CONDITION

Myocarditis - pediatric

Pediatric myocarditis is inflammation of a child's heart muscle that can affect its pumping and rhythm.

WHAT IT IS
Inflammation of a child's heart muscle

BODY SYSTEM
Heart and circulation

MAIN SYMPTOMS
Chest pain, breathing trouble, fatigue, fast heartbeat

WHAT CAUSES IT
Usually infection-triggered immune inflammation; sometimes unknown

HOW IT IS DIAGNOSED
Heart tests and MRI; occasionally heart-muscle biopsy

MAIN TREATMENT
Supportive heart care and complication treatment

CAN IT BE CURED?
Sometimes - many children recover heart function

IS IT AN EMERGENCY?
Sometimes - breathing trouble, fainting, or shock signs

LONG-TERM OUTLOOK
Most recover; some develop lasting heart weakness

Overview

Myocarditis is inflammation of the myocardium, the muscular wall of the heart. In children, the inflammation can weaken the heart's pumping action or disturb its electrical system, which controls the heartbeat.

The condition ranges from mild inflammation that improves with rest and monitoring to severe heart failure. Heart failure means the heart cannot pump enough blood to meet the body's needs. Some children become ill quickly, while others develop less specific symptoms over days or weeks.

Myocarditis can affect children of any age, including newborns and teenagers. It may follow an infection, but the exact cause is not always found. The inflammation itself is not contagious.

Many children recover their heart function. However, myocarditis needs careful assessment because symptoms can change and heart rhythm problems may occur. Follow-up is important even after a child appears to feel better.

Symptoms

Symptoms depend on the child's age and how much the heart is affected. They may begin during an infection or several days to weeks afterward.

Older children and teenagers may have:

Babies and younger children often cannot describe chest pain or a racing heart. Signs may include poor feeding, sweating during feeds, rapid breathing, irritability, unusual sleepiness, or fewer wet diapers. Some develop vomiting, abdominal pain, cool hands and feet, or poor weight gain.

Myocarditis can resemble a respiratory illness, stomach infection, asthma, or another heart problem. Chest pain in children has many causes and is usually not due to myocarditis, but chest pain combined with breathing trouble, fainting, or a racing heartbeat needs prompt assessment.

Severe inflammation may cause cardiogenic shock, meaning the weakened heart cannot deliver enough blood and oxygen to the organs. Warning signs include pale or mottled skin, confusion, very low energy, cold limbs, or reduced responsiveness.

- Chest pain or pressure
- Shortness of breath, especially during activity or when lying down
- A fast, pounding, or irregular heartbeat
- Unusual tiredness or reduced exercise ability
- Dizziness or fainting
- Swelling around the feet, ankles, or abdomen

Causes and risk factors

Myocarditis often develops when the immune system reacts to an infection and unintentionally injures heart-muscle cells. Viruses are common triggers. These include influenza, adenovirus, enteroviruses, parvovirus, herpesviruses, and SARS-CoV-2. Bacterial, fungal, and parasitic infections can also cause myocarditis, but they are less common in many

settings.

A positive throat, nose, or blood test does not always prove that a particular infection caused the heart inflammation. By the time heart symptoms appear, the original infection may no longer be detectable.

Other possible causes include:

Some inherited heart-muscle conditions can look like myocarditis or may become noticeable during an infection. A cardiology team may consider genetic testing when there is persistent heart weakness, repeated episodes, or a family history of cardiomyopathy, heart transplant, or unexplained sudden death.

Often, no definite cause is identified. This does not mean that anyone failed to notice or prevent the condition.

- An abnormal immune reaction, including inflammation linked to an autoimmune condition
- Multisystem inflammatory syndrome in children, or MIS-C, following SARS-CoV-2 infection
- A reaction to certain medicines or toxins
- Rare inflammatory or immune disorders
- Myocarditis following vaccination, which is uncommon and has been reported most often after an mRNA COVID-19 vaccine in adolescent and young adult males

Diagnosis

There is no single simple test that identifies every case. Doctors combine the child's symptoms, examination, blood tests, and heart tests while checking for other possible causes.

An electrocardiogram, or ECG, records the heart's electrical activity. It may show inflammation-related changes or an abnormal rhythm. Blood tests can measure troponin, a protein released when heart-muscle cells are injured. Other tests assess inflammation and how well organs such as the kidneys and liver are working.

An echocardiogram uses ultrasound to show the heart's structure, pumping strength, valves, and surrounding fluid. A normal echocardiogram does not completely exclude mild myocarditis.

Cardiac magnetic resonance imaging, usually called cardiac MRI, can show swelling, injury, and scarring within the heart muscle. Younger children may need sedation or anesthesia to remain still during the scan.

An endomyocardial biopsy removes very small samples of heart muscle through a thin tube passed through a blood vessel. A laboratory examines the tissue for inflammation and other abnormalities. Biopsy can provide a definite tissue diagnosis, but it is invasive and may miss patchy inflammation. It is generally reserved for situations in which the result could change urgent or specialized treatment.

A chest X-ray, rhythm monitor, infection tests, exercise testing, or genetic assessment may also be used. Doctors must sometimes rule out coronary artery problems, congenital heart conditions, and inherited cardiomyopathies.

Treatment and management

Treatment is based on the child's symptoms, heart function, rhythm, and suspected cause. Children with significant symptoms or abnormal heart tests are usually monitored in hospital, at least during the early stage.

The first goals are to support breathing and circulation while reducing the heart's workload. Care may include oxygen, careful fluid management, and medicines that help the heart pump or remove excess fluid. Children with very low blood pressure may need medicines given through a vein.

Abnormal heart rhythms are monitored and treated when necessary. Treatment may include rhythm-control medicines, temporary pacing, or a procedure for a dangerous rhythm. Blood-thinning medicine is used only in selected children, such as those with certain clots, rhythms, or severe pumping weakness.

Antibiotics like amoxicillin or doxycycline treat a confirmed or strongly suspected bacterial infection, but they do not treat viral or immune-related myocarditis. Corticosteroids like prednisone or hydrocortisone , intravenous immunoglobulin, and other immune treatments may be considered for certain causes or severe presentations. Evidence for these treatments is not equally strong in every form of pediatric myocarditis, so specialist teams consider them case by case.

A child with life-threatening heart failure may need temporary mechanical circulatory support. Extracorporeal membrane oxygenation, or ECMO, pumps and oxygenates blood outside the body. A ventricular assist device helps the heart pump. These treatments can support the child while the heart recovers or while the team considers transplantation. Heart transplantation is needed only when severe heart failure does not recover with other care.

Physical activity is restricted during healing because vigorous exercise can place extra strain on an inflamed heart and increase rhythm risks. Return to sports requires cardiology clearance,

usually after repeat assessment of heart function, rhythm, symptoms, and signs of ongoing injury.

Complications

Possible complications include heart failure, dangerous heart rhythms, blood clots, or cardiogenic shock. Severe rhythm disturbances can occasionally cause cardiac arrest.

Some children develop dilated cardiomyopathy, in which the heart becomes enlarged and pumps weakly. Others recover normal pumping function but retain small areas of scar tissue. Scarring may increase the risk of later rhythm problems, although its meaning differs between children.

Complications are more likely when heart function is severely reduced at presentation, but the early appearance does not predict every child's long-term course.

Prevention

Most cases of pediatric myocarditis cannot be reliably prevented. The immune response that causes heart inflammation is difficult to predict, and many triggering infections are common.

Routine infection-control steps, such as handwashing and avoiding close contact when someone is acutely ill, may reduce some infections. Recommended vaccinations can prevent infections that themselves may affect the heart, but no vaccine prevents every cause of myocarditis.

Do not stop a prescribed medicine or avoid a recommended vaccine solely because of concern about myocarditis without discussing the benefits and risks with the child's healthcare professional.

Living with it and what to expect

Recovery is different for each child. Some improve within days, while heart-muscle healing may continue for weeks or months. Children who had severe illness can still recover substantial or normal heart function. Others have ongoing weakness that needs long-term heart failure treatment.

Follow-up usually includes cardiology visits, ECGs, echocardiograms, blood tests, or rhythm monitoring. Cardiac MRI or exercise testing may be repeated when the result will guide activity

or treatment. Medicines should continue until the treating team says they can be changed or stopped, even when the child feels well.

School attendance often resumes before sports. Temporary limits may affect physical education, competitive activities, heavy lifting, and strenuous play. The cardiology team can provide a written activity plan for school.

A child with lasting heart weakness may need treatment and monitoring over years. Families may need to watch for reduced stamina, swelling, breathing changes, or palpitations. Recurrent myocarditis can occur, but it is not the usual course.

A serious heart illness can also cause anxiety about exercise, sleep, or future symptoms. Clear follow-up plans and age-appropriate explanations can help the child return to ordinary routines as safely as possible.

When to get medical help

Call emergency services if a child has:

Seek prompt same-day medical assessment for new chest pain after a recent infection, an unexplained fast or irregular heartbeat, rapidly worsening fatigue, or shortness of breath. Babies need prompt assessment for rapid breathing, poor feeding, sweating during feeds, unusual sleepiness, or noticeably fewer wet diapers.

For a child already diagnosed with myocarditis, contact the treating team promptly if symptoms return or worsen, swelling develops, weight rises quickly from fluid retention, or medicine cannot be taken because of vomiting.

Routine cardiology follow-up is different from urgent care. Keep planned appointments even when the child feels well, because heart function and rhythm can change without obvious symptoms.

- Severe difficulty breathing or blue or grey lips
- Fainting with chest pain, breathlessness, or a racing heartbeat
- Severe or persistent chest pain with sweating or marked weakness
- Confusion, poor responsiveness, cold mottled skin, or other signs of shock
- Cardiac arrest or no normal breathing

Common questions

Can a child recover completely from myocarditis?

Yes, many children regain normal heart function and return to usual activities. Recovery cannot be guaranteed. Some children have lasting heart weakness, scarring, or rhythm problems and need longer follow-up.

Is myocarditis contagious?

No. Heart-muscle inflammation itself does not spread between people. An infection that triggered it, such as influenza or COVID-19, may be contagious.

How long does a child need to avoid sports?

The length of restriction is based on symptoms and repeat heart testing. A child should not return to strenuous exercise or competitive sport until a cardiology team confirms that it is safe. Feeling better alone does not show that the heart has fully healed.

Does chest pain mean my child has myocarditis?

Usually not. Muscle strain, inflammation around the ribs, asthma, reflux, and other conditions cause most childhood chest pain. Chest pain with fainting, trouble breathing, palpitations, or severe weakness needs urgent assessment.

Can COVID-19 vaccination cause myocarditis?

Myocarditis has been reported rarely after mRNA COVID-19 vaccination, most often in adolescent and young adult males. Symptoms usually begin within several days, and many affected people improve with care. SARS-CoV-2 infection can also cause myocarditis and other heart complications.

Can myocarditis come back?

It can recur, but recurrence is not typical. Repeated episodes may lead the cardiology team to investigate immune conditions, persistent infection, medicine reactions, or inherited heart-muscle disorders.

Sources

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