PROCEDURE

Sternal exploration or closure

Sternal exploration or closure is surgery to inspect the chest and repair or close the breastbone after chest surgery.

PURPOSE
Find and treat chest bleeding, infection, instability, or delayed closure

PROCEDURE TYPE
Therapeutic surgery to reopen, inspect, repair, and close the sternum

WHERE IT IS DONE
Operating theatre; emergency reopening may begin at the bedside

ANAESTHESIA
General anaesthesia

HOW LONG IT TAKES
Usually 1 to 3 hours, longer for complex reconstruction

PREPARATION
Fasting, blood tests, and medication review when time allows

RECOVERY
Several hospital days; no driving until medically cleared

MAIN RISKS
Bleeding, infection, organ injury, and poor sternal healing

RESULTS
Main findings immediate; cultures usually take several days

Overview

The sternum is the breastbone in the centre of your chest. During many heart and major chest operations, surgeons divide the sternum to reach the organs underneath. This opening is called a sternotomy.

Sternal exploration means reopening some or all of a recent surgical wound to look for and treat a problem inside the chest. The surgeon may remove blood clots, control bleeding, clean infected tissue, repair an injury, or check the heart and nearby structures.

Sternal closure means bringing the breastbone back together. It may be done at the end of the original operation, after an exploration, or later if the chest was intentionally left open. The bone is usually secured with surgical wires, cables, or plates. Drains may be left in place to remove blood or fluid.

This is major surgery. Some explorations are planned, but others are urgent because waiting could be more dangerous than operating.

Why the procedure is performed

Your surgical team may recommend sternal exploration for:

In some people, the sternum is not closed at the end of the first operation. This may give a swollen heart more room or avoid harmful pressure inside the chest. Closure is then performed when swelling has improved and the circulation is more stable.

The exact goal should be explained before surgery when circumstances allow. In an emergency, the team may need to act before every detail is known.

- Bleeding or blood clots collecting around the heart
- Pressure on the heart from accumulated blood or fluid, called cardiac tamponade
- A deep infection behind or around the sternum
- Separation, movement, or poor healing of the breastbone
- Concern about an injury or another problem after heart surgery
- The need to remove damaged tissue or obtain samples for testing

Who should and should not have it

Sternal exploration may be appropriate when bleeding, pressure around the heart, deep infection, or wound breakdown cannot be managed safely without surgery. Closure may be appropriate when the chest is clean, bleeding is controlled, and the heart and lungs can function safely with the sternum closed.

It is not a routine treatment for mild surface redness, uncomplicated pain, or a small fluid collection that can be watched or drained another way.

Planned closure may be delayed if closing the chest would place too much pressure on the heart, blood pressure remains unstable, bleeding is not controlled, or severe swelling is still present. Immediate closure may also be unsuitable when there is extensive infection or damaged bone. In that situation, treatment may involve cleaning the wound, temporary negative-pressure wound therapy, and later reconstruction using healthy muscle or other tissue.

Serious medical conditions can increase the risks of anaesthesia and poor wound healing.

However, there is no single condition that always rules out exploration. Your team weighs the risks of surgery against the risks of leaving the chest problem untreated.

How to prepare

This procedure is often performed during the same hospital stay as the original chest operation. You may already be in an intensive care unit and receiving sedation or breathing support.

If there is time to prepare, you may need blood tests, an electrocardiogram, and chest imaging. The team may arrange blood products in case a transfusion is needed.

Follow the treating facility's own instructions first, because they take priority. You may be told:

Do not stop a blood thinner like warfarin or apixaban on your own. In an emergency, there may be no time for fasting or medication changes. The anaesthesia and surgical teams will manage the added risks.

When possible, the surgeon will explain the expected benefit, alternatives, major risks, and whether wires, plates, temporary dressings, or tissue reconstruction may be needed.

- When to stop eating and drinking
- Which medicines to take or pause
- Whether blood-thinning medicines need adjustment
- How to wash before surgery

What happens during the procedure

You will usually have general anaesthesia, meaning you are unconscious and do not feel the operation. Monitoring lines may be placed to measure your blood pressure and heart function closely. A breathing tube and ventilator support your breathing.

The surgeon opens the previous incision and removes or releases the material holding the sternum together. Blood and clots are removed so the area can be examined.

What happens next is based on the findings. The surgeon may stop a bleeding vessel, drain fluid, repair tissue, wash the chest, or remove infected and unhealthy tissue. Samples may be sent to a laboratory to identify infection.

If it is safe to close the chest, the surgeon brings the sternum together with wires, cables, or plates. Drains are often placed before the skin is closed.

If immediate closure would put too much pressure on the heart or trap an active infection, the chest may be covered temporarily instead. Closure or reconstruction is then performed later. Complex wounds may require a plastic surgeon to move healthy muscle or other tissue over the area.

Recovery and what to expect afterward

Pain: Chest and wound pain are expected, especially with coughing, deep breathing, or movement. Pain medicine should make it possible to breathe deeply and begin moving. Tell the hospital team if pain suddenly worsens or is not controlled.

Eating: You may receive fluids first, followed by food as you wake fully and your stomach begins working normally. Some people need temporary nutrition support after a complicated or prolonged illness.

Activity: Nurses and physiotherapists will help you sit up, walk, cough, and perform breathing exercises. Follow your team's instructions about lifting, pushing, pulling, and using your arms. These limits may differ if plates were used or if the wound required reconstruction.

Driving: You cannot drive home after general anaesthesia. Do not drive until your surgeon or cardiac team says it is safe. You must be able to move comfortably, control the vehicle, and perform an emergency stop without harming the healing sternum.

Work: Time away from work is usually measured in weeks rather than days. It is often longer after infection, repeated surgery, or a physically demanding job. Your team can base advice on the operation, wound healing, and your type of work.

Your hospital stay may last several days or longer. Some people need intensive care, antibiotics like amoxicillin or doxycycline , wound therapy, rehabilitation, or another operation before going home.

Risks and possible complications

The risks are affected by why exploration is needed, how soon it occurs after the original operation, and your overall health.

Possible complications include:

Major complications, including death, are possible, particularly when exploration is performed for severe bleeding, infection, or unstable circulation. Your surgeon can explain which risks matter most in your situation without assuming that every listed complication will occur.

- Further bleeding, blood transfusion, or another operation
- Infection of the skin, sternum, or deeper chest tissues
- Delayed bone healing, separation, or ongoing sternal movement
- Injury to the heart, lungs, blood vessels, or surgical grafts
- Irregular heart rhythm, breathing problems, kidney injury, heart attack, or stroke
- Blood clots and complications from anaesthesia
- Need for temporary open-chest management or later reconstruction

Results and follow up

The surgeon usually knows the main findings during the operation. Afterward, you or your chosen contact should be told what was found, what was repaired, and whether the sternum was fully closed.

Blood tests and monitoring show whether bleeding and organ function are improving. Laboratory cultures used to identify bacteria or fungi usually require several days. Those results may lead to a change in antibiotics.

Routine follow-up checks the incision, breastbone stability, breathing, activity level, and recovery from the original chest operation. Staples or sutures may need removal unless dissolving material was used. Keep scheduled appointments even if the wound looks well.

Alternatives

The alternatives depend on the problem and how stable you are.

Careful monitoring, correction of blood-clotting problems, and blood transfusion may control limited bleeding. This avoids another operation but may be unsafe if bleeding continues or blood is compressing the heart.

A needle or catheter can drain some fluid collections around the heart. This is less invasive, but it may not remove thick blood clots or repair the source of bleeding.

Antibiotics and wound care may treat a surface infection. They are usually not enough by themselves when infection extends around the sternum or includes dead tissue.

Negative-pressure wound therapy uses a sealed dressing and gentle suction. It can help control drainage and support healing, but it may be a temporary step rather than a final closure.

Delaying closure gives swelling time to improve and allows further treatment of infection or

bleeding. The trade-off is continued intensive monitoring and another procedure later.

For severe bone loss or repeated wound failure, reconstruction with plates, muscle, or other healthy tissue may provide stronger coverage. It is a more complex operation with a longer recovery.

When to call your healthcare team

For routine questions about dressings, activity limits, medicines, or follow-up dates, contact the surgical team during normal office hours.

Seek urgent advice the same day for:

Call emergency services for severe trouble breathing, fainting, heavy or uncontrolled bleeding, a wound that suddenly opens, or new severe chest pressure. Do not drive yourself in an emergency.

- Fever or chills
- Increasing redness, warmth, swelling, or wound drainage
- Worsening pain after it had begun improving
- New clicking, movement, or separation at the breastbone
- Increasing shortness of breath, palpitations, or leg swelling

Common questions

Will I be asleep?

Yes. Sternal exploration or closure is usually performed under general anaesthesia. If emergency reopening starts in intensive care, sedation and pain relief are given as the situation permits.

Can I drive home?

No. You will remain in hospital after the operation. Once home, wait for clearance from your surgical or cardiac team before driving.

How painful is it?

Pain is common but should be treated. It is often most noticeable during coughing, deep breathing, and getting out of bed. Sudden or increasing pain needs assessment.

When will I know what the surgeon found?

The main findings are known immediately after surgery. Culture results for infection usually take several days.

How is my breastbone held together?

Most sternums are secured with strong wires, cables, or plates. The choice is based on bone quality, infection, previous operations, and the type of repair required.

Could I need another operation?

Possibly. Another procedure may be needed for recurrent bleeding, persistent infection, failure of the bone to heal, or closure after temporary open-chest treatment.

Sources

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