Intracranial tumor surgery

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Intracranial tumor surgery, also known as neurosurgery or brain surgery, involves various techniques depending on the type, size, and location of the tumor. Here's an overview of some common techniques used:

Craniotomy: This is the most common approach for accessing brain tumors. It involves making an incision in the scalp and then removing a portion of the skull to access the brain. The neurosurgeon then carefully removes the tumor while minimizing damage to surrounding healthy brain tissue. Once the tumor is removed, the piece of skull is typically replaced and secured with plates and screws.

Image-Guided Surgery (IGS): This technique uses advanced imaging technology, such as MRI or CT scans, to create a detailed map of the brain and the tumor's location. This allows surgeons to precisely plan the surgical approach and navigate within the brain during the procedure, improving accuracy and minimizing damage to healthy tissue.

Endoscopic Surgery: In some cases, particularly for tumors located in deep or difficult-to-reach areas of the brain, endoscopic surgery may be used. This involves inserting a thin, flexible tube with a camera and surgical instruments through a small incision in the skull or through the nasal passage. The camera provides a live video feed, allowing the surgeon to visualize and remove the tumor with minimal disruption to surrounding tissue.

Stereotactic Radiosurgery: This technique uses highly focused radiation beams to target and destroy tumors without the need for traditional surgery. It is often used for small tumors or tumors located in areas of the brain that are difficult to access with conventional surgical techniques. Common types of stereotactic radiosurgery include Gamma Knife and CyberKnife.

Awake Craniotomy: In some cases, particularly when the tumor is located near critical areas of the brain that control speech or movement, an awake craniotomy may be performed. This involves keeping the patient awake during part of the surgery so that the surgeon can monitor brain function in real-time and avoid damaging important areas of the brain.

Neuroendoscopy: This technique involves using an endoscope to access and remove tumors located within the ventricles (fluid-filled spaces) of the brain or within the spinal cord. It is less invasive than traditional open surgery and can often lead to faster recovery times.

Intraoperative MRI (iMRI): Some advanced surgical centers have intraoperative MRI technology, which allows surgeons to take real-time MRI scans during the surgery. This helps them assess the extent of tumor removal and make any necessary adjustments to ensure complete resection while minimizing damage to surrounding brain tissue.

These are just a few examples of the techniques used in intracranial tumor surgery. The specific approach chosen will depend on factors such as the tumor's size, location, and characteristics, as well as the patient's overall health and individual circumstances.

Neurosurgical planning appears to be the fundamental pillar when preparing for any neurooncology intervention [1)]

Neurosurgical procedures in neurooncology require the neurosurgeon to carry out a detailed and individualized study of the preoperative images of each case. Historically, this analysis has been referred to as neurosurgical planning and has been performed by studying a stack of two-dimensional images. Continuous development and technological advances have allowed this stack of images to become a combination of different three-dimensional structures, making their analysis more intuitive.

The original protocol of González-López et al allows for the implementation of all these three-dimensional objects in a virtual reality space where they can be modified (changes in size, position, transparency, perspective, etc.) so that neurosurgeons can study each case individually and from a much more immersive perspective to develop much safer neurosurgical plans. In addition, these objects can be printed, forming an exact replica of the anatomical structures of the patient to be operated on so that the surgical team can perform an advanced simulation before the actual surgery. Further studies will be needed to assess the usefulness and accuracy of these technologies [2)].

Brain tumor surgery

see Brain tumor surgery.

Pediatric intracranial tumor surgery

Pediatric intracranial tumor surgery

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2)
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