CONDITION

Primary and secondary hyperaldosteronism

Hyperaldosteronism is excess aldosterone that can raise blood pressure and disturb potassium levels.

WHAT IT IS
Excess aldosterone causing sodium retention and potassium loss

BODY SYSTEM
Hormone system, heart and circulation, kidneys

MAIN SYMPTOMS
High blood pressure, weakness, cramps, excessive urination

WHAT CAUSES IT
Adrenal overproduction or kidney-driven renin activation

HOW IT IS DIAGNOSED
Aldosterone and renin tests, confirmation, adrenal vein sampling

MAIN TREATMENT
Surgery, hormone-blocking medicines, or treatment of the underlying cause

CAN IT BE CURED?
Sometimes - unilateral adrenal overproduction can be removed

IS IT AN EMERGENCY?
Sometimes - fainting, paralysis, or dangerous heart rhythm symptoms

LONG-TERM OUTLOOK
Usually manageable with targeted treatment and follow-up

Overview

Hyperaldosteronism means the body is making too much aldosterone. Aldosterone is a hormone made by the adrenal glands, which sit above the kidneys. It helps control blood pressure by telling the kidneys how much sodium and potassium to keep or remove.

Too much aldosterone makes the kidneys retain sodium and water. It can also cause excessive potassium loss. This may raise blood pressure, sometimes to a level that is difficult to control.

There are two main types.

Primary hyperaldosteronism , also called primary aldosteronism, starts in one or both adrenal glands. They release aldosterone even when the body does not need it. Common causes include overactivity in both glands and a noncancerous adrenal growth called an adenoma.

Secondary hyperaldosteronism starts outside the adrenal glands. Reduced blood flow to the kidneys, or a condition that lowers the effective blood volume reaching them, activates a hormone called renin. Renin then signals the adrenal glands to make more aldosterone.

"Secondary" does not mean less serious. It describes where the hormonal signal begins.

Recognising the type matters because treatment is different. Some people with primary hyperaldosteronism can have surgery. Secondary hyperaldosteronism is managed mainly by treating the condition driving the excess renin signal.

Symptoms

Many people have no clear symptoms beyond high blood pressure. The condition may be found when blood pressure remains high despite treatment or when a blood test shows low potassium.

Possible symptoms include:

These symptoms are not specific to hyperaldosteronism. Many other conditions and medicines can cause them.

Potassium may be normal, especially in primary hyperaldosteronism. A normal potassium result therefore does not rule it out. When potassium falls substantially, weakness can become severe and abnormal heart rhythms may occur.

Primary hyperaldosteronism usually does not cause obvious swelling. In secondary hyperaldosteronism, ankle swelling, abdominal swelling, breathlessness, or rapid weight gain may occur because of the underlying heart, liver, or kidney condition.

- Headaches associated with high blood pressure
- Muscle weakness, cramps, twitching, or fatigue
- Increased thirst or urination
- Numbness or tingling
- Palpitations, meaning an unusually fast, pounding, or irregular heartbeat

Causes and risk factors

Primary hyperaldosteronism most often results from excess aldosterone production in both adrenal glands or from an aldosterone-producing adenoma in one gland. Less common causes include overactivity affecting only one gland, adrenal cancer, or inherited forms that run in

families.

Features that can raise suspicion of primary hyperaldosteronism include:

Secondary hyperaldosteronism occurs when renin levels rise. Possible causes include narrowing of an artery supplying a kidney, heart failure, advanced liver disease with fluid accumulation, and kidney conditions that cause substantial protein loss in urine. Certain medicines, including diuretics or "water tablets like furosemide or hydrochlorothiazide ," can also increase renin and aldosterone.

Rarely, a kidney tumour that produces renin can cause secondary hyperaldosteronism.

- Blood pressure that remains high despite several medicines
- High blood pressure with unexplained low potassium
- High blood pressure and an adrenal growth found on a scan
- High blood pressure beginning at a young age
- A family history of early-onset high blood pressure or stroke
- A close relative with confirmed primary hyperaldosteronism

Diagnosis

Diagnosis begins with blood tests for aldosterone and renin. In primary hyperaldosteronism, aldosterone is inappropriately high while renin is low or suppressed. Clinicians often compare the two results using an aldosterone-to-renin ratio.

The ratio is a screening test rather than a complete diagnosis. Results can be affected by salt intake, potassium levels, posture, the time of testing, kidney function, and several blood pressure medicines. Do not stop prescribed medicines to prepare for testing unless the clinician arranging the test gives you a safe plan.

Low potassium is usually corrected because it can make aldosterone appear lower than it really is. Repeat testing may be needed if the results are unclear.

A suppression test may then check whether aldosterone falls when it should. Depending on the situation, this can involve receiving saline, increasing sodium under supervision, or taking a medicine used for testing. Some tests are unsuitable for people with certain heart or kidney conditions, so the method is chosen individually.

If primary hyperaldosteronism is confirmed, a CT scan can look for adrenal growths and assess the glands' structure. A scan alone often cannot show which gland is producing excess aldosterone. Nonfunctioning adrenal nodules become more common with age and may be

unrelated.

When surgery is being considered, adrenal vein sampling is often used to identify whether one or both glands are responsible. A specialist takes blood from veins draining each adrenal gland and compares the hormone levels. This is a specialised procedure and is not needed when surgery is not planned.

In suspected secondary hyperaldosteronism, both aldosterone and renin are usually elevated. Further tests are directed at the possible cause and may include kidney tests, urine tests, heart assessment, liver tests, or imaging of the kidney arteries.

Treatment and management

Treatment aims to control blood pressure, correct potassium problems, and reduce long-term strain on the heart, blood vessels, and kidneys.

If primary hyperaldosteronism comes from one adrenal gland, keyhole surgery to remove that gland may be offered. This usually corrects the hormone excess, but blood pressure does not always return fully to normal. Some people still need blood pressure medicine because of existing blood vessel changes or other causes of hypertension.

When both glands are overactive, or surgery is not suitable or preferred, treatment usually includes a mineralocorticoid receptor antagonist. These medicines, such as spironolactone or eplerenone, block aldosterone's effects. Another potassium-sparing medicine may sometimes be considered if these are not tolerated.

These treatments can increase potassium and affect kidney function. Blood tests are therefore needed after treatment begins, after relevant dose changes, and at routine follow-up. Spironolactone can also cause breast tenderness, breast enlargement, menstrual changes, or sexual side effects because it affects other hormone pathways.

Treatment for secondary hyperaldosteronism focuses on the cause. This may include managing heart failure, liver disease, or kidney disease. Selected cases of kidney artery narrowing may need a procedure, but many are managed with medicines. Aldosterone-blocking treatment may be part of care for some underlying conditions, with careful monitoring of potassium and kidney function.

Reducing excess dietary sodium may support blood pressure treatment. It does not replace investigation or condition-specific care.

Complications

Untreated primary hyperaldosteronism is associated with more heart and blood vessel damage than ordinary high blood pressure at a similar reading. Possible complications include:

Low potassium can cause muscle weakness, problems concentrating urine, and abnormal heart rhythms. Severe potassium loss can rarely cause paralysis.

The complications of secondary hyperaldosteronism also reflect the underlying condition. Heart failure may cause worsening fluid retention and breathlessness. Liver or kidney disease may lead to increasing swelling and changes in kidney function or blood salts.

Treatment that blocks aldosterone can sometimes cause potassium to become too high, particularly when kidney function is reduced. Regular blood tests help identify this before it causes symptoms.

- Stroke or transient ischaemic attack
- Atrial fibrillation and other abnormal heart rhythms
- Heart attack or heart failure
- Thickening of the heart muscle
- Progressive kidney damage

Prevention

Primary hyperaldosteronism usually cannot be prevented. Adrenal overactivity, noncancerous adenomas, and inherited forms are not caused by something you did.

Secondary hyperaldosteronism cannot always be prevented either. Managing heart, liver, kidney, and blood vessel conditions may reduce the hormonal drive in some people, but this is not guaranteed.

If you already have hyperaldosteronism, taking treatment as agreed and attending blood pressure and laboratory checks can help prevent complications. Do not use potassium supplements or potassium-based salt substitutes unless your care team has confirmed they are safe for you.

Living with it and what to expect

Over the first weeks or months of treatment, blood pressure and potassium often need closer monitoring. Medicines may be adjusted according to blood pressure, kidney function, potassium, side effects, and whether renin remains suppressed.

After surgery for one-sided primary hyperaldosteronism, aldosterone and potassium are checked to confirm the hormonal response. Blood pressure may improve gradually. Some people can reduce or stop blood pressure medicines, while others continue them long term.

When medicine is used, treatment is often ongoing. Regular follow-up usually includes blood pressure checks and blood tests for potassium and kidney function. The schedule is more frequent after a medicine change or during an illness that causes dehydration.

Secondary hyperaldosteronism may improve if its underlying cause improves. When it is linked to a long-term heart, liver, or kidney condition, its course usually follows that condition and may change over time.

Most people can continue their usual work, exercise, and daily activities once blood pressure and potassium are stable. Home blood pressure readings can be useful if you are shown how to take them correctly. Record the readings rather than changing medicine on your own.

When to get medical help

Arrange a routine medical appointment if your blood pressure remains above your agreed target, you have repeated low-potassium results, or you develop ongoing cramps, weakness, thirst, or excessive urination. An adrenal nodule found on imaging should also be reviewed in context, particularly if you have high blood pressure.

Contact your care team promptly if you have new medicine side effects, vomiting or diarrhoea that may cause dehydration, or a major change in swelling, weight, or blood pressure. These situations may affect potassium, kidney function, or the safety of your medicines.

Seek emergency help for:

These symptoms do not prove that hyperaldosteronism is the cause, but they need immediate assessment.

- Chest pain, severe breathlessness, or fainting
- New facial drooping, arm weakness, speech difficulty, or confusion
- Severe muscle weakness or inability to move normally
- A sustained irregular heartbeat, especially with dizziness or weakness
- Very high blood pressure accompanied by severe headache, vision changes, chest pain, confusion, or neurological symptoms

Common questions

Is hyperaldosteronism the same as high blood pressure?

No. Hyperaldosteronism is one possible cause of high blood pressure. Many people with hypertension do not have excess aldosterone, and some people with hyperaldosteronism have only moderately raised readings.

Can I have primary hyperaldosteronism with normal potassium?

Yes. Potassium is often normal, especially earlier in the condition. Diagnosis relies on aldosterone and renin testing rather than potassium alone.

Does an adrenal nodule mean I have primary hyperaldosteronism?

Not necessarily. Many adrenal nodules do not produce hormones. Blood testing shows whether aldosterone production is abnormal, and adrenal vein sampling may be needed before deciding whether a nodule is responsible.

Will removing an adrenal gland cure it?

Surgery can correct aldosterone excess when one adrenal gland is the source. It may also improve blood pressure, but it does not guarantee that all blood pressure medicines can be stopped.

What is the difference between primary and secondary hyperaldosteronism?

In primary hyperaldosteronism, the adrenal glands produce aldosterone independently and renin is suppressed. In secondary hyperaldosteronism, another condition raises renin, which then stimulates aldosterone production.

Can hyperaldosteronism come back?

One-sided hormone excess usually does not return after successful removal of the affected adrenal gland, although high blood pressure may persist. Bilateral adrenal overactivity generally needs long-term medicine. Secondary hyperaldosteronism can improve or worsen as its underlying cause changes.

Sources

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