



Information for patients having an awake craniotomy

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This leaflet provides information for patients and their families about having an awake craniotomy. This leaflet will outline the answers to some frequently asked questions. This information will also supplement consultations with your Neurosurgeon and Anaesthetist.

What is a craniotomy?

A craniotomy is a neurosurgical operation where a trap-door is made in part of the skull to access the underlying brain for surgery.

What is an awake craniotomy?

An awake craniotomy is a type of craniotomy where for part of the procedure, the patient is alert and responsive. Pain relief and sedation are given as required.

Why is it done?

- We undertake awake craniotomies for one of two reasons; either
- to remove or reduce the size of a brain tumour OR
- to remove part of the brain responsible for epilepsy that is resistant to drugs alone

Why do I need to be awake?

An awake craniotomy is useful in cases where the intended surgery is close to areas of the brain with an important function; for example, those responsible for movement, speech or vision. This is because the function of these areas can be accurately tested during your operation in order to reduce the risk of injury. An awake craniotomy may also allow more of the affected brain tissue to be removed.

Who will be responsible for my care?

Your overall care, surgery and treatment plan will be coordinated by a Consultant Neurosurgeon. During the operation, a Consultant Anaesthetist will be responsible for your monitoring, pain relief and safety.

What are the possible risks of having an awake craniotomy?

As with all surgery there are possible risks, and as part of the consent process your Neurosurgeon will discuss these with you in more detail.

For craniotomies these risks can include;

- infection around the wound site or rarely deep in the brain (meningitis)
- fluid leak from the wound site
- bleeding
- brain swelling
- stroke
- seizures
- residual tumour (tumour left behind after surgery)
- recurrence of tumour (tumour re-growth after surgery)
- medical complications – such as a chest or urine infection or a heart attack
- blood clots affecting the legs or lungs
- a very small risk to life

Having the procedure awake significantly reduces the risk of causing a stroke (speech or movement impairment) but does not eliminate it completely. We estimate the risk of a serious complication (stroke, risk to life) to be less than 5%.

Are there any other risks related to having an awake craniotomy?

One specific risk is the occurrence of seizures during the procedure, whilst awake. We have methods to reduce the risk of seizures and to stop them if they were to happen.

Rarely, if you become very uncomfortable during the course of the awake phase or to help complete the operation following a seizure, we may need to restart a general anaesthetic (to send you to sleep again).

What happens before the operation?

At your first neurosurgical consultation, we will discuss the options for treatment as well as risks and benefits, to enable you to make an informed decision about your surgery.

There will also be an opportunity to discuss what will happen during the operation and any treatment required before and after surgery. You will attend a pre-operative anaesthetic assessment, to assess your physical health and fitness for the operation. A visit to the operating theatre before your surgery to see how things will be set up on the day can also be arranged upon request.

We use a combination of clinical tests and scans to determine precisely where key functions are located in the brain, and where it is safest to operate. You may be asked to attend a detailed scan (functional MRI) to assess the location of important areas in the brain, and also a more specialised mapping technique using an advanced transcranial magnetic stimulation machine (NexStim). An assessment by a speech and language therapist may also be required to establish whether and how your speech could be affected by surgery.

What happens during the operation?

Our technique for awake craniotomy involves three phases which are described below.

Phase 1 – asleep phase (general anaesthetic)

From the ward or the admissions lounge, you will come to the anaesthetic room where you will see the Anaesthetist and their team. A small needle is used to insert a cannula (a thin plastic tube) on your hand or forearm and some routine monitors are attached. The anaesthetic drugs can be given through the cannula and you will then go to sleep.

Once you are asleep, a urinary catheter is used for your convenience, so that we can measure urine output during and after the operation.

To allow adequate exposure of the surgical area, a section of your hair on your scalp will need to be removed once you are asleep. In preparation for the awake part of the surgery, the Anaesthetist will administer long acting local anaesthetic injections all around the scalp including the operating site so that it is numbed. While asleep, you will also be moved from the anaesthetic room into the operating theatre, where we will ensure that you are positioned comfortably. The head is secured in a frame so that it cannot move at all during the operation. The surgery then begins with an incision (cut) on the scalp, in order to allow a disc of bone to be lifted to access the underlying brain.

Phase 2 – awake phase

Our priority is for you to be as comfortable as possible throughout this phase and with this in mind, we administer a sedative (calming) painkiller through your cannula that can be adjusted as required. The local anaesthetic injections to the scalp will also have taken full effect by this stage. The sedation is started and the general anaesthetic is withdrawn so that you will gradually regain consciousness. When you are comfortable, alert and cooperative the surgery can continue. You will be reminded that your head is secured in a frame so you will not be able to move it at all and you will not be able to see the surgery going on behind you. You will be able to see and talk to the theatre team throughout this phase. You will be asked to complete some simple tasks to assess your movement, speech and vision which help the surgeon to more accurately identify important areas of the brain. These tasks may include; reading, counting to ten and back, moving your hand, identifying colours and shapes and confirming personal details. During the operation, these important tasks will be continuously assessed to ensure that we identify the margin between tissue that needs to be removed and critical structures that need to be preserved.



A: This photo shows a patient under general anaesthetic, with preparations being made to inject local anaesthetic in several places around the scalp. Together with tailored sedation, the local anaesthetic injections provide excellent pain relief during the awake phase.



B: The awake phase during which the patient is alert and responsive.



C: During the awake phase, you may be asked to complete simple tasks such as raising your hand.



D: Surgery in progress during the awake phase with a patient who is comfortable and alert. A member of theatre staff will be available throughout the operation to provide reassurance and support (see front cover photo).

Phase 3 – wound closure

When the operation is complete, the bone is put back into place and the various layers covering the brain and the scalp will be closed again. You will remain awake for this phase but sedation can be provided if requested.

Can an awake craniotomy be painful?

Most awake craniotomy patients are comfortable during the operation and we do our utmost to ensure you are pain free throughout.

However, some discomfort can be felt and should this happen, please let us know so that we can adjust the sedation and provide painkillers as necessary.

What happens after the operation?

When you feel able, you can eat, drink and move. You will be looked after in a neurosurgical ward and monitored very closely. Towards the end of surgery, we give painkillers and anti-sickness medicines. You may feel some discomfort and/or nausea in the period after the surgery as the drugs begin to wear off. Please do ask the nurses for more painkillers and anti-sickness medicines if you need them.

Further tests of your speech, language and movement, similar to those done during the operation may be required when you are back on the ward. You will be reviewed by the neurosurgical team after the operation to explain the details of your surgery and to answer any questions you may have. Samples of brain tissue (biopsies) taken during the surgery will be sent for analysis and, in time you will be advised as to any further treatment that may be necessary.

During your inpatient stay, a further scan (CT or MRI) will be undertaken to see how much of the affected brain tissue has been removed and to ensure no other complications have occurred. If the scan is satisfactory and you are well enough, we aim to discharge you home 24–48 hours after your operation.

What happens after I am discharged?

You may experience tiredness and minor head pains around your wound for the first few weeks after the operation, and this should settle down over time. We will routinely invite you to attend clinic 1–2 weeks after your operation to see how you are, to discuss the results of any biopsies (usually available by this stage) and to check your wound. Your stitches or staples will typically be removed by your GP practice nurse seven days after your operation.

What if I have any concerns after going home?

You must tell your GP or Clinical Nurse Specialist if you have any concerns after the operation, in particular if you notice any of the following symptoms;

- discharge from the wound (clear fluid or pus)
- wound swelling
- temperature/fever
- seizures
- new symptoms of weakness in the limbs
- worsening headaches or drowsiness

Contact information

Your Neurosurgeon is: Mr

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