PROCEDURE

Pediatric heart surgery

Pediatric heart surgery repairs or improves a child's heart or major blood vessels.

PURPOSE
Repair or improve heart structure, blood flow, or function

PROCEDURE TYPE
Therapeutic surgery, usually open-heart or closed-heart

WHERE IT IS DONE
Operating theatre in a specialist children's heart centre

ANAESTHESIA
General

HOW LONG IT TAKES
About 2-6 hours; complex operations may take longer

PREPARATION
Fasting, medicine review, blood tests, and heart imaging

RECOVERY
Several days in hospital; no driving until cleared

MAIN RISKS
Bleeding, infection, rhythm problems, heart or brain injury

RESULTS
Initial outcome known immediately; recovery assessed during follow-up

Overview

Pediatric heart surgery is an operation on a baby's, child's, or teenager's heart or the large blood vessels connected to it. Most operations treat a congenital heart defect, meaning a heart difference present from birth. Surgery may also treat heart disease that developed later.

Some operations repair the heart so blood can flow more normally. Others improve blood flow without creating a normal heart structure. This is called palliation. A child with a complex condition may need several planned operations as they grow.

"Open-heart" surgery usually means the surgeon opens the chest and uses a heart-lung bypass machine. This machine temporarily pumps and adds oxygen to the blood while the heart is repaired. Some operations can be done without opening the heart or using bypass, but they are still major surgery.

Why the procedure is performed

Heart surgery may be recommended when a heart or blood-vessel problem affects oxygen levels, blood flow, heart workload, growth, or long-term health.

Reasons include:

The goal may be a complete repair, a temporary step before another procedure, or long-term improvement in circulation.

- Closing a hole between heart chambers
- Repairing or replacing a narrowed or leaking heart valve
- Widening a narrowed blood vessel
- Reconnecting blood vessels that formed in the wrong position
- Improving blood flow to the lungs or body
- Treating complications from infection, injury, or previous surgery
- Performing one stage of a planned series of operations

Who should and should not have it

A pediatric cardiology and heart-surgery team considers the child's heart anatomy, symptoms, growth, test results, age, and overall health. Surgery is generally offered when its expected benefits are greater than its risks.

It may not be the right choice when the condition can be watched safely, treated with medicine, or managed through a catheter procedure. In a catheter procedure, thin tubes are passed through a blood vessel instead of making a chest incision.

Planned surgery may be delayed if the child has a fever, significant respiratory infection, uncontrolled infection elsewhere, or another medical problem that increases anaesthetic or surgical risk. Poor nutrition or dental infection may need attention first. Urgent surgery may still proceed when delaying it would be more dangerous.

For some complex heart conditions, surgery cannot create normal circulation. The team should explain whether the proposed operation is a repair, palliation, bridge to transplantation, or another stage of treatment.

How to prepare

The treating facility's own instructions take priority because fasting rules, medicine plans, and arrival times are specific to the child and operation.

Before surgery, the child may have blood tests, an electrocardiogram to check heart rhythm, an echocardiogram to create ultrasound pictures of the heart, and a chest X-ray or other imaging. The team may arrange blood for transfusion if needed.

Tell the surgical team about all prescription medicines, over-the-counter products, vitamins, supplements, allergies, and previous reactions to anaesthesia. Do not stop aspirin, blood thinners like warfarin or apixaban , or heart medicines unless the treating team gives specific instructions.

Follow the facility's fasting directions exactly. These state when the child must stop solid food, milk, and clear liquids. Contact the team before arrival if the child develops a fever, cough, vomiting, diarrhoea, rash, or recent exposure to an infectious illness.

Explain the operation honestly using age-appropriate language. The hospital may offer a child-life specialist to help your child prepare.

What happens during the procedure

Your child receives general anaesthesia and remains unconscious throughout the operation. The anaesthesia team monitors breathing, heart rhythm, blood pressure, oxygen, temperature, and other vital functions.

For many operations, the surgeon makes an incision through the breastbone. If heart-lung bypass is needed, tubes connect the circulation to a machine that temporarily does the work of the heart and lungs. The surgeon then repairs, reconstructs, or redirects the affected structures.

Other operations use an incision between the ribs and may not require bypass. The exact method depends on the heart condition and planned repair.

Before the operation ends, the team checks the repair and controls bleeding. Temporary pacing wires, chest drains, intravenous lines, and a breathing tube may be left in place. The incision is closed, and the child is taken to a cardiac intensive care unit.

Recovery and what to expect afterward

Pain and soreness are expected, especially around the chest incision. Pain medicine is given regularly at first and then reduced as healing progresses. Babies may show discomfort through

irritability, poor sleep, or reluctance to feed.

Fluids and food restart when it is safe. Some children begin with clear liquids, while babies may return gradually to breast milk or formula. Temporary nausea, constipation, or reduced appetite can occur.

Activity increases in stages. At first, staff help the child sit, stand, walk, cough, and breathe deeply. After discharge, follow instructions about lifting, sports, bathing, tummy time for babies, and protecting the breastbone. Full recovery often takes several weeks, but the schedule differs by operation and age.

An adult must drive the child home. Teenagers must not drive until the surgical team clears them, and nobody should drive while taking medicine that causes sleepiness.

Return to school, childcare, or work is based on healing, energy, infection exposure, and activity restrictions. A caregiver may also need time away from work. Hospital stays range from several days to weeks after complex surgery.

Risks and possible complications

The team should discuss risks specific to the planned operation. Risk is affected by the heart condition, type and urgency of surgery, age, previous operations, and other health problems.

Possible complications include:

Some children need temporary pacing, longer breathing support, or another operation. The surgeon can explain the expected benefit and the child-specific chance of serious complications before consent.

- Bleeding or the need for a blood transfusion
- Infection of the incision, lungs, bloodstream, or heart
- Abnormal heart rhythms
- Breathing problems
- Blood clots, stroke, or injury to other organs
- Fluid around the heart or lungs
- Problems with the repair, sometimes requiring another procedure
- Reactions to medicines or anaesthesia
- Death

Results and follow up

The surgeon usually explains the initial result soon after the operation. Echocardiograms, oxygen measurements, blood tests, and other monitoring help show how well the repair is working.

Follow-up starts during the hospital stay and continues after discharge. Visits may include an incision check, medicine review, heart imaging, and guidance about activity or feeding.

Many children need lifelong cardiology care, even after a successful repair. A repaired heart condition may still require monitoring for valve problems, rhythm changes, narrowing, or the need for later procedures. Keep routine appointments even when the child feels well.

Alternatives

The realistic alternatives depend on the heart condition and its urgency.

Observation with regular imaging avoids surgery now, but the condition could worsen or become harder to repair. Medicines may control fluid buildup, blood pressure, rhythm, or symptoms, but they usually do not correct a structural heart defect.

A catheter procedure may close a hole, open a narrowed valve or vessel, or place a stent without opening the chest. Recovery is usually faster, but not every defect, size, or anatomy can be treated this way. Some catheter repairs are temporary.

For complex conditions, alternatives may include a different surgical approach, staged palliative operations, transplantation assessment, or comfort-focused care. Each option trades possible benefit against invasiveness, future procedures, waiting time, and uncertainty. Ask what is likely to happen with each option, including no procedure now.

When to call your healthcare team

Contact the heart-surgery team promptly for fever at or above the threshold in your discharge instructions, increasing redness or drainage from the incision, worsening pain, repeated vomiting, poor feeding, fewer wet diapers, unusual sleepiness, fainting, or a new fast or irregular heartbeat.

Seek emergency help for severe trouble breathing, unresponsiveness, a seizure, sudden blue or grey colouring, heavy bleeding, or collapse. Use your local emergency number rather than waiting for a routine callback.

Questions about mild constipation, school forms, activity progression, or routine appointments can usually wait for normal office hours unless the discharge instructions say otherwise.

Common questions

Will my child be asleep?

Yes. Pediatric heart surgery is performed under general anaesthesia. Your child will be unconscious and continuously monitored.

Can we drive home afterward?

An adult must drive the child home after discharge. A teenager should not drive until cleared by the surgical team or while taking medicine that causes drowsiness.

How painful is heart surgery?

Chest soreness is expected, but the team provides pain medicine. Pain should gradually improve. Pain that becomes worse rather than better needs medical advice.

When will we know whether it worked?

The surgeon usually gives an initial update immediately after surgery. Monitoring and heart imaging during recovery provide more detail. Some results become clearer over weeks or months.

How long will my child stay in hospital?

Many children stay several days. Newborns and children having complex or staged operations may remain longer, especially if they need breathing, feeding, or circulation support.

Will there be a scar?

Most open operations leave a scar down the centre of the chest. Some use an incision along the side of the chest. Scars usually flatten and fade over time but do not disappear completely.

Sources

- MedlinePlus Medical Encyclopedia: Pediatric heart surgery , U.S. National Library of Medicine
- American Heart Association: Congenital Heart Defects and Surgical Procedures , American Heart Association
- NHLBI: Congenital Heart Defects - Treatment , National Heart, Lung, and Blood Institute

- NHS: Congenital heart disease - Treatment , National Health Service
- CDC: Living with a Congenital Heart Defect , U.S. Centers for Disease Control and Prevention