CONDITION

Parapneumonic pleural effusion

A parapneumonic pleural effusion is fluid that collects around a lung because of pneumonia.

WHAT IT IS
Fluid around the lung linked to pneumonia

BODY SYSTEM
Lungs and breathing

MAIN SYMPTOMS
Fever, cough, chest pain, shortness of breath

WHAT CAUSES IT
Inflammation or infection spreading from pneumonia

HOW IT IS DIAGNOSED
Chest imaging and pleural fluid testing

MAIN TREATMENT
Antibiotics, with chest drainage when needed

CAN IT BE CURED?
Yes - usually clears with effective treatment

IS IT AN EMERGENCY?
Sometimes - severe breathlessness or sepsis signs

LONG-TERM OUTLOOK
Most recover; some develop pleural scarring

Overview

A parapneumonic pleural effusion is a collection of fluid next to a lung during pneumonia. Pneumonia is an infection within the lung. "Pleural" refers to the thin layers of tissue covering the lung and lining the inside of the chest.

A small amount of fluid normally sits between these layers so they can slide smoothly during breathing. Pneumonia can cause extra fluid to collect in this space, known as the pleural space.

Some effusions contain inflammation but no bacteria. These are called uncomplicated parapneumonic effusions and often clear as antibiotics like amoxicillin or doxycycline treat the pneumonia.

Other effusions become infected or develop chemical changes showing that infection is

progressing. These are called complicated parapneumonic effusions. They usually need drainage as well as antibiotics. If the pleural fluid becomes pus, the collection is called an empyema.

Recognising the difference matters because antibiotics may reach an uncomplicated effusion adequately, while established pleural infection can be difficult to clear without removing the fluid.

Symptoms

The symptoms often overlap with those of pneumonia. The fluid itself may also make it harder or more painful to breathe.

Possible symptoms include:

Chest pain caused by irritation of the pleura is called pleuritic pain. It is often felt on one side and may improve when you take shallow breaths. This can make coughing and deep breathing uncomfortable.

A larger effusion can press on the lung and limit how much it expands. However, the size of the collection does not always show how serious the infection is. A smaller pocket of infected fluid can still require drainage.

Older adults and people with weakened immune systems may have less obvious symptoms. Confusion, reduced alertness or a sudden decline in normal activities can sometimes be more noticeable than fever.

- Fever, chills or sweating
- Cough, sometimes with mucus
- Shortness of breath
- Sharp chest pain that worsens with deep breathing or coughing
- Tiredness, weakness or reduced appetite

Causes and risk factors

A parapneumonic pleural effusion occurs because of pneumonia. Inflammation in the infected lung makes nearby blood vessels leak fluid into the pleural space.

At first, the fluid may be sterile, meaning it does not contain bacteria. If bacteria enter the pleural space, immune cells respond and the fluid becomes more acidic and harder to clear.

Fibrin, a protein involved in clotting and healing, can divide the fluid into separate pockets called loculations.

Any pneumonia can lead to an effusion. The risk of a complicated infection may be higher when pneumonia is severe, treatment is delayed or the immune system cannot respond normally.

Other factors associated with pleural infection include:

These factors do not mean that someone will develop an effusion. Pleural infection can also occur in people without a clear risk factor.

- Lung disease or poor general health
- Diabetes
- Heavy alcohol use
- Conditions or medicines that weaken the immune system
- Difficulty swallowing, which can allow food or saliva into the lungs
- Recent chest surgery or injury

Diagnosis

Chest imaging shows whether fluid is present. A chest X-ray may identify a moderate or large collection, although a small effusion can be difficult to see.

Chest ultrasound gives more detail about the amount and location of fluid. It can show pockets or internal strands and helps clinicians choose a safe place for a needle or drainage tube. A CT scan may be used to examine the lungs and pleura more closely or to look for another cause of the collection.

If the effusion is more than very small or there is concern about infection, a sample may be removed with a needle. This procedure is called thoracentesis or pleural aspiration. Local anaesthetic is used to numb the skin.

The laboratory may assess:

Pus, bacteria in the fluid or a low pleural-fluid pH supports the need for drainage. A negative culture does not rule out infection, especially if antibiotics were started before the sample was taken.

Blood tests can show inflammation and how the body is coping with the infection. Blood cultures may identify bacteria that have entered the bloodstream.

- Whether the fluid is cloudy or contains pus

- Acidity, reported as pH
- Glucose, protein and an enzyme called LDH
- Bacteria seen on a Gram stain or grown in a culture
- Cell types within the fluid

Treatment and management

Treatment aims to control the pneumonia, remove infected fluid when necessary and help the lung expand.

Antibiotics are started promptly when bacterial pneumonia or pleural infection is suspected. The choice depends on where the infection developed, likely bacteria, allergy history, local resistance patterns and culture results. Treatment may begin through a vein and later change to tablets as the infection improves. The total course is often longer for pleural infection than for uncomplicated pneumonia, but the appropriate length is individual.

A small, uncomplicated effusion may clear with antibiotics alone. Imaging and symptoms are monitored to make sure it is not increasing or becoming complicated.

Drainage is usually considered when the fluid contains pus or bacteria, has biochemical signs of infection, is divided into pockets, or is not improving with antibiotics. A flexible chest tube is inserted through the chest wall using local anaesthetic and imaging guidance. It stays connected to a drainage system while fluid comes out.

A chest tube can become blocked or may not reach every pocket. In selected cases, medicines called tissue plasminogen activator and DNase may be placed through the tube. They help break down strands and thin infected material so it drains more easily. This treatment is managed in hospital because it is not suitable for everyone and can cause bleeding.

Surgery may be needed when infection and fluid remain despite antibiotics and drainage. Video-assisted thoracoscopic surgery, or VATS, uses a camera and small chest incisions to wash out the pleural space and remove infected tissue. More extensive surgery is occasionally needed for a thick peel of scar tissue that prevents the lung from expanding.

Oxygen, pain relief, fluids and support with eating or activity may also form part of hospital care.

Complications

Infection can spread from the lung or pleural space into the bloodstream. This can cause

sepsis, a serious reaction in which infection begins to affect circulation and organ function.

Other possible complications include:

Chest drainage can cause pain, bleeding, infection around the tube or, rarely, injury to nearby structures. Ultrasound guidance and monitoring reduce these risks.

Pleural scarring seen on later imaging does not always cause symptoms. More extensive scarring can reduce lung expansion and lead to continuing breathlessness.

- Empyema, meaning pus within the pleural space
- Separate pockets that are difficult to drain
- A prolonged air leak between the lung and pleural space
- Thickening and scarring of the pleura
- A trapped lung that cannot fully expand
- A return of fluid or infection

Prevention

A parapneumonic pleural effusion cannot always be prevented. It is a complication of pneumonia, and it can develop even when the infection is recognised and treated.

Reducing the chance or severity of pneumonia may lower the risk. This includes receiving recommended influenza, COVID-19 and pneumococcal vaccines when eligible. Vaccination does not prevent every lung infection.

Not smoking helps protect the lungs' normal defences. Managing swallowing problems may also reduce the risk of aspiration pneumonia, which happens when food, drink or saliva enters the lungs.

If you are being treated for pneumonia, seek reassessment if fever, chest pain or breathing worsens rather than improves. This can help identify an effusion early, although early treatment cannot guarantee that one will not develop.

Living with it and what to expect

Many people recover fully after the pneumonia and fluid have been treated. An uncomplicated effusion may disappear as the infection settles. A complicated effusion or empyema often requires a hospital stay and a longer recovery.

Fever and breathing may improve before energy and appetite return. Cough, chest discomfort

and tiredness can continue for several weeks. Recovery may take longer after severe infection, surgery or a prolonged period in bed.

Follow-up may include a clinical review, blood tests or another chest X-ray. Imaging changes can take longer to clear than symptoms. Follow-up is especially important if symptoms continue, the lung did not fully expand, or there is concern that another lung problem contributed to the pneumonia.

Gentle, gradual activity can help rebuild strength after discharge. Pain should be controlled well enough to allow comfortable movement, coughing and deep breathing. Follow the wound-care instructions provided if you had a chest tube or surgery.

Some people are left with pleural thickening on imaging but have little or no lasting limitation. A smaller group develops ongoing breathlessness or discomfort from more extensive scarring. Lung-function tests or specialist review may be arranged if recovery is slower than expected.

When to get medical help

Call emergency services if you have:

These symptoms can indicate low oxygen, sepsis or another urgent condition.

Seek urgent medical assessment the same day if you have pneumonia and develop worsening breathlessness, persistent fever, increasing one-sided chest pain or a clear decline after starting to improve.

If you are recovering at home, arrange routine follow-up if cough, tiredness or breathlessness is not gradually improving. Also contact your care team if a previous chest-tube or surgical site becomes increasingly red, swollen, painful or starts leaking fluid.

- Severe or rapidly worsening trouble breathing
- Blue, grey or unusually pale lips or skin
- New confusion, fainting or difficulty staying awake
- Severe chest pain with sweating, collapse or a feeling of pressure
- Signs of severe infection, such as very fast breathing with cold or mottled skin

Common questions

Is a parapneumonic pleural effusion the same as pneumonia?

No. Pneumonia is an infection within the lung tissue. A parapneumonic effusion is fluid that

collects beside the lung because of that infection. The two conditions often occur together.

Is it the same as empyema?

Not always. Empyema means there is pus in the pleural space. It is an advanced form of pleural infection. Some parapneumonic effusions are sterile and clear with pneumonia treatment alone.

Will the fluid go away with antibiotics?

A small, uncomplicated effusion often does. Infected, acidic or pocketed fluid may not clear with antibiotics alone and may need a chest tube. Imaging and pleural-fluid test results help guide that decision.

How long does it take to recover?

Improvement may begin within days of effective treatment, but tiredness, cough and reduced stamina can last for weeks. Recovery can take longer after empyema, surgery or severe pneumonia. Follow-up checks whether the fluid and lung changes are clearing.

Can the fluid come back?

It can return if the infection has not fully cleared or if drainage was incomplete. Fluid may also have another cause, such as heart failure or cancer, so a collection that returns may need further investigation.

Is parapneumonic pleural effusion contagious?

The fluid itself is not contagious. Some infections that cause pneumonia can spread between people, depending on the organism. Normal infection-control advice for the underlying pneumonia still applies.

Sources

- British Thoracic Society Guideline for pleural disease . Thorax . 2023;78(Suppl 3):s1-s42.
- The American Association for Thoracic Surgery consensus guidelines for the management of empyema . Journal of Thoracic and Cardiovascular Surgery . 2017;153(6):e129-e146.
- ERS/EACTS statement on the management of pleural infection in adults . European Respiratory Journal . 2018;52(1):1800547.
- Intrapleural use of tissue plasminogen activator and DNase in pleural infection . New England Journal of Medicine . 2011;365:518-526.



- Pneumococcal vaccine recommendations . US Centers for Disease Control and Prevention. Reviewed January 26, 2026.