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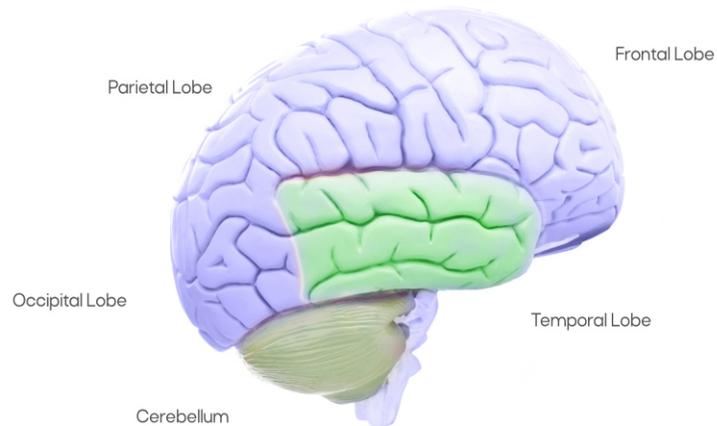
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Understanding Brain Tumour



Understanding the Brain

The main parts of the brain include:

The cerebrum: This is divided into the right side (right hemisphere) which controls the left side of the body, and the left hemisphere which controls the right side of the body. Each hemisphere is divided into various sub-sections, the main divisions being the frontal lobe, temporal lobe, parietal lobe and occipital lobe. The cerebrum is also where you think and store your memory.

The cerebellum: This lies behind and below the cerebrum. One of its main functions is to help control balance and coordination.

The brain stem: This helps to control basic bodily functions such as the heartbeat, breathing and blood pressure. Nerves from the cerebrum also pass through the brainstem to the spinal cord.

The meninges: These are thin layers of tissue which separate the skull from the brain. The outer layer next to the skull is called the dura. The next layer is called the arachnoid. Under the arachnoid tissue is the Cerebrospinal Fluid (CSF) which bathes the brain and spinal cord.

The pituitary gland: This releases various hormones into the bloodstream.



The main type of cell in the brain is called neuron. There are millions of Neurons in the brain. Neurons have long thin nerve fibres which enable them to send messages to other parts of the brain and down the spinal cord to all parts of the body. The brain also contains glial cells. These provide support, nourishment and protection for neurons. There are various types of glial cells, including astrocytes, oligodendrocytes and ependymal cells.

What causes Brain Tumour?

The cause of most non-cancerous (benign) brain tumours and primary cancerous (malignant) brain tumours is not known.

Genetic factors may be a risk for some people - perhaps in about 1 in 20 cases. For example, people with hereditary diseases such as, neurofibromatosis type 1, turcot's syndrome, Li-Fraumeni cancer syndrome, and tuberous sclerosis have a higher-than-average risk of developing glioma.

When people with these diseases develop glioma, it tends to occur in childhood or early adult life. However, these cases are only a small proportion of all glioma tumours.



Different types of Brain Tumour

There are many types of non-cancerous (benign) brain tumours and primary cancerous (malignant) brain tumours. Most common types of brain tumours are:

Meningioma

Meningiomas are usually benign. They grow from cells in the tissues that surround the brain (the meninges).

Medulloblastoma

These are high-grade malignant tumours that grow in the cerebellum. They are uncommon in adults but are one of the two most common brain tumours in children. The other most common tumour in cerebellum is astrocytoma in the cerebellum.

Gliomas

These are malignant primary brain tumours that arise from glial cells. There are various types, depending on the cell of origin - for example:

- Astrocytomas (originating from astrocyte cells.) There are various types of astrocytoma:
 - Low-grade astrocytomas

- Anaplastic astrocytoma. This is a high-grade tumour
- Glioblastoma multiforme. This is a high-grade tumour which tends to grow quite quickly. It is the most common type of primary malignant brain tumour in adults
- Oligodendrogliomas (originating from oligodendrocytes). These can vary in their grade
- Ependymoma (originating from ependymal cells). These are rare but are usually low-grade

Primitive Neuroectodermal Tumours (PNETs)

These are very similar to medulloblastomas and mainly occur in children.

Pituitary Tumours

There are various types of tumour which arise from the different cells in the pituitary gland. They tend to be benign. However, the cells of the tumour may produce large number of hormones which can cause various symptoms. As they grow, they may also cause pressure symptoms. The nerves of sight (optic nerves) are near to the pituitary gland and so a growing pituitary gland tumour may press on an optic nerve and affect the vision.



Acoustic Neuroma

An acoustic neuroma (schwannoma) is a benign tumour which arises from Schwann cells which cover the nerve that goes to the ear. Symptoms can include deafness of the affected side and dizziness with a spinning sensation (vertigo).

Others

There are various other rare types of benign and primary malignant brain tumours.

How common are Brain Tumours?

Non-cancerous (benign) brain tumours and cancerous (malignant) primary brain tumours are uncommon. Overall, they occur in about 12 in 100,000 people each year.

The most common types in adults are benign meningioma and a glioma called Glioblastoma Multiforme. Some types are very rare.

Brain tumours can occur at any age. Some types (such as medulloblastoma) are more common in children and some are more common in adults. Generally, the tumours that tend to occur in adults become more common with ageing.

Secondary (metastatic) brain tumours are more common than benign brain tumours and malignant primary brain tumours.

What are the symptoms of a Brain Tumour?

General symptoms

Early symptoms may include headaches and generally feeling sick. These are due to increased pressure within the skull (raised intracranial pressure). These symptoms may come and go at first and tend to be worse during morning hours.

Coughing, sneezing and stooping may make the headaches worse. Patient might experience epileptic seizures sometimes due to increasing drowsiness as the tumour enlarges.

Symptoms due to the location in the Brain

As a tumour grows it can damage the nearby brain tissues. The function of various parts of the body are controlled by different parts of the brain. Therefore, the symptoms vary from case to case, depending on which part of the brain is affected and the size of the affected area. For example, one or more of the following may develop:

- Weakness of muscles in an arm, leg, part of the face, or eyes.
- Problems with balance, coordination, vision, hearing, speech, communication or swallowing.



- Loss of smell
- Dizziness or unsteadiness
- Numbness or weakness in a part of the body
- Confusion
- Personality changes
- Symptoms related to hormonal changes if you have a pituitary tumour

These symptoms tend to develop gradually

How are Brain Tumours diagnosed and assessed?

A doctor will examine you if a brain tumour is suspected from the symptoms. This will include checking on the functions of the brain and nerves (movements, reflexes, vision, etc).

A Magnetic Resonance Imaging (MRI) scan or Computerised Tomography (CT) scan of the head is the common test done to confirm or rule out the presence of a brain tumour. If a tumour is identified, further more detailed scans and tests may be done. For example, a PET scan or a cerebral angiogram are sometimes done to obtain more information about the tumour.



A small tissue sample (a biopsy) may be needed to be sure of the type of tumour. The sample is then examined under the microscope to look for abnormal cells. To obtain a biopsy from a brain tumour you need to have a small operation, usually done under anaesthetic. A small hole is bored in the skull to allow a fine needle through to obtain a small sample of tissue. By examining the cells obtained by the biopsy, the exact type of tumour can be identified. If it is cancerous (malignant), the tumour grade can be determined.

Blood tests, including specialist molecular markers for some types of tumour, and additional tests on other parts of the body may be done if the tumour is thought to be a secondary (metastatic) tumour. For example, it is quite common for a lung cancer to spread to the brain. Therefore, a chest X-ray may be done if this is suspected. Various hormone tests may be done if a pituitary gland tumour is suspected.

What are the treatments for Brain Tumours?

Once you are diagnosed with a brain tumour, the main recommended treatments are: surgery, chemotherapy, radiotherapy and medication to control symptoms such as seizures. For some types of tumours, for example if the risks of surgery are very high, and/or the tumour is thought to be very slow-growing, the initial treatment might be 'active monitoring' where no surgery or other treatment is done but scans are regularly repeated to look for growth.



The pros and cons of active monitoring versus treatment would always be discussed with the patient, and the decision would be made by both the patient and the doctors together. The treatment or combination of treatments advised in each case depends on various factors - for example:

- The type of brain tumour.
- The grade of the tumour, if it is cancerous (malignant).
- The exact site of the tumour.
- Your general health.

Surgery

Your specialist will advise on whether surgery is a possible option for treatment of brain tumour. Surgery always carries a risk as healthy brain, nerves or blood vessels can be damaged. Surgery is often the main treatment for non-cancerous (benign) brain tumours and primary cancerous (malignant) tumours. The aim of surgery is to remove the tumour (or even some part of the tumour) whilst ensuring minimal damage to normal brain tissue.

Radiotherapy

Radiotherapy is a treatment which uses high-energy beams of radiation focused on cancerous tissue. This kills cancer cells or stops them from multiplying.

Radiotherapy is sometimes used instead of surgery when an operation is not possible for a malignant brain tumour. Sometimes it is used in addition to surgery if it is not possible to remove all the tumour with surgery or to kill cancerous cells which may be left behind following surgery.

Chemotherapy

Chemotherapy is a treatment which uses anti-cancer medicines to kill cancer cells, or to stop them from multiplying. It may be used in addition to other treatments such as surgery or radiotherapy; again, depending on various factors such as the type of tumour.

Medication to control symptoms

If you have seizures caused by the tumour then anticonvulsant medication will usually control the seizures. Painkillers may be needed to ease any headaches. Steroid medication is also commonly used to reduce inflammation around a brain tumour. This reduces the pressure inside the skull, which helps to ease headaches and other pressure symptoms.

You should have a full discussion with a specialist who knows your case. They will be able to share the pros and cons, likely success rate, possible side-effects and other details about various treatment options for your type of brain tumour.

Aim of treatment

You should also discuss with your specialist, the objective of your treatment. For example:

- In some cases, treatment aims for a cure. If a benign tumour can be removed by surgery, then a cure is likely. The chance of a cure for malignant tumours varies, depending on the type of tumour, grade and other factors such as the location in the brain.
- In some cases, treatment aims to control the cancer. If a cure is not realistic, with treatment it may be possible to limit the growth or spread of the cancer so that it progresses less rapidly. This may keep you free of symptoms for some time.
- In some cases, treatment aims to ease symptoms (palliative treatment). For example, if a cancer is advanced then you may require painkillers or other treatments to help keep you free of pain or other symptoms. Some treatments may be used to reduce the size of a cancer, which may ease symptoms such as pain.