CONDITION

Meconium aspiration syndrome

Meconium aspiration syndrome is breathing difficulty caused by a newborn inhaling meconium-stained fluid around birth.

WHAT IT IS
Newborn lung irritation and blockage from inhaled meconium

BODY SYSTEM
Lungs and breathing

MAIN SYMPTOMS
Fast breathing, grunting, chest pulling-in, blue-grey skin

WHAT CAUSES IT
Inhaling meconium-stained amniotic fluid around birth

HOW IT IS DIAGNOSED
Birth findings, oxygen checks, and chest X-ray

MAIN TREATMENT
Breathing support and intensive newborn care

CAN IT BE CURED?
Yes - most newborns recover with support

IS IT AN EMERGENCY?
Yes, when a newborn has breathing difficulty

LONG-TERM OUTLOOK
Most recover fully; severe oxygen shortage may cause lasting harm

Overview

Meconium aspiration syndrome is a breathing condition that can affect a newborn during or shortly after birth. Meconium is a baby's first stool. It is thick, sticky, and usually dark green.

Some babies pass meconium into the amniotic fluid, the liquid surrounding them in the womb. If a baby breathes in this mixture before, during, or just after birth, it can enter the lungs. This is called meconium aspiration.

Meconium can block small airways, irritate lung tissue, and interfere with surfactant. Surfactant is a natural substance that helps keep the tiny air sacs in the lungs open. These effects can make it difficult for oxygen to enter the blood.

Meconium-stained fluid does not always mean a baby has meconium aspiration syndrome.

Many babies exposed to meconium breathe normally and need only observation. The syndrome is diagnosed when exposure is accompanied by breathing problems and findings consistent with meconium in the lungs.

The condition matters because breathing difficulty can worsen quickly after birth. A team trained in newborn resuscitation may need to provide oxygen or other breathing support. Most affected babies recover, but severe cases can place strain on the lungs, heart, and brain.

Symptoms

Symptoms usually appear at birth or within the first hours of life. The baby may have meconium staining on the skin, nails, or umbilical cord, although staining alone does not mean the lungs are affected.

Possible signs include:

Clinicians may also hear coarse or reduced breath sounds through a stethoscope. Some babies are mildly affected and need extra oxygen for a short time. Others are very unwell at birth and need immediate resuscitation.

- Fast, difficult, or irregular breathing
- Grunting sounds during breathing
- Flaring of the nostrils
- Skin pulling in between or below the ribs
- Blue-grey lips or skin caused by low oxygen
- Low muscle tone or reduced alertness
- A slow heart rate at birth
- A chest that looks unusually expanded

Causes and risk factors

Meconium aspiration syndrome begins when meconium-stained amniotic fluid enters the lungs. This may happen if a baby makes gasping movements before birth or takes early breaths while the fluid is still around the mouth and nose.

Once inside the lungs, meconium may partly or completely block airways. Air can become trapped behind a blockage, while other areas of the lung may collapse. Meconium also causes inflammation and can stop surfactant from working normally.

Meconium is more likely to be present when a pregnancy has reached or passed full term because the baby's digestive system is more mature. A baby may also pass meconium after stress that reduces oxygen delivery.

Factors associated with meconium-stained fluid or aspiration include:

These factors do not mean the condition will occur. Many babies born through meconium-stained fluid remain healthy. Meconium aspiration syndrome is not inherited and is not contagious.

- Pregnancy continuing beyond the due date
- A difficult or prolonged labour
- Concerns about the baby's heart rate during labour
- Problems with the placenta or umbilical cord
- Poor growth in the womb
- Maternal high blood pressure or diabetes
- Infection or inflammation around the time of birth

Diagnosis

The maternity and newborn teams may suspect the condition when the amniotic fluid contains meconium and the baby has breathing difficulty. They will assess the baby's breathing effort, heart rate, muscle tone, skin colour, and response to care.

A pulse oximeter measures oxygen levels using a small sensor placed on the hand or foot. A blood gas test may be used to measure oxygen, carbon dioxide, and acidity in the blood.

A chest X-ray can show patchy areas of inflammation, collapsed lung tissue, trapped air, or overexpansion. The findings are considered alongside what happened around the birth. No single X-ray feature proves the diagnosis by itself.

Other newborn conditions can cause similar breathing problems. These include pneumonia, infection in the blood, temporary retained fluid in the lungs, and an air leak around a lung. Blood tests and cultures may be performed when infection is possible.

An ultrasound scan of the heart may be needed if oxygen levels remain low. This can identify persistent pulmonary hypertension of the newborn, a condition in which high pressure in the lung's blood vessels limits blood flow through the lungs.

Treatment and management

Treatment begins with stabilising the baby's breathing and heart rate. The exact level of support is based on how the baby responds, rather than on the appearance of the amniotic fluid alone.

Routine suctioning of every baby born through meconium-stained fluid is not recommended. The team follows standard newborn resuscitation steps. If meconium is physically blocking the airway and preventing effective ventilation, a clinician may remove the blockage using a breathing tube and suction.

A baby who is breathing but has low oxygen may receive warmed oxygen. Continuous positive airway pressure, often called CPAP, can keep the airways and air sacs open. It is delivered through small prongs or a mask at the nose.

If the baby cannot breathe effectively, a tube may be placed into the windpipe and connected to a ventilator. This machine supports or controls breathing while the lungs recover. The team carefully adjusts oxygen and pressure to reduce further lung injury.

Other treatments may include:

ECMO temporarily circulates blood through a machine that adds oxygen and removes carbon dioxide. It is available only in specialist centres.

Parents can usually visit and take part in care in the newborn unit. Depending on the baby's condition, this may include touching, talking, providing expressed breast milk, and later holding or feeding the baby.

- Surfactant placed into the lungs when meconium has disrupted the baby's natural surfactant
- Intravenous fluids until breathing is stable enough for feeding
- Antibiotics like amoxicillin or doxycycline while tests rule out bacterial infection
- Inhaled nitric oxide to relax lung blood vessels in severe pulmonary hypertension
- Medicines to support blood pressure or heart function
- Extracorporeal membrane oxygenation, or ECMO, for rare, life-threatening cases not responding to other support

Complications

Meconium aspiration syndrome can cause complications because affected parts of the lung may be blocked while others are under high pressure.

Possible complications include:

Severe oxygen shortage can contribute to brain injury, seizures, or problems with development. These outcomes are not inevitable and are more closely linked to the severity and duration of oxygen deprivation than to the presence of meconium alone.

- Air leaks: Trapped air can rupture tiny air sacs and collect around a lung. This is called a pneumothorax.
- Persistent pulmonary hypertension: High pressure in the lung's blood vessels can prevent enough blood from reaching the lungs for oxygen.
- Severe inflammation: Lung irritation may increase the need for oxygen or ventilation.
- Low oxygen reaching the brain and organs: This is most concerning when oxygen was reduced before birth or remained very low after delivery.
- Difficulty feeding: Rapid breathing and intensive treatment can delay safe feeding by mouth.

Prevention

Meconium aspiration syndrome cannot always be prevented. Meconium may enter the lungs before anyone knows it has been passed, and there may be no clear warning.

Regular pregnancy care can identify concerns such as poor fetal growth, placental problems, or pregnancy continuing well beyond the due date. Your maternity team can discuss monitoring and the timing of birth based on your pregnancy.

Contact your maternity unit promptly if your waters break and the fluid is green or brown. This colour may indicate meconium. It does not prove that the baby has inhaled it, but the baby may need closer monitoring during labour and assessment after birth.

Routine suctioning of a baby's mouth and nose before the shoulders are delivered does not prevent the syndrome. After birth, the resuscitation team focuses on helping the baby breathe effectively rather than suctioning solely because meconium is present.

Nothing a parent eats, drinks, or does in ordinary daily life causes meconium aspiration syndrome.

Living with it and what to expect

The early course depends on how much the lungs are affected and whether the baby had a shortage of oxygen before or during birth. Babies with mild breathing difficulty may improve

over several days. Those who need ventilation or treatment for pulmonary hypertension may stay in a newborn intensive care unit for longer.

Breathing support is reduced as oxygen levels improve and the baby can breathe with less effort. Feeding usually increases gradually. Some babies begin with milk through a feeding tube because fast breathing can make sucking and swallowing unsafe or tiring.

After discharge, most babies do not need ongoing respiratory treatment and develop normally. The lungs can continue to recover after breathing appears normal. Some babies who had severe lung inflammation or prolonged ventilation may have coughing, wheezing, or a greater need for respiratory follow-up.

Follow-up is especially important after severe oxygen deprivation, seizures, pulmonary hypertension, ECMO, or a long intensive-care stay. Appointments may review growth, movement, hearing, vision, feeding, and early development. Extra therapy can be arranged if a delay or difficulty becomes apparent.

A history of meconium aspiration does not automatically limit future activity. What matters over months and years is whether there was lasting lung, hearing, or neurological injury. The newborn team can explain which follow-up is relevant to your baby's hospital course.

When to get medical help

Meconium aspiration syndrome is treated as an emergency when a newborn has breathing difficulty. In a hospital or birth centre, the maternity team will call staff trained in newborn resuscitation.

Call emergency services immediately after a home birth or after discharge if a newborn:

During pregnancy or labour, contact your maternity unit promptly if your waters are green or brown, your baby's movements have reduced, or you have been told to seek care for a change in movements. Meconium-stained fluid without breathing symptoms is not itself a diagnosis, but it needs professional assessment.

Routine follow-up is appropriate after discharge if your baby is breathing comfortably but has concerns with feeding, weight gain, coughing, wheezing, hearing, movement, or development. Bring these concerns to the baby's scheduled clinician or newborn follow-up team.

- Has blue-grey lips, tongue, or skin
- Is struggling to breathe, grunting, or pulling in at the ribs
- Has pauses in breathing or becomes floppy

- Is difficult to wake or cannot feed because of breathing trouble

Common questions

Is meconium-stained fluid the same as meconium aspiration syndrome?

No. Meconium-stained fluid means the baby passed stool before birth. The syndrome occurs only when meconium enters the lungs and causes breathing problems. Most babies exposed to stained fluid do not develop the syndrome.

Did my baby swallow meconium?

A baby may swallow meconium-stained fluid without developing lung disease. Aspiration means the fluid entered the windpipe and lungs rather than only the stomach. It is the effect on breathing that defines the syndrome.

Can a baby inhale meconium before birth?

Yes. A baby under stress may make gasping movements while still in the womb. Aspiration may also happen during the first breaths around delivery. This is why suction after the head appears cannot prevent every case.

How long does recovery take?

Mild cases may improve within a few days. More severe lung inflammation, an air leak, or pulmonary hypertension can require longer intensive care. Recovery time is guided by oxygen needs, breathing support, feeding, and any effects of low oxygen.

Will my baby have long-term problems?

Most babies recover without lasting problems. The risk of longer-term difficulties is higher after severe oxygen deprivation, prolonged respiratory failure, seizures, or ECMO. Follow-up helps identify concerns with breathing, hearing, movement, or development early.

Can it happen again in another pregnancy?

Meconium aspiration syndrome is not inherited, so one affected baby does not mean another baby will have it. Future risk is shaped by the circumstances of that pregnancy and labour, including gestational age and fetal wellbeing.

Sources

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