PROCEDURE

Pectus excavatum repair

Pectus excavatum repair is surgery that lifts a sunken breastbone into a more normal position.

PURPOSE
Correct chest depression and improve related function or appearance

PROCEDURE TYPE
Therapeutic surgery; minimally invasive or open repair

WHERE IT IS DONE
Operating theatre

ANAESTHESIA
General

HOW LONG IT TAKES
About 1 to 4 hours, based on surgical technique

PREPARATION
Fasting, medication review, tests, and home-recovery planning

RECOVERY
Several hospital days; no driving until cleared and off opioids

MAIN RISKS
Bleeding, lung injury, infection, bar movement

RESULTS
Chest shape changes immediately; full recovery takes months

Overview

Pectus excavatum repair is surgery to correct a breastbone that curves inward. The breastbone is also called the sternum. The operation moves it forward to create a more typical chest shape and, in some people, more space for the heart and lungs.

The two main operations are the Nuss procedure and the Ravitch procedure.

The Nuss procedure is minimally invasive. The surgeon passes one or more curved metal bars behind the breastbone through small cuts on the sides of the chest. Turning the bars lifts the breastbone. The bars usually remain in place for several years before being removed during another operation.

The Ravitch procedure is an open operation. The surgeon makes a larger cut at the front of the

chest, removes or reshapes abnormal rib cartilage, and repositions the breastbone. A support bar or plate may be used while the chest heals.

Why the procedure is performed

Surgery may be offered when the chest depression is severe, causes important symptoms, or has a major effect on daily life. The aim may be to improve heart or lung function, reduce symptoms during activity, improve chest appearance, or address several of these concerns together.

Reasons for considering repair include:

Scans can measure the depth of the depression and show whether the heart is compressed. One measurement, called the Haller index, compares the chest's width with its front-to-back depth. It can support decision-making, but it does not determine treatment by itself.

- Shortness of breath, chest discomfort, or reduced exercise ability linked to the chest shape
- Pressure on or displacement of the heart
- A deep or worsening chest depression
- Significant distress about appearance or social activities
- Testing that suggests the chest shape is affecting heart or lung function

Who should and should not have it

Repair may be appropriate for children, teenagers, or adults with a significant chest depression. Timing is individualized. Many operations are performed during adolescence, when the chest remains flexible, but adults can also have successful repair.

Surgery may not be the right choice if the depression is mild, causes little concern, or can be managed without an operation. It may be delayed if you have an active infection, an uncontrolled heart or lung condition, poor nutrition, or another problem that makes general anaesthesia or healing less safe.

Previous chest or heart surgery can make repair more complex. A known metal allergy may affect the type of bar used. Older adults and people with a stiffer chest may need a modified approach and can have a more painful or longer recovery.

Your surgeon should explain why a particular technique is being offered, what improvement is

realistic, and whether the expected benefit outweighs the risks for you.

How to prepare

Your surgical team may arrange a chest CT or MRI scan, heart ultrasound, electrocardiogram, exercise testing, or lung function tests. These help show how the chest shape affects nearby organs and assist with planning.

Tell the team about all medicines, supplements, allergies, previous operations, and problems with anaesthesia. Ask specifically what to do with blood thinners like warfarin or apixaban , diabetes medicines, and anti-inflammatory pain medicines. Do not stop a prescribed medicine unless the treating team tells you to.

Smoking and nicotine can interfere with healing. Your team may discuss stopping before and after surgery.

You will need to stop eating and drinking for a set period before anaesthesia. Arrange help at home and transport after discharge. Prepare loose clothing and place commonly used items where you can reach them without bending or twisting.

Your treating facility's own preparation instructions take priority because fasting rules, medication plans, and admission arrangements differ between hospitals.

What happens during the procedure

You will receive general anaesthesia, so you are unconscious and do not feel the operation. Your breathing is supported while the surgery is performed.

For a Nuss procedure, the surgeon makes small cuts on each side of the chest. A camera may be placed inside the chest to guide the operation. A curved metal bar is passed behind the breastbone and rotated to lift it. One or more bars may be secured to the ribs or surrounding tissues to reduce movement.

For a Ravitch procedure, the surgeon makes a cut over the front of the chest. Abnormal rib cartilage is removed or reshaped while preserving tissue needed for regrowth. The breastbone is moved forward and may be supported with a bar, plate, or other device.

The team checks for bleeding and lung problems before closing the cuts. A temporary chest drain may be placed to remove air or fluid, although it is not needed in every case.

Recovery and what to expect afterward

Pain can be significant, especially during the first several days. Hospitals use a combination of pain treatments. These may include oral or intravenous medicine, a nerve block, an epidural, or freezing selected chest nerves during surgery. Tell staff if pain prevents you from breathing deeply, coughing, sleeping, or walking.

You usually begin with fluids and then return to regular food as nausea settles. Constipation is common with opioid pain medicines and reduced activity. Fluids, movement, and any bowel medicine prescribed by your team can help.

You will be encouraged to take deep breaths and begin walking soon after surgery. Activity restrictions protect the repair while tissues heal. You may need to avoid heavy lifting, contact sports, twisting, and sleeping in certain positions. Follow the limits given by your surgeon because they are based on your operation and bar placement.

Do not drive while taking opioid pain medicine. You must also be able to turn comfortably, wear a seat belt, and perform an emergency stop before driving. Wait until your surgical team clears you.

Returning to school or desk work often takes several weeks. Physical jobs may require more time. Fatigue and chest stiffness can continue after the wounds have healed. The implanted bars are removed later in a planned operation, commonly after the chest has had several years to remodel.

Risks and possible complications

All operations and general anaesthesia carry risks. The risks of pectus repair include:

Serious injury to the heart or major blood vessels is uncommon but can be life-threatening. The risk may be higher when scar tissue is present from earlier chest or heart surgery. Ask how your surgeon plans to reduce the risks that apply to you.

- Bleeding or the need for a blood transfusion
- Air around a lung, called a pneumothorax
- Injury to the lungs, heart, diaphragm, or major blood vessels
- Wound or implanted-bar infection
- Bar movement, rotation, or breakage
- Fluid around the lungs

- Persistent pain, numbness, or visible scarring
- An unsatisfactory appearance or return of the depression
- Blood clots or complications from anaesthesia

Results and follow up

The change in chest shape is visible after surgery, although swelling can temporarily affect the appearance. Breathing, exercise tolerance, pain, and confidence may improve gradually rather than immediately. Surgery cannot guarantee that every symptom will resolve.

Follow-up visits check the wounds, chest position, pain control, activity level, and any implanted support. Imaging may be used if there is concern about bar position or a lung problem.

If you have a Nuss bar or another temporary support, you will need a later operation to remove it. Keep information about the implant and tell healthcare staff about it before future chest procedures or MRI scans. Many modern bars are compatible with certain MRI conditions, but the imaging service must confirm the exact implant.

Alternatives

Pectus excavatum repair is usually planned rather than an emergency. You may have time to compare surgery with other options.

Observation avoids surgical risks and recovery, but the chest depression remains and may become more rigid with age.

Exercise or physical therapy can improve posture, muscle strength, and general fitness. It does not usually move the breastbone permanently, so it may not correct deeper structural compression.

A vacuum bell is a suction device worn against the chest to gradually lift the breastbone. It is most useful for selected people with a flexible chest and requires regular use over a long period. It may not work well for a deep, uneven, or rigid depression.

Support for body-image distress can help with confidence and decision-making. It does not change the chest structure but may be useful whether or not you choose surgery.

The Nuss and Ravitch operations are also alternatives to each other. Nuss repair uses smaller cuts but leaves bars in place and can cause substantial postoperative pain. Ravitch repair uses a larger cut and reshapes cartilage directly, which may suit some rigid, uneven, or complex

chest shapes.

When to call your healthcare team

Attend routine follow-up for wound checks, activity guidance, and planning for bar removal. Contact the surgical team during office hours if constipation, sleep problems, numbness, or ongoing discomfort is not improving.

Seek urgent advice the same day for:

Call emergency services for severe breathing difficulty, sudden severe chest pain, fainting, blue or grey lips, uncontrolled bleeding, or rapidly worsening symptoms.

- Fever, increasing redness, warmth, swelling, or wound drainage
- Pain that is worsening or not controlled by the prescribed plan
- Repeated vomiting or inability to keep fluids down
- New clicking, movement, or a visible change in bar position
- Increasing shortness of breath

Common questions

Will I be asleep?

Yes. Pectus excavatum repair is performed under general anaesthesia. You will be unconscious during the operation.

How painful is it?

Chest pain and pressure can be substantial during the first days, particularly after bar placement. Nerve blocks and several types of pain medicine are often combined. Pain usually improves, but stiffness and discomfort can continue for weeks.

Can I drive home?

No. You will remain in hospital until it is safe to leave, and someone else must take you home. Do not drive while using opioid pain medicine or until you can move safely and your team has cleared you.

When will I know whether it worked?

The change in chest shape is usually visible immediately. Recovery of comfort, activity, and exercise tolerance takes longer and is assessed during follow-up.

Will the bars stay in forever?

Usually not. Nuss bars and some other supports are intended to remain while the chest remodels, then are removed during a separate planned operation.

Will I be able to play sports again?

Many people return to sports after healing. Contact sports, heavy lifting, and twisting are restricted at first. Your surgeon will provide a staged plan based on healing and bar stability.

Sources

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