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## Neuro-Oncology Service

# Living with a brain tumour: Undergoing neurosurgery

### Neurosurgery explained

This leaflet explains what a brain tumour is and details some common types of neurosurgery undertaken at Addenbrooke's Hospital for people diagnosed with a brain tumour.

Your neurosurgeon and key-worker will discuss the most suitable form of surgery for you based on your tumour size/location, your particular symptoms and current health situation.

### What is a brain tumour?

A brain tumour is a collective name for an abnormal or excessive growth of cells found in the brain. An excessive growth of normal brain cells are collectively referred to as **benign tumours**, whereas excessive growth of abnormal brain cells are known as **malignant tumours**. There are many different types of brain tumours, both benign (non-cancerous) and malignant (cancerous).

### What is a primary or secondary brain tumour?

Some people have a **primary brain tumour**. These types of tumours develop and arise from the brain cells themselves. This means they usually stay within the brain and generally do not spread to other parts of your body. Many primary brain tumours are benign, but there are also many that are malignant in nature.

**Secondary brain tumours** are sometimes also known as **metastasis**. These tumours occur when cancer cells from other parts of the body spread into the brain. Most metastasis to the brain are cancerous tumours. As part of your ongoing investigations, you may have had a scan of your chest, abdomen and pelvis area. This is to see if there is evidence of active disease in other parts of your body. A common example of a brain metastasis could be from a primary lung, or perhaps bowel cancer.

### What kind of brain tumour do I have?

A diagnosis of a brain tumour can usually be made radiologically. This means undertaking a brain scan (either CT or MRI). This is generally undertaken at your local hospital.

Your scan is then viewed by a neurosurgeon as well as other brain specialists. Your neurosurgeon will then see you in order to discuss the results of the scan and the best way to treat your tumour.

There are however, over 120 different types of brain tumours. Therefore the only way to diagnose the exact type of tumour you have is to remove a sample of your tumour as part of a surgical procedure, and examine it under a microscope. We need to establish the type of tumour you have so that we can plan for further treatment, if this is required.

This leaflet explains the various surgical treatments we have to offer. The option most suited for you will be discussed directly with you and your family/carer. This mainly depends on the size/location of your tumour and your overall health.

## Pre-admission clinics

Once you've had your first outpatient clinic consultation with your neurosurgeon, you should have a clearer picture about what form of neurosurgery is most suitable for you.

To help facilitate your surgery admission, you may need to have tests including blood tests, echocardiogram (a tracing of your heart rhythm) and a chest x-ray amongst other things undertaken in order to ensure you are well enough to undergo surgery.

We try and get as many of these tests done in a clinic setting before your admission in order to minimise any delays to your surgery date and subsequent discharge and follow-on care (if required). This is often referred to as a **pre-admission clinic**.

Please bring a list of all your current medication with you to this clinic and inform us if you are taking any blood thinning agents such as Aspirin or Warfarin.

You will be responsible for your own transport arrangements to and from this clinic, as well as for your surgical admission. If you do not have any friends / family that can bring you in, and if you are unable to use public transport, you must arrange transport via your GP. You are not allowed to drive unless you have been told otherwise by your neurosurgeon.

We only arrange pre-admission clinics if you are deemed well enough to attend as an outpatient. If you are an inpatient in another hospital awaiting your surgery with us, we will arrange all tests between ourselves and your transfer across to us.

## On admission to Addenbrooke's Hospital

Patients are usually admitted as close to their surgery date as possible. This is usually the day before or sometimes even the morning of your planned surgery. You are responsible for arranging transport for your admission and again home from hospital. Please inform us at your earliest opportunity if this is a problem.

On admission you will be assessed by a doctor and a ward nurse. You will also meet the anaesthetist who will ask you questions regarding your general health, allergies, previous operations and past reactions to any drugs (if applicable). You will have the opportunity to ask any questions you may have about the anaesthetic.

Any further imaging required (such as an MRI scan) will also have been arranged for your admission date, if this was not undertaken during your pre-admission clinic. You will be kept fasted for at least 6 hours of food and drink prior to your operation. However, you must take all of your prescribed medication as per normal, even on the day of surgery. If you are diabetic you will be kept on an insulin chart and monitored closely.

## **What is a stealth scan?**

This is a very detailed scan often used by neurosurgeons to help pinpoint the precise location of your tumour. It will help avoid disturbing other parts of your brain that remain unaffected by your tumour.

The information from this scan is entered into a computer once you are in theatres. You will most likely be asleep at this stage (unless you are having an awake procedure – see below). You will have your head secured in a frame to prevent it from moving during the operation.

This frame has focus points (also known as fiducials) on it which are 'seen' by the computer. Together with your scan results, they generate an exact, three-dimensional (3D) image of your head and brain, including your tumour. It will help the surgeon find the best way to access your tumour safely.

Most patients undergoing neurosurgery for a brain tumour will either have a stealth MRI or stealth CT as part of their assessment.

## **What is a functional MRI scan?**

Sometimes your tumour may be close to an area of the brain that is important in controlling your ability to move your arms and legs. It may also be close to the part of your brain that controls your speech and understanding of language. This part of your brain is referred to as your 'motor strip'. A functional MRI enables your surgeon to see how close your tumour is to your motor strip.

During the scanning procedure, you will be asked to move your arms or legs, or to say certain things. The scan done during this time will produce an instant colour chart of your brain, mapping the areas used. It pinpoints the location of your motor strip as sometimes these areas differ slightly from person to person. Don't worry if you find the tasks difficult, it is the act of trying to do them that is important.

## What is a craniotomy?

A craniotomy is where the surgeon makes an incision in your scalp (skin) before temporarily removing a small piece of your skull-bone in order to expose your brain. This temporary removal of your skull-bone is known as a craniotomy. It is sometimes referred to as a bone-flap. This operation is usually done under general anaesthetic, unless you are having an awake craniotomy (see below). In most cases, a craniotomy needs to be performed in order to gain access your brain tumour.

The size and shape of the opening will depend upon the size and position of your tumour. Where possible an incision will be made behind the hairline so that the scar is hidden when the hair grows back. Once you are asleep the area around this craniotomy site will be shaved. The surgeon will do their best to minimise how much hair is shaved.

After the surgery, the bone piece is replaced and fixed back in place with bio-plates. There is no chance of the bone coming out once it has been secured. The scalp incision is closed with sutures and a wound dressing applied.

## What is an awake craniotomy?

This procedure is carried out much like the above craniotomy but with you, the patient, being awake for all or part of the operation. You will only have an awake craniotomy if your tumour is in, or near, the vital parts of your brain that control your speech, language or movements.

This option will be discussed directly with you and your family/carer if applicable. You will also be given our separate patient information leaflet entitled 'Awake craniotomy'. This contains more in depth information about this procedure.

## Excision/debulking (resection) surgery

During an **excision** procedure the surgeon performs a craniotomy and then removes the tumour in its entirety before replacing the bone-flap and closing the surgical wound with sutures. This type of surgery is mainly done if the tumour has well defined margins and is easy to remove.

Sometimes it is not safe for the surgeon to remove your tumour in its entirety. This depends on the size and location of your tumour, and if it has poorly defined margins. This makes a complete removal of your tumour much more difficult. This procedure is referred to as a **partial resection** or **debulking** procedure.

We aim to debulk as much of the tumour mass as is safe. Typically, around 90% of the tumour mass is debulked.

Sometimes surgery is all you will require in terms of treatment. Where benign tumours are concerned, surgery may even be a curative process.

On other occasions, tumour excision or debulking is done to help reduce the overall tumour mass (burden). This will allow other treatments such as radiotherapy and/or chemotherapy, to work better. All these options will be discussed with you if applicable.

## 5-ALA guided resection

In some cases your consultant may feel that a more complete removal of your tumour could be achieved using a substance called Gliolan® (5-ALA). 5-ALA is drug that can help identify the edge of the tumour. It is diluted in normal water and drunk between three and five hours before the operation.

5-ALA goes into the tumour cells of the brain but not the normal brain tissue. In the tumour it is converted to a substance that glows pink when exposed to blue light. During the operation the surgeon will use a blue light filter on the surgical microscope. This helps identify remaining tumour cells which can then be removed. Your neurosurgeon and key worker will discuss this option with you if applicable.

## Carmustine wafers

Carmustine implants are small discs the size of a five pence coin that contain a type of chemotherapy called **Carmustine**. They are given to people with a particular type of malignant (cancerous) brain tumour called a high grade glioma.

The discs are inserted into the brain during brain tumour surgery. The aim is to kill any remaining tumour cells. This method gets chemotherapy straight to any cancer cells left behind. It means we can use much smaller doses of chemotherapy than we would if we were injecting chemotherapy into your vein.

Carmustine can only be given on confirmation of a high grade glioma and if at least 90% of the tumour can be removed. We will not know this for certain until surgery is underway. Therefore, it is only when you wake up after the operation that we can say whether or not we have been able to put in the Carmustine implants.

Your surgeon and key worker will discuss this option directly with you if you are deemed suitable for this procedure. If you have been administered Carmustine wafers intra-operatively, please refer to our separate patient information leaflet which you will have been given, entitled: *Carmustine chemotherapy wafers (Gliadel)*

## What does a biopsy involve?

A biopsy is the removal of a sample of tissue. This tissue is examined under a microscope and enables a diagnosis to be made.

A biopsy is only ever carried out if an resection or debulking procedure is not possible, but a diagnosis is still required. This will help to plan any further treatment that may be needed, such as radiotherapy or chemotherapy.

During a **closed biopsy** procedure, a small hole (called a burr hole) is made in the skull. A sample of tissue is obtained by passing a needle through this hole and into the tumour. The skin over the wound is stitched and the bone grows back over the small hole in the skull in a few months.

A craniotomy and biopsy may also be referred to as an **open biopsy**. A craniotomy is performed (see above) before several large samples of the tumour are taken.

## How long will my operation take?

This depends entirely on the size/location of your tumour and the type of operation you have had. In most cases you will be gone from the ward for several hours. We are not allowed to ring theatres to find out how your operation is progressing as this may disrupt the surgery. The phone lines need to be kept free for operating staff.

Your anaesthetic procedure (where your anaesthetist puts you to sleep) takes around an hour. This is done in the anaesthetic room next door to the operating suite. During this part of your surgery they also insert most of the blood lines and monitoring equipment (such as a urine catheter) that will be required during the operation.

On average, a craniotomy and resection/debulking procedure takes around four to six hours. This is in addition to your anaesthetic procedure. A biopsy will take around two to three hours in addition to the anaesthetic procedure. All in all you may be away from the ward for around six hours, sometimes more.

## Waking up after surgery

You will wake up in/be taken to the recovery suite of the operating theatre as soon as surgery is over. Visitors are not allowed in this area. You will be recovered there until your sedation has worn off and you are awake enough to return to a ward.

Depending upon your procedure, the underlying condition and any possible complications during or after your operation, you will be transferred back to either a ward, our High Dependency Unit (HDU) or our Critical Care Unit (NCCU) for a period of time.

## Discharge and follow-up with results

Once you have recovered from your procedure you will be discharged home or transferred back to your local hospital. Providing your surgery has been straight forward we anticipate you will be able to go home in a matter of days.

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Please read our other patient information leaflet entitled: Living with a brain tumour – discharge advice / follow up.

The biopsy or a sample of your tumour will be sent to a **histopathologist**. This is a doctor who specialises in examining cells. The tests take seven to ten working days. The results tell us two things: first, the type of cells that make up your tumour and second, how these cells are behaving (such as how quickly they are dividing and whether they are a threat to normal cells).

We recognise that this is a very stressful time. As soon as the results are known you will be invited to the next available outpatient appointment. **We do not give results over the telephone.** To minimise delays we will contact you by telephone and invite you to the next available clinic.

We are a part of a region-wide team who treat brain tumours. This means that you get the best care possible. By the time we see you in clinic the team will have discussed your results and either your surgeon or your key worker will discuss the team's recommendations with you. It is not always easy to remember everything so it is a good idea to bring someone with you. You may also find it useful to bring a note pad and pen with you to make notes.

## Contact details

Please do not hesitate to contact any of the numbers below, during office hours, if you have any questions or concerns regarding any aspect of your neurosurgical care. We are here to help.

- **Neuro Oncology Specialist Nurse** (direct dial with answering machine): 01223 256246 or via Addenbrooke's contact centre 01223 245151 via bleep 154-506
- **Clinical Nurse Practitioner**: 01223 216127 or via Addenbrooke's contact centre 01223 245151 via bleep 152-090
- **Team Secretary** (direct dial with answering machine): 01223 216780



We are currently working towards a smoke free site. Smoking is only permitted in the designated smoking areas.

For advice and support in quitting, contact your GP or the free NHS stop smoking helpline on 0800 169 0 169

## Help with this leaflet:



If you would like this information in another language, large print or audio format, please ask the department to contact Patient Information: 01223 216032 or

[patient.information@addenbrookes.nhs.uk](mailto:patient.information@addenbrookes.nhs.uk)



## Document history

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