CONDITION

Pleural effusion

Pleural effusion is a build-up of fluid between a lung and the chest wall.

WHAT IT IS
Excess fluid between the lung and chest wall

BODY SYSTEM
Lungs and breathing

MAIN SYMPTOMS
Breathlessness, chest pain, dry cough, reduced exercise tolerance

WHAT CAUSES IT
Heart failure, infection, cancer, inflammation, or injury

HOW IT IS DIAGNOSED
Chest imaging, often with pleural fluid testing

MAIN TREATMENT
Treating the cause, fluid drainage, and symptom relief

CAN IT BE CURED?
Sometimes - when the underlying cause resolves

IS IT AN EMERGENCY?
Sometimes - with sudden severe breathlessness or chest pain

LONG-TERM OUTLOOK
Often resolves; recurrence follows the underlying cause

Overview

A pleural effusion is a build-up of fluid in the pleural space. This is the narrow space between the lung and the inside of the chest wall. It normally contains a very thin layer of fluid that helps the lung move smoothly during breathing.

When extra fluid collects, it can press on the lung and make it harder to expand. A small effusion may cause no symptoms. A larger one can lead to breathlessness, chest discomfort, or a cough.

Pleural effusion is a condition rather than a disease by itself. It usually develops because of another health problem, such as heart failure, pneumonia, inflammation, or cancer. Finding that cause is important because treatment and long-term outlook are mainly determined by it.

An effusion can affect one or both sides of the chest. The fluid may be thin and free-flowing, or

it may collect in separate pockets because of inflammation and scarring.

Symptoms

Some pleural effusions are found on an X-ray or scan done for another reason. When symptoms occur, they may include:

Symptoms from the underlying cause may also be present. For example, pneumonia can cause fever, chills, and a productive cough. Heart failure may cause swollen ankles, rapid weight gain from fluid retention, or difficulty breathing when lying flat.

The amount of fluid does not always match the severity of symptoms. A slowly developing effusion may become quite large before it is noticed, while a smaller inflamed effusion can be painful.

- Shortness of breath, especially during activity or when lying down
- Sharp chest pain that worsens with a deep breath or cough
- A dry cough
- Tiredness or reduced ability to exercise

Causes and risk factors

Pleural fluid builds up when more fluid enters the pleural space than the body can remove. This can happen because pressure rises in blood vessels, blood protein levels fall, or the pleura becomes inflamed or damaged.

Doctors often group pleural effusions into two broad types.

A transudative effusion forms because of changes in fluid pressure or blood protein levels. The pleura itself is not usually inflamed. Heart failure is the most common example. Advanced liver or kidney problems can also cause this type.

An exudative effusion forms when inflammation, infection, injury, or abnormal cells make blood vessels leak fluid and protein. Causes include pneumonia, cancer, tuberculosis, blood clots in the lung, and autoimmune conditions such as rheumatoid arthritis or lupus.

Other possible causes include chest injury, recent chest or heart surgery, inflammation of the pancreas, and certain medicines. Sometimes testing does not identify a cause immediately.

Your personal likelihood of developing an effusion is higher if you already have a condition that affects the heart, lungs, kidneys, or liver. A history of cancer, blood clots, tuberculosis

exposure, or asbestos exposure may also be relevant. These factors do not prove what caused an effusion.

Diagnosis

Diagnosis usually begins with a discussion of your symptoms and medical history. A clinician may listen to your chest, measure your oxygen level, and look for signs such as leg swelling, fever, or reduced breath sounds.

A chest X-ray can show moderate or large amounts of fluid. Ultrasound is better at detecting small amounts and showing whether the fluid is free-flowing or divided into pockets. Ultrasound also helps guide a needle safely if fluid needs to be removed.

A CT scan can provide more detail about the lungs, pleura, lymph nodes, and surrounding organs. It may help identify pneumonia, a blood clot, a mass, or pleural thickening. Imaging alone cannot always establish the cause.

A sample may be taken by thoracentesis , also called pleural aspiration. After local anaesthetic numbs the skin, a needle or thin tube is passed between the ribs into the fluid. Ultrasound guidance is commonly used.

The laboratory may examine the fluid for protein, acidity, glucose, blood cells, bacteria, and abnormal cells. These results help distinguish fluid caused by pressure changes from fluid caused by inflammation or injury. A negative test for cancer cells does not always rule out cancer.

Not every effusion needs immediate sampling. For example, fluid on both sides of the chest in someone with a clear episode of heart failure may improve when that condition is treated. Sampling is more likely when the cause is uncertain, the fluid is mainly on one side, infection is possible, or treatment is not working as expected.

If the cause remains unclear, further tests may include blood tests, repeat imaging, a pleural biopsy, or thoracoscopy. Thoracoscopy uses a small camera to inspect the pleura and collect tissue.

Treatment and management

Treatment is chosen according to the cause, the amount and type of fluid, and how much it affects your breathing.

A small effusion that is not causing symptoms may only need treatment of the underlying

condition and follow-up imaging. The fluid may then be absorbed naturally.

Heart failure-related effusions often improve as excess body fluid is treated. Effusions caused by bacterial pneumonia usually require antibiotics like amoxicillin or doxycycline . If the fluid itself is infected or has become pus, called empyema , drainage is generally needed as well.

Thoracentesis can remove fluid to ease breathlessness while also providing a sample for testing. If a large amount must be removed or fluid continues to collect, a chest tube may be placed. This tube stays in the pleural space for a period of time and drains into a collection system.

Inflamed fluid can form separate pockets, known as loculations . Medicines may sometimes be placed through a chest tube to help break down these pockets. Some people need keyhole surgery to clear infected material and allow the lung to expand.

Effusions caused by cancer may return after drainage. Options for repeated fluid build-up include an indwelling pleural catheter, which allows fluid to be drained at home, or pleurodesis. Pleurodesis seals the pleural space so that fluid has less room to collect. The choice takes account of symptoms, how well the lung expands, treatment goals, and personal preferences.

Treatment does not always remove every trace of fluid. The main goals are to improve breathing, manage the cause, and reduce the chance of troublesome recurrence.

Complications

A large effusion can compress part of the lung and limit breathing. Infection within the fluid can lead to empyema, pockets of pus, and pleural scarring. A thick layer of scar tissue can occasionally prevent the lung from expanding normally.

Thoracentesis and chest-tube drainage are commonly performed, but they have risks. These include pain, bleeding, infection, and pneumothorax, which is air around the lung causing it to partly collapse. Rarely, breathing can worsen after a large effusion is drained rapidly because fluid develops within the re-expanding lung.

The team performing a drainage procedure should explain its purpose, expected benefits, and relevant risks.

Prevention

Pleural effusion cannot always be prevented because it is usually a complication of another condition. There is no single action that prevents every type.

Managing known heart, kidney, liver, or inflammatory conditions may lower the chance of fluid returning. Taking prescribed treatment as directed and attending planned monitoring can help identify changes early.

Reducing the risk of lung infection through recommended vaccination, hand hygiene, and avoiding smoking may prevent some infections that can lead to an effusion. These measures cannot guarantee prevention.

Living with it and what to expect

What happens over the following months and years mainly reflects the underlying cause.

An effusion related to a treatable infection may clear over several weeks, although tiredness and reduced exercise tolerance can last longer. Follow-up imaging may be used to confirm that the fluid and pneumonia are resolving.

Fluid caused by heart failure can improve with treatment but may return if the heart condition worsens or body fluid builds up again. Monitoring symptoms, swelling, and any weight plan recommended by your care team may help detect a change.

Cancer-related effusions are more likely to recur. Repeated needle drainage is not the only option; a longer-term catheter or pleurodesis may reduce repeated hospital visits. Some people or family members are taught to drain an indwelling catheter at home.

After recovery, many people return to their usual activities. Others continue to have breathlessness because of the underlying heart or lung condition rather than the remaining amount of pleural fluid. Planned follow-up may include symptom review, imaging, or further investigation if the fluid persists.

When to get medical help

Seek emergency help for:

These symptoms can have causes other than pleural effusion, including a blood clot, heart problem, severe infection, or collapsed lung.

Ask for prompt medical assessment if breathlessness is worsening, breathing becomes painful, or you develop fever, shaking chills, or a productive cough. New swelling of the legs or rapid fluid-related weight gain also deserves timely review.

After thoracentesis or chest-tube treatment, get urgent advice for increasing breathlessness, severe chest pain, fever, bleeding, or redness and drainage around the procedure site.

Routine follow-up is appropriate when symptoms are stable but not improving, the effusion has returned before, or a planned scan or test result needs review.

- Sudden or severe difficulty breathing
- Blue or grey lips or skin
- Fainting, severe confusion, or difficulty staying awake
- New severe chest pressure or chest pain
- Coughing up more than a small streak of blood

Common questions

Is pleural effusion the same as fluid in the lungs?

Not exactly. Pleural fluid collects around the lung, between the lung and chest wall. Pulmonary oedema is fluid within the lung tissue and air sacs. Heart failure can cause either or both.

Can pleural effusion go away on its own?

Some small effusions are absorbed once their cause improves. Others need drainage or specific treatment. Whether it clears and stays away is mainly determined by why it developed.

Does pleural effusion mean I have cancer?

No. Cancer is one possible cause, but heart failure and infection are also common causes. Imaging, fluid testing, and sometimes a biopsy are used to investigate the reason. A pleural effusion alone does not establish a cancer diagnosis.

How long does it take to recover?

Recovery may take days to weeks when a reversible cause is treated. It can take longer after a serious infection or when another heart, lung, or cancer condition continues. A scan may improve more slowly than your symptoms.

Is draining pleural fluid painful?

Local anaesthetic is used to numb the skin and deeper tissues. You may feel pressure, pulling, or brief discomfort. Some people cough as the lung expands. Tell the procedure team if you develop pain, dizziness, or worsening breathlessness.

Can a pleural effusion come back?

Yes. Recurrence is more likely when the underlying condition remains active, particularly heart failure or cancer. If repeated drainage is needed, longer-term approaches such as an indwelling catheter or pleurodesis may be considered.

Sources

- Roberts ME, Rahman NM, Maskell NA, and colleagues. "British Thoracic Society Guideline for Pleural Disease." Thorax . 2023;78(Supplement 3):s1-s42.
- Shen-Wagner J, Gamble C, MacGilvray P. "Pleural Effusion: Diagnostic Approach in Adults." American Family Physician . 2023;108(5):464-475.
- Feller-Kopman DJ, Light RW. "Pleural Disease." New England Journal of Medicine . 2018;378:740-751.
- American Thoracic Society. "Thoracentesis." Patient Education Series, American Journal of Respiratory and Critical Care Medicine .
- Bibby AC, Dorn P, Psallidas I, and colleagues. "ERS/EACTS Statement on the Management of Malignant Pleural Effusions." European Respiratory Journal . 2018;52(1):1800349.