PROCEDURE

Brain surgery

Brain surgery is an operation used to diagnose or treat conditions affecting the brain.

PURPOSE
Diagnose or treat a condition affecting the brain

PROCEDURE TYPE
Diagnostic or therapeutic; open, endoscopic, or minimally invasive surgery

WHERE IT IS DONE
Operating theatre

ANAESTHESIA
General, or local with sedation for selected awake procedures

HOW LONG IT TAKES
About 2-8 hours, with longer times for complex surgery

PREPARATION
Fasting, medication review, blood tests, imaging, and transport planning

RECOVERY
Several hospital days; no driving until your surgical team approves

MAIN RISKS
Bleeding, infection, seizures, stroke, and new neurological problems

RESULTS
Surgical findings immediately; tissue results within days to weeks

Overview

Brain surgery includes operations on the brain or nearby structures. It may involve taking a tissue sample, removing a tumour, stopping bleeding, treating an aneurysm, draining fluid, controlling seizures, or placing a device.

During a craniotomy , the surgeon temporarily removes a section of skull, called a bone flap, to reach the brain. The bone is usually replaced afterward. In a craniectomy , it is left out temporarily to allow room for swelling.

Some operations use smaller openings, an endoscope, or instruments guided by scans. Others reach the pituitary gland through the nose. What happens depends on the condition and surgical approach.

Why the procedure is performed

Brain surgery may be offered to:

The goal may be diagnosis, cure, symptom relief, prevention of further harm, or a combination of these.

- Remove or biopsy a brain tumour
- Drain bleeding, an abscess, or excess fluid
- Repair an aneurysm or abnormal blood vessel
- Reduce pressure on the brain
- Treat epilepsy arising in one defined area
- Place a shunt, electrode, or medicine-delivery device
- Treat certain movement disorders or severe nerve pain
- Repair an injury or skull defect

Who should and should not have it

Brain surgery may be appropriate when tests show that an operation is likely to provide more benefit than harm. Your team considers the condition and its location, your symptoms, general health, and preferences.

Surgery may be avoided or delayed if the area cannot be reached safely, another treatment is similarly effective, or the expected benefit is small. It may also be postponed because of an active infection, uncontrolled bleeding risk, unstable heart or lung disease, or another problem that makes anaesthesia unsafe.

Blood-thinning medicines and some supplements increase bleeding risk but do not always rule out surgery. Your team will decide whether and when to change them. Do not stop prescribed medicine on your own.

How to prepare

Follow your treating facility's instructions because preparation differs between operations.

You may have blood tests, an electrocardiogram, and detailed brain imaging. Tell the team about all medicines, supplements, allergies, previous reactions to anaesthesia, and any chance you could be pregnant.

You will usually need to stop eating and drinking for a set time. Follow your exact fasting instructions.

Ask which medicines to take on the day, especially blood thinners like warfarin or apixaban , diabetes medicines, seizure medicines, and steroids like prednisone or hydrocortisone . Arrange transport and help at home because you cannot drive yourself after surgery.

Your hair may not need to be fully shaved. Often, only a small area is clipped.

What happens during the procedure

Most brain surgery is performed under general anaesthesia, so you are unconscious. For selected procedures, you may be awake for part of the operation with your scalp numbed and sedation to keep you comfortable.

Awake surgery allows the team to test speech, movement, vision, or other functions while working near important brain areas. You will not see the operation.

The surgeon may make a scalp incision and create one or more openings in the skull. Imaging and navigation systems guide the instruments. The surgeon then performs the planned biopsy, removal, repair, drainage, or device placement.

After a craniotomy, the bone flap is usually secured in place and the scalp is closed with stitches or staples. You then go to a recovery area, high-dependency unit, or intensive care unit for monitoring.

Recovery and what to expect afterward

Pain: Headache, scalp soreness, swelling, and tightness around the incision are common. You may receive pain and anti-sickness medicines. Tell your team if pain is worsening rather than improving.

Eating: You may begin with fluids and return to regular food as nausea settles. Some people need a swallowing check first.

Activity: Staff may help you sit, stand, and walk soon after surgery. Increase activity gradually. Avoid heavy lifting, strenuous exercise, swimming, and activities that could cause a head injury until cleared. Rehabilitation may help with changes in strength, balance, speech, or thinking.

Driving: Do not drive home. Restrictions may continue for weeks or longer, especially after seizures or surgery affecting neurological function. Follow your team's advice and local licensing rules.

Work: Return time depends on the operation, symptoms, and type of work. Fatigue and concentration problems can continue during healing.

Risks and possible complications

Risks depend on the brain area involved, the condition, and your health. Possible complications include:

Neurological changes may be temporary or permanent. Further treatment or another operation may be needed. Death is possible, although your personal risk cannot be estimated from general information. Ask your surgeon about the risks of your planned operation.

- Bleeding in or around the brain
- Infection of the wound, skull, or tissues around the brain
- Seizures
- Stroke or reduced blood supply to brain tissue
- Leakage of cerebrospinal fluid, which surrounds the brain
- Blood clots, chest infection, or reactions to anaesthesia
- New problems with movement, speech, memory, vision, balance, or personality

Results and follow up

Your surgeon may explain the immediate findings after the operation. If tissue was removed, a pathologist examines it. Results often take several days or longer when special testing is needed.

Follow-up may include wound checks, removal of staples or stitches, neurological examinations, and repeat scans. Results help determine whether you need rehabilitation, medicine, radiation therapy, chemotherapy, monitoring, or further surgery.

Keep taking prescribed medicines unless your team changes them.

Alternatives

Alternatives depend on why surgery is being considered. Ask what is likely to happen with each option, including no immediate treatment.

Possible alternatives include:

- Active monitoring: Regular scans avoid immediate surgery but may allow the condition to grow or change.
- Medicine: Drugs may control seizures, swelling, pain, or tumour symptoms without removing the underlying problem.
- Radiation therapy or radiosurgery: Focused radiation avoids an incision but works gradually and cannot provide a large tissue sample.
- Endovascular treatment: Some blood-vessel conditions can be treated through a blood vessel, although open surgery may be safer or more effective for some anatomy.
- Needle biopsy: This uses a smaller opening and may provide a diagnosis but does not remove most abnormal tissue.
- Supportive or palliative care: This focuses on comfort and quality of life rather than removing or repairing the condition.

When to call your healthcare team

Contact your surgical team promptly for fever, increasing wound redness, fluid leaking from the wound or nose, worsening headache, repeated vomiting, increasing drowsiness, or uncontrolled pain.

Seek emergency help for:

Questions about tiredness, mild stable discomfort, medicines, activity, work, or routine wound care can usually wait for normal clinic hours.

- A first seizure or a seizure lasting longer than instructed
- Sudden weakness, facial drooping, speech trouble, or loss of vision
- Collapse, severe confusion, or difficulty waking
- Trouble breathing or chest pain
- Heavy wound bleeding or clear fluid leaking continuously

Common questions

Will I be asleep?

Most people receive general anaesthesia. Some operations are performed partly awake so the

team can protect speech, movement, or other functions. Your scalp is numbed and you receive sedation.

Can I drive home?

No. Arrange for someone to take you home. Do not drive again until your team says it is safe and any legal restrictions have been met.

How painful is brain surgery?

The brain itself does not feel pain, but tissues around the skull do. Headache and incision soreness are expected and treated with pain medicine.

When will I know the results?

Your surgeon may discuss the operation soon afterward. Biopsy or tumour results usually take days to weeks.

How long will I stay in hospital?

Many people stay several days. Your stay may be shorter or longer depending on the operation, neurological checks, mobility, and complications.

Will my hair grow back?

Clipped hair usually grows back. The incision may leave a scar, although surrounding hair often covers it.

Sources

- National Health Service. Craniotomy
- Johns Hopkins Medicine. Craniotomy
- Mayo Clinic. Awake brain surgery
- National Cancer Institute. Adult Central Nervous System Tumors Treatment (PDQ), Patient Version
- National Institute for Health and Care Excellence. Brain tumours (primary) and brain metastases in over 16s , guideline NG99
- American Association of Neurological Surgeons. Craniotomy