CONDITION

Obesity hypoventilation syndrome

Obesity hypoventilation syndrome causes persistently shallow breathing and high carbon dioxide levels in people with obesity.

WHAT IT IS
Obesity-related underbreathing causing high daytime carbon dioxide

BODY SYSTEM
Lungs, breathing, heart and circulation

MAIN SYMPTOMS
Daytime sleepiness, morning headaches, breathlessness, loud snoring

WHAT CAUSES IT
Obesity disrupting breathing control and chest movement

HOW IT IS DIAGNOSED
Arterial blood gas and sleep breathing tests

MAIN TREATMENT
Positive airway pressure and sustained weight loss

CAN IT BE CURED?
Sometimes - substantial sustained weight loss can resolve it

IS IT AN EMERGENCY?
Sometimes - severe breathlessness, confusion, or blue lips

LONG-TERM OUTLOOK
Treatment often improves symptoms and lowers serious health risks

Overview

Obesity hypoventilation syndrome, or OHS, is a breathing condition that affects some people with obesity. It means you do not breathe deeply or often enough to remove the carbon dioxide your body produces. As a result, carbon dioxide remains too high while you are awake.

"Hypoventilation" means underbreathing. It is different from feeling short of breath after activity. In OHS, blood tests show that breathing is not clearing enough carbon dioxide from the body.

Most people with OHS also have obstructive sleep apnoea. This causes repeated pauses or reductions in breathing when the throat narrows during sleep. However, sleep apnoea and OHS are not the same. Sleep apnoea happens mainly during sleep, while OHS causes high carbon dioxide levels during the day as well.

OHS matters because untreated underbreathing puts extra strain on the lungs and heart. It can also lead to dangerously low oxygen or very high carbon dioxide during an illness. Effective treatment can improve sleep, alertness, breathing and long-term health.

Symptoms

Symptoms often develop gradually. They may be mistaken for poor sleep, low fitness or another health condition.

Possible symptoms include:

A partner or family member may notice snoring and breathing pauses before you do. Some people first learn they may have OHS during a hospital admission for breathing difficulty.

Symptoms alone cannot confirm OHS. Other conditions can cause similar problems, including obstructive sleep apnoea without OHS, lung disease, heart disease, thyroid disorders and side effects from medicines.

- Excessive sleepiness during the day
- Loud snoring, choking or pauses in breathing during sleep
- Morning headaches
- Poor concentration, irritability or memory problems
- Breathlessness during everyday activities
- Waking frequently or not feeling refreshed after sleep
- Swelling around the feet and ankles

Causes and risk factors

OHS develops when obesity affects breathing in several connected ways.

Extra tissue around the chest and abdomen can make it harder for the lungs to expand. The breathing muscles must then work harder. The brain's automatic control of breathing may also respond less effectively when carbon dioxide starts to rise.

Breathing often becomes most shallow during sleep. Repeated overnight increases in carbon dioxide can eventually make it harder for the body to return carbon dioxide to a normal daytime level.

Obesity is required for the diagnosis, but most people with obesity do not develop OHS. There is no single weight at which the condition begins. Risk is influenced by how body tissue is

distributed, sleep apnoea severity, breathing control and other health problems.

Factors associated with OHS include:

OHS is diagnosed only after other causes of underbreathing have been considered. These include significant lung disease, muscle or nerve disorders, chest-wall conditions and an underactive thyroid.

- More severe obesity
- Obstructive sleep apnoea
- Reduced physical mobility
- Medicines or substances that slow breathing, such as opioids or sedatives
- Other conditions that place additional strain on breathing

Diagnosis

A healthcare professional may suspect OHS if you have obesity together with sleep-related breathing symptoms, daytime sleepiness, low oxygen or an unexplained increase in blood bicarbonate. Bicarbonate is a substance in the blood that can rise when the body has been retaining carbon dioxide.

The key confirmatory test is an arterial blood gas. This takes blood from an artery, usually at the wrist, and measures carbon dioxide, oxygen and acidity. OHS involves an abnormally high carbon dioxide level while you are awake. A raised bicarbonate result can suggest the problem, but it does not confirm OHS by itself.

You will usually also need an overnight sleep study. This records breathing, oxygen levels and sometimes carbon dioxide while you sleep. It shows whether obstructive sleep apnoea is present and helps guide the choice of breathing support.

Other tests may include:

A low reading from a fingertip oxygen monitor is important, but it cannot diagnose OHS. Oxygen levels may be low for many reasons, and a pulse oximeter does not measure carbon dioxide.

- Blood tests, including thyroid function
- Lung function tests
- Chest imaging
- Heart tests, such as an electrocardiogram or echocardiogram

- A review of medicines that may suppress breathing

Treatment and management

Treatment aims to improve ventilation, keep oxygen and carbon dioxide at safer levels, reduce symptoms and protect the heart and lungs.

The main treatment is positive airway pressure, delivered through a mask during sleep. A machine gently pushes air into the airway and supports breathing.

Continuous positive airway pressure, or CPAP, provides one steady level of pressure. It is often used when OHS occurs with severe obstructive sleep apnoea.

Non-invasive ventilation provides different pressure levels when breathing in and out. This gives more support to each breath. It may be used when sleep apnoea is not severe, when carbon dioxide remains high despite CPAP, or after serious breathing problems. The best option is based on sleep-study findings and follow-up measurements.

A comfortable, well-fitting mask makes treatment easier to use. Dryness, air leaks, skin irritation and a feeling of pressure are common adjustment problems. These can often be improved by changing the mask, humidification or machine settings through your treatment service.

Weight management is also central to treatment. Substantial, sustained weight loss can improve breathing and may resolve OHS in some people. Support may include nutrition changes, suitable physical activity, behavioural programmes, weight-management medicines or bariatric surgery. Surgery can produce greater weight loss but has risks and requires specialist assessment and long-term follow-up.

Do not stop positive airway pressure just because weight has fallen or symptoms have improved. Repeat sleep and blood-gas testing may be needed before treatment can be safely reduced.

Supplemental oxygen is sometimes added when oxygen remains low despite effective breathing support. Oxygen alone does not correct underbreathing and can allow carbon dioxide to rise in some people. It should therefore be prescribed and monitored for a specific reason.

Medicines such as opioids like oxycodone or morphine , sleeping tablets and other sedatives may worsen underbreathing. Ask for a medication review, but do not suddenly stop a prescribed medicine without advice.

Complications

Untreated OHS can place continuing stress on the body. Possible complications include:

Respiratory infections, surgery, sedating medicines and other illnesses can cause a sudden worsening. Treatment lowers risk but does not remove every possibility, so changes in breathing or alertness should not be ignored.

- Pulmonary hypertension, meaning high pressure in the lung's blood vessels
- Strain or failure of the right side of the heart
- Fluid retention and swelling
- Severe obstructive sleep apnoea
- Reduced alertness and greater accident risk
- Acute respiratory failure, when breathing cannot maintain safe gas levels

Prevention

There is no guaranteed way to prevent OHS. Because it occurs in people with obesity, preventing or reducing excess weight may lower the chance of developing it. However, body weight is shaped by many biological, medical, social and environmental factors, and OHS is not a personal failure.

If you already have obesity or sleep apnoea, recognising persistent daytime sleepiness, morning headaches or unexplained breathlessness may lead to earlier testing. Treating OHS early cannot undo every health effect, but it can help prevent further strain on the heart and lungs.

Use medicines that slow breathing only as directed. If you are having surgery or sedation, tell the healthcare team that you have OHS or use positive airway pressure.

Living with it and what to expect

OHS is usually managed over months and years. Positive airway pressure can improve sleep and daytime alertness, sometimes relatively quickly, but changes in carbon dioxide, breathlessness and heart strain may take longer. Improvement is not identical for everyone.

Regular follow-up may include checking machine use, mask fit, symptoms, oxygen levels and blood gases. If you lose or gain a substantial amount of weight, or if symptoms change, your

pressure settings may need reassessment.

Using the machine whenever you sleep is important, including during naps and while travelling. Your equipment provider or sleep service can help with practical problems rather than expecting you to tolerate an uncomfortable mask.

Weight management is often a long-term process. Even when OHS does not fully resolve, weight loss may improve mobility, sleep apnoea and other health conditions. Some people can eventually reduce breathing support after substantial sustained weight loss, while others continue treatment.

Avoid driving or operating machinery when you feel excessively sleepy. Follow local driving rules for sleep-related breathing conditions.

With consistent treatment and follow-up, many people experience better sleep, more daytime energy and fewer serious breathing problems. The outlook is less favourable when OHS remains untreated or when advanced heart and lung complications are already present.

When to get medical help

Arrange a routine medical appointment if you have ongoing daytime sleepiness, loud snoring, witnessed breathing pauses, morning headaches or breathlessness that is not explained. Swelling in your legs or difficulty using prescribed breathing equipment also needs review.

Contact your treatment service promptly if your usual positive airway pressure no longer controls symptoms, you are becoming sleepier, or you repeatedly wake with headaches. These changes may mean that ventilation, mask fit or another health condition needs reassessment.

Seek emergency help if you have:

These symptoms can indicate respiratory failure or another medical emergency. Do not drive yourself for emergency care.

- Severe or rapidly worsening breathlessness
- Blue or grey lips, tongue or skin
- New confusion, unusual behaviour or extreme drowsiness
- Difficulty waking or staying awake
- Chest pain, collapse or loss of consciousness

Common questions

Is OHS the same as sleep apnoea?

No. Most people with OHS also have obstructive sleep apnoea, but OHS causes high carbon dioxide while awake. Sleep apnoea by itself does not necessarily cause daytime carbon dioxide retention.

Can obesity hypoventilation syndrome go away?

Sometimes. Substantial, sustained weight loss can resolve OHS in some people. Repeat testing is needed before stopping positive airway pressure because symptoms alone cannot show whether carbon dioxide has returned to a safe level.

Do I need to use CPAP every night?

Positive airway pressure usually needs to be used whenever you sleep, including during naps. Missing treatment allows the airway or breathing problem to return. If the mask or pressure is difficult to tolerate, ask the treatment service about adjustments rather than stopping it.

Can I use oxygen instead of CPAP or non-invasive ventilation?

Usually not. Oxygen can raise the amount of oxygen in your blood, but it does not fix shallow breathing or remove carbon dioxide. Some people need oxygen in addition to positive airway pressure, with monitoring.

Will losing a small amount of weight cure OHS?

Any sustainable weight loss may benefit general health, but OHS usually requires substantial sustained weight loss before it resolves. The amount needed is not the same for everyone. Breathing treatment should continue until testing shows that it can be changed safely.

Is OHS life-threatening?

It can become serious if untreated, especially during an infection, after surgery or when sedating medicines suppress breathing. Regular positive airway pressure, weight management and follow-up reduce these risks. Severe breathlessness, confusion, blue lips or difficulty waking require emergency help.

Sources

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