helps maintain blood pressure, blood sugar, fluid balance, and the body's response to illness or injury.

Adrenal crisis usually occurs in someone with adrenal insufficiency. In this condition, the body does not make enough cortisol. Some people already know they have adrenal insufficiency. For others, a crisis may be the first sign of the condition.

During an infection, injury, operation, or other physical stress, the body normally releases more cortisol. A person with adrenal insufficiency may not be able to meet this increased need. A crisis can also develop if steroid medicine is stopped suddenly or cannot be absorbed because of vomiting or diarrhea.

Without prompt treatment, blood pressure and blood sugar can fall to unsafe levels. Severe dehydration and changes in blood salts, called electrolytes, may also occur. Emergency treatment with a corticosteroid like prednisone or hydrocortisone , usually hydrocortisone, and fluids is highly effective when given promptly.

Symptoms

Symptoms can develop over several hours or may worsen more gradually during an illness. They may resemble symptoms of other conditions, so the person's history of adrenal insufficiency or steroid use is important.

Possible symptoms include:

Blood tests may show low sodium. In primary adrenal insufficiency, potassium may be high because the adrenal glands may also lack aldosterone, a hormone that helps control salt and potassium. High potassium is less typical in secondary or tertiary adrenal insufficiency because aldosterone production is usually preserved.

Some people have symptoms of adrenal insufficiency before a crisis. These can include ongoing tiredness, weight loss, nausea, muscle weakness, or low blood pressure. Primary adrenal insufficiency may also cause salt cravings and darkening of the skin, especially in skin creases, scars, and the gums.

Seek emergency medical help immediately if a person with known or suspected adrenal insufficiency develops severe weakness, fainting, confusion, repeated vomiting, inability to keep steroid medicine down, or signs of shock. If the person has been prescribed an emergency hydrocortisone injection, it should be used according to their emergency plan. Emergency care is still needed after the injection.

- Severe weakness, unusual tiredness, or difficulty standing
- Dizziness, fainting, or very low blood pressure
- Nausea, repeated vomiting, diarrhea, or abdominal pain
- Confusion, unusual sleepiness, or reduced alertness
- Fever or symptoms of an infection
- Headache
- Dehydration, including thirst and reduced urination
- Low blood sugar, which may cause sweating, shaking, confusion, or loss of consciousness

Causes and risk factors

Adrenal crisis can occur with primary, secondary, or tertiary adrenal insufficiency.

In primary adrenal insufficiency, the adrenal glands themselves are damaged. Autoimmune disease, in which the immune system mistakenly attacks the adrenal glands, is a common cause. Other causes include infections, bleeding into both adrenal glands, genetic conditions, cancer affecting the glands, or surgery that removes them. Both cortisol and aldosterone may be reduced.

Secondary adrenal insufficiency results from a problem with the pituitary gland. This small gland at the base of the brain normally makes adrenocorticotropic hormone, or ACTH, which tells the adrenal glands to produce cortisol. Pituitary tumors, surgery, radiation, bleeding, or other pituitary disorders can reduce ACTH.

Tertiary adrenal insufficiency involves reduced signaling from the hypothalamus, another part of the brain that helps control hormone production. A frequent cause is suppression of the body's cortisol system after prolonged use of corticosteroid medicines.

Corticosteroids include medicines such as hydrocortisone, prednisone, prednisolone, and dexamethasone. They may be taken by mouth, injection, or other routes. The risk of adrenal suppression depends on factors such as the medicine, dose, treatment length, and individual response. People should not stop long-term corticosteroid treatment suddenly unless a clinician has provided a safe tapering plan.

Common triggers for crisis include:

A person can develop adrenal crisis even when taking medicine correctly, particularly during a severe illness. A written prevention and emergency plan helps clarify what to do.

- Fever, infection, or another significant illness
- Vomiting or diarrhea that prevents medicine absorption
- Surgery, a major dental procedure, injury, or childbirth
- Missing steroid doses or stopping treatment suddenly
- Not increasing steroid treatment during physical stress when a sick-day plan calls for it
- Previously unrecognized adrenal insufficiency

Diagnosis

Adrenal crisis is mainly a clinical diagnosis during the emergency. Clinicians consider the

person's symptoms, blood pressure, medical history, medication use, and response to treatment.

Blood may be collected to measure cortisol and ACTH. If possible, these samples are taken before corticosteroid treatment. However, treatment should not be delayed while waiting for tests or when collecting blood would slow emergency care.

Other tests may include blood glucose, sodium, potassium, kidney function, and markers of infection. An electrocardiogram may be used if potassium is abnormal. Blood cultures, urine tests, chest imaging, or other studies may help identify an infection or another trigger.

After the person is stable, further testing may be needed to confirm adrenal insufficiency and identify its cause. An ACTH stimulation test checks whether the adrenal glands can produce cortisol after receiving a medicine that acts like ACTH. Additional hormone tests can help distinguish primary adrenal disease from pituitary or hypothalamic causes.

Imaging of the adrenal glands or pituitary may be appropriate in some cases. Tests for autoimmune antibodies may support a diagnosis of autoimmune primary adrenal insufficiency.

Treatment and management

Treatment begins immediately when adrenal crisis is suspected. The main treatment is hydrocortisone given by injection into a vein or muscle. Hydrocortisone replaces the missing cortisol and helps support blood pressure and the body's response to stress.

Intravenous saline is used to restore fluid and salt. Glucose may be added or given separately if blood sugar is low. Clinicians monitor blood pressure, heart rate, urine output, glucose, and electrolytes. Any trigger, such as a bacterial infection, is treated at the same time.

Once the person is improving and can keep medicine down, treatment is changed from injected hydrocortisone to oral corticosteroid medicine. The dose is then reduced toward the person's usual replacement plan under medical supervision. People with primary adrenal insufficiency may also need fludrocortisone to replace aldosterone, depending on their regular treatment plan.

Long-term management focuses on preventing another crisis. People with adrenal insufficiency should receive clear sick-day instructions. These explain when and how to adjust steroid treatment during fever, significant illness, injury, or a medical procedure. Instructions should also address vomiting or diarrhea, when oral medicine may not be absorbed.

Many patients are advised to keep an emergency hydrocortisone injection kit. The patient and people close to them should be trained to use it. The kit should be checked regularly to make sure it is available, stored correctly, and not expired.

A steroid emergency card or medical alert bracelet can tell emergency professionals that corticosteroid treatment is needed. Patients should inform surgeons, dentists, anesthetists, and other clinicians about adrenal insufficiency before a procedure.

Travel plans should include enough medication for delays, an emergency kit, and a copy of the treatment plan. Steroid medicine should remain accessible rather than being placed only in checked baggage. Replacement corticosteroids should not be skipped or stopped without medical guidance.

Complications

A severe cortisol shortage can cause shock, meaning the organs are not receiving enough blood and oxygen. Other possible complications include severe dehydration, low blood sugar, kidney injury, and dangerous electrolyte changes.

Very low blood sugar can cause seizures or loss of consciousness. High potassium, when present, may affect heart rhythm. Confusion and reduced alertness can increase the risk of falls or aspiration, in which vomit enters the lungs.

Delayed treatment increases the risk of serious illness and death. Prompt hydrocortisone and fluid treatment usually produces a clear improvement, although continued monitoring may be needed while the underlying trigger is treated.

A previous adrenal crisis raises concern for another episode. Prevention depends on identifying what triggered the crisis, reviewing the steroid plan, and ensuring the patient and household know how to respond to future illness.

Follow up

After discharge, routine follow-up should review the cause of the crisis and whether the diagnosis of adrenal insufficiency has been fully established. A primary care clinician and an endocrinologist, a doctor who specializes in hormone conditions, may both be involved.

At follow-up visits, patients can review their daily replacement treatment, sick-day instructions, emergency injection technique, and medical alert identification. The clinician may also check blood pressure, symptoms, electrolytes, and signs that steroid replacement is too low or too high.

Patients should contact their healthcare team promptly if they have repeated episodes of vomiting, frequent low blood pressure, worsening weakness, or difficulty following their sick-day plan. Advice is also needed before planned surgery, invasive procedures, or

pregnancy and childbirth because steroid needs may change.

Emergency care is different from routine follow-up. Severe weakness, fainting, confusion, repeated vomiting, inability to take steroid medicine, or rapidly worsening illness requires immediate emergency assessment. An emergency injection, when prescribed, is not a replacement for evaluation in an emergency department.

Sources

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