CONDITION

Transposition of the great arteries

Transposition of the great arteries is a congenital heart condition in which the two main arteries leaving the heart are reversed.

WHAT IT IS
Reversed connections of the heart's two main arteries

BODY SYSTEM
Heart and circulation

MAIN SYMPTOMS
Blue skin, rapid breathing, poor feeding, unusual sleepiness

WHAT CAUSES IT
Abnormal heart development before birth, usually unexplained

HOW IT IS DIAGNOSED
Fetal or newborn echocardiogram

MAIN TREATMENT
Newborn stabilization and corrective heart surgery

CAN IT BE CURED?
Sometimes - surgery corrects circulation, but monitoring remains

IS IT AN EMERGENCY?
Yes - critically low oxygen after birth

LONG-TERM OUTLOOK
Often good after repair, with lifelong specialist follow-up

Overview

Transposition of the great arteries, often shortened to TGA, is a serious congenital heart condition. Congenital means it is present from birth.

In the usual heart, the pulmonary artery carries oxygen-poor blood from the heart to the lungs. The aorta carries oxygen-rich blood from the heart to the rest of the body. In TGA, these two arteries are connected to the opposite pumping chambers.

This creates two separate loops of blood flow. Oxygen-poor blood returns to the body without passing through the lungs, while oxygen-rich blood keeps moving between the lungs and heart. A baby can survive only if some blood mixes between the two loops.

Mixing may happen through another opening, such as:

TGA requires immediate specialist care after birth and usually corrective surgery soon afterward. With modern treatment, many children grow into adulthood and lead active lives. Lifelong congenital heart follow-up is still important because problems can develop years after surgery.

This article mainly covers dextro-transposition, or d-TGA, the most common form. Congenitally corrected TGA is a different arrangement with a different course and treatment.

- An atrial septal defect, an opening between the heart's upper chambers
- A ventricular septal defect, an opening between its lower chambers
- The ductus arteriosus, a normal fetal blood vessel that usually closes after birth

Symptoms

TGA often causes symptoms within minutes or hours of birth. The main sign is cyanosis, which means the skin, lips or tongue look blue or grey because the blood does not contain enough oxygen. On darker skin, this colour change may be easier to see on the lips, gums, tongue, palms or soles.

Other possible signs include:

The severity partly reflects how much blood can mix between the two circulation loops. A baby with a large opening between heart chambers may initially appear less blue than a baby with very limited mixing. This does not make the condition minor.

TGA does not usually cause noticeable symptoms before birth because the placenta supplies oxygen and fetal blood flows through temporary openings in the heart. These openings begin to close after delivery, which is why symptoms can appear suddenly.

Some babies are diagnosed during pregnancy before symptoms occur. This allows delivery and newborn heart care to be planned.

- Fast or difficult breathing
- Poor feeding or tiring during feeds
- Unusual sleepiness or reduced responsiveness
- A fast heartbeat
- Poor weight gain if diagnosis is delayed

Causes and risk factors

TGA develops early in pregnancy while the baby's heart and large blood vessels are forming. The exact reason is usually unknown. It is not caused by something a parent did after the heart had formed.

Most babies with TGA do not have an identified inherited syndrome. However, congenital heart conditions can sometimes run in families, and genetic factors may contribute. TGA can also occur alongside other heart differences, including a ventricular septal defect or narrowing near the pulmonary valve.

Certain pregnancy-related and genetic factors have been associated with congenital heart conditions, but an association does not prove that a factor caused an individual baby's TGA. In most families, there is no single clear explanation.

Parents who have had a pregnancy affected by TGA or another congenital heart condition may be offered genetic counselling. This can help review family history and discuss the chance of a heart condition in a future pregnancy without assuming that TGA was inherited.

Diagnosis

TGA may be detected during a routine pregnancy ultrasound, although it is not always visible. If a heart difference is suspected, a fetal echocardiogram is usually arranged. This is a detailed ultrasound of the baby's heart.

After birth, low oxygen levels, blue colouring or breathing problems may raise concern. Newborn pulse oximetry screening measures oxygen through a sensor placed on the skin. It can detect low oxygen but cannot show which heart condition is responsible.

An echocardiogram confirms the diagnosis. This painless ultrasound shows how the arteries connect to the heart, whether blood is mixing and whether other heart differences are present.

Other tests may include an electrocardiogram, which records the heart's electrical activity, and a chest X-ray. Blood tests can measure oxygen and check the baby's general condition. Cardiac catheterization may be used when more information or an urgent procedure is needed. During catheterization, a thin tube is guided through a blood vessel to the heart.

If TGA is diagnosed before birth, the pregnancy and heart teams can plan where delivery should take place. This is usually a hospital able to provide immediate newborn and pediatric cardiac care.

Treatment and management

Treatment begins by making sure enough oxygen-rich blood reaches the body. A baby is cared for in a neonatal or cardiac intensive care unit while the heart team assesses the anatomy.

A medicine called prostaglandin may be given through a vein. It keeps the ductus arteriosus open so that blood can continue mixing temporarily. This medicine is a bridge to further treatment rather than a permanent correction.

If mixing remains inadequate, the baby may need balloon atrial septostomy. During this catheter procedure, a specialist enlarges the opening between the upper heart chambers. This allows more oxygen-rich and oxygen-poor blood to mix.

Most babies with d-TGA have an arterial switch operation during the newborn period. The surgeon reconnects the aorta and pulmonary artery to the correct pumping chambers. The coronary arteries, which supply the heart muscle, must also be moved to the reconnected aorta. Other heart differences may be repaired during the same operation.

Some children have more complex anatomy that requires a different surgical approach. The plan is based on the precise artery connections, the coronary arteries, the heart valves and any openings or narrowing within the heart.

After surgery, care may include medicines, feeding support and repeated imaging. The length of recovery differs between babies. Before discharge, families are taught how to care for the incision, give any prescribed medicines and recognize signs that need review.

Long-term management usually includes:

People should not start or stop heart medicines or limit activity without advice from their congenital heart team.

- Regular visits with a congenital heart specialist
- Echocardiograms, electrocardiograms or heart rhythm monitoring
- MRI or exercise testing when appropriate
- Monitoring growth, development, learning and emotional well-being
- Individual advice about exercise, dental care and pregnancy

Complications

Before treatment, the main danger is that too little oxygen reaches the brain and other organs. Prompt newborn treatment is intended to restore effective circulation and reduce this risk.

Surgery has immediate risks, including bleeding, infection, rhythm problems and difficulty with heart function. The surgical team explains these risks in relation to the baby's anatomy and

health.

Possible later complications after an arterial switch include:

These problems do not occur in everyone. They may be found during routine imaging before they cause symptoms. Some need medicines, a catheter procedure or another operation.

Adults who had an older atrial switch operation, such as the Mustard or Senning procedure, have different long-term risks. These include rhythm disorders, leakage within the surgically created blood-flow channels and weakening of the right ventricle, which must pump blood to the body.

Some children have developmental, movement, attention or learning difficulties after a complex newborn heart condition and surgery. Early assessment and school support can help when concerns arise.

- Narrowing of the pulmonary arteries
- Narrowing where the arteries were reconnected
- Leakage from the new aortic valve
- Enlargement of the aortic root
- Reduced blood flow through a coronary artery
- Abnormal heart rhythms
- Reduced pumping function

Prevention

TGA usually cannot be prevented. It develops before birth, and most cases have no known single cause.

General health care before and during pregnancy can support fetal development, but it cannot guarantee that a congenital heart condition will not occur. This includes managing existing health conditions and reviewing medicines with a qualified professional before pregnancy. Prescribed medicines should not be stopped without medical advice.

If TGA or another congenital heart condition has occurred in a family, genetic counselling and fetal heart imaging may be offered in a future pregnancy. These steps do not prevent TGA, but they may help assess risk and allow earlier diagnosis.

Living with it and what to expect

The first weeks are usually focused on surgery, recovery and feeding. Some babies need extra calories or temporary tube feeding because heart surgery and rapid breathing can make feeding tiring. Growth often improves after circulation has been corrected, although regular monitoring may be needed.

Many children who have had an arterial switch attend school, take part in family activities and exercise. Some need few day-to-day restrictions. Others need limits based on heart function, artery narrowing or rhythm problems. Exercise advice should be updated as the child grows.

Follow-up continues throughout life, even when someone feels well. TGA is repaired rather than simply disappearing. Tests may detect gradual changes in the heart valves, arteries, coronary circulation or pumping function.

As teenagers move into adult care, follow-up should transfer to an adult congenital heart disease service rather than stop. Keeping copies of operation reports, catheterization records and current medicine lists can help future teams understand the repair.

Emotional responses may also change over time. Children may become more aware of scars or medical visits, while parents may remain anxious after an intense newborn period. Psychological support can be part of congenital heart care.

Pregnancy may be possible for many adults with repaired TGA, but it puts extra strain on the heart. Pre-pregnancy assessment by adult congenital heart and pregnancy specialists is important. Risk is influenced by the type of previous operation, heart function, valve problems and abnormal rhythms.

No outcome can be promised for an individual person. However, timely repair and continued specialist monitoring have allowed many people with TGA to live well into adulthood.

When to get medical help

TGA in an undiagnosed newborn is an emergency. Call emergency services if a baby has blue or grey lips or tongue, severe breathing difficulty, becomes limp, is difficult to wake or stops responding normally.

After repair, seek emergency help for:

Contact the congenital heart team promptly for a clear decline in feeding, fewer wet nappies, increasing swelling, unexplained weight gain, fever around the time of recent surgery, wound redness or drainage, or a new reduction in exercise ability.

Routine follow-up is still needed when there are no symptoms. Keep scheduled congenital heart appointments and arrange a non-emergency review for recurring palpitations, gradual

tiredness or concerns about growth, learning or development.

- Severe or rapidly worsening breathing difficulty
- Fainting, collapse or reduced responsiveness
- New blue or grey colouring
- Chest pain with fainting, sweating or breathing difficulty
- A fast or irregular heartbeat with dizziness or collapse

Common questions

Can a baby survive transposition of the great arteries?

Yes. TGA needs urgent treatment, but many babies survive after stabilization and corrective surgery. The outlook is shaped by the baby's detailed heart anatomy, other health conditions and any complications.

Does surgery completely cure TGA?

An arterial switch operation corrects the circulation, but it does not remove every future risk. Lifelong monitoring is needed because the arteries, valves, coronary circulation or heart rhythm can change over time.

Can TGA be found before birth?

Sometimes. A pregnancy ultrasound may suggest the artery connections are abnormal, and a fetal echocardiogram can examine them more closely. TGA can still be missed before delivery.

Will my child be able to exercise?

Many children can take part in normal play and a wide range of sports after recovery. Safe activity levels are based on heart function, rhythm and any narrowing or valve problems. Competitive or very intense exercise may require extra assessment.

Is transposition of the great arteries inherited?

It is not usually inherited in a simple pattern. Genetic and family factors may contribute in some cases, but most families do not receive one definite cause. Genetic counselling can provide information tailored to the family history.

Can someone with repaired TGA have children?

Many adults with repaired TGA can consider pregnancy or parenthood. Pregnancy-related heart risks require assessment before conception, especially after an older atrial switch operation or when heart function or rhythm is abnormal.

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