Brain tumours are usually identified from a Computed Tomography (CT) or Magnetic Resonance Imaging (MRI) brain scan. When people present with a new diagnosis of a brain tumour, a neurosurgeon typically starts with questions about the reason why the CT or MRI scan was performed in the first place. Sometimes, a scan may have been done for reasons that are unrelated to the tumour that is identified, such as a minor head injury. More commonly, symptoms like a seizure, severe headaches or complaints concerning loss of neurological function (e.g. speech or motor function), often in combination with evidence of an abnormality during a neurological examination, will have led to the CT or MRI scan. This information (the history of symptoms, the neurological exam and the scan) provides the background essential to help guide potential further testing, treatment options and timelines for possible surgery.

Physicians from surgical, medical and radiation neuro-oncology can then collaborate with each other on a daily basis to ensure treatments plans are comprehensive for every patient.

CT and MRI have revolutionized the identification and treatment of patients with brain tumours, which essentially provide the equivalent of brain pictures. Even more significant is the ability of the CT and MRI scan to not just identify that a brain tumour exists, but to establish the location and size of the mass and frequently identify the specific type of tumour.

It’s important to remember that MRI has only been available for regular patient care in the last 25 years. While a definitive diagnosis of the type of brain tumour typically requires the microscopic evaluation of a sample of the brain tumour, MRI advancements have significantly improved our ability to predict the suspected tumour type and to determine the brain anatomy and functions affected by the tumour. Although years from clinical use, research into the possible use of MRI and nanotechnology in combination will likely reach a point where a specific diagnosis and a molecular profile of a brain tumour will be determined without a surgical biopsy.

What then is the role for surgery when a person has a new diagnosis of a brain tumour?
As brain imaging has become more widely used, neuro-oncologists have worked to better understand what happens to treated and untreated patients with suspected low-grade (slow-growing) tumours to determine what the best options are. There will be times when a neurosurgeon will recommend against immediate surgery in favour of...
what is referred to as ‘surveillance imaging.’ This non-surgical approach is undertaken when the tumour type is obvious and when the natural history (our understanding of how the tumour ‘behaves’) is expected to be favourable. In other words, surgery may not be the ideal first choice for some patients with a brain tumour.

However, for some patients, surgery may be recommended to:

- Provide a definite pathological diagnosis
- Provide relief from the ‘mass effect’ produced by the tumour (relieve compression on nearby brain structures and reduce high brain pressure)
- Provide relief from tumour hormone production (e.g. certain pituitary tumours)
- Provide a surgical ‘cure’ if possible (applicable only for certain tumours)
- Remove as much of a tumour as possible to optimize further treatment with radiation and/or chemotherapy

The safety and outcomes associated with surgical treatment for a patient with a brain tumour have improved significantly over the past 20 years. Some of the enhancements in surgical care that have permitted these better patient outcomes include:

- Improvements in MRI and the ability to use this information to plan surgical approaches with precision, or repeat an MRI during an operation
- Improvements in microsurgical techniques, endoscopic and keyhole surgery to minimize surgical trauma
- Improvements in neuro-anesthesia to enhance safety and provide improved brain protection during an operation
- Improved ability to do awake operations when it is necessary to have precise identification of vital brain structures responsible for functions, such as speech or limb movement, so that they can be preserved during surgery

Finally, while surgical care for patients with a brain tumour has improved significantly during the past two decades, substantial advancements have also been made in non-surgical treatment: chemotherapy and radiation therapy. Research into new diagnostic and treatment methods is very active and we should anticipate important developments during the next 10 years to further improve outcomes for people with brain tumours.

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