Skull base tumor surgery

The contemporary surgical management of skull base tumors offers satisfactory surgical results and good to excellent clinical outcomes. Modern microsurgical techniques, diagnostic imaging, intraoperative neuronavigation, and endoscopic technology have remarkably changed the concept of skull base surgery. These refinements have extended the boundaries of tumor resection and obviated the need for adjuvant therapies in some patients with benign tumors. In some cases, the main goal of skull base surgery is not the complete removal of the lesion, but the improvement of quality of life and the prolongation of the disease-free survival time. For patients with skull base malignancies, a multidisciplinary approach is mandatory to plan treatments that incorporate surgery, radiation, and chemotherapy to maximize the patients' outcomes [1)].

Meningiomas, schwannomas, and pituitary neuroendocrine tumors are typically benign tumors of intracranial origin, but all of these tumors have a border with the surrounding tissue. The basic structure is a clear "boundary" between the tumor and its surroundings, with a thin membrane layer to create that separation. This layer of membrane is the boundary between the tumor and its surroundings and provides a space for the tumor to grow its cells, and can be viewed as the so-called "tumor capsule". Based on the relationship between the membrane structure of the tumor capsule and the surrounding normal tissues, Watanabe and Murayama performed surgery to reduce surgical complications. They histologically evaluated three types of tumor capsules (meningioma, schwannoma, and pituitary neuroendocrine tumor) and compared the membrane structure of each tumor with that seen in clinical surgery [2)].

One of the main challenges during skull base tumor surgery is identifying the relationships between the lesion and the principal intracranial vessels.

Intraoperative navigated B-mode ultrasonography (ioUS) is useful in defining the extent of brain tumor.

Doppler imaging adds information about flow entity in neighboring vessels. Second generation ultrasound contrast agents improve the signal noise ratio of B-mode imaging and permits study of vessels course, blood flow and perfusion characteristics of focal lesions.

Pituitary tumors. The pituitary gland sits behind the nose and eyes.

Meningiomas. These tumors are often benign and grow from the meninges, the tissue that covers the brain and lies between the brain and skull.

Chordomas. This is a slow-growing bone tumor most often found at the base of the skull.

Navigated angiosonography can be applied to skull base tumor surgery, providing helpful information about the relationship between principal intracranial vessels and tumors. This technique could be of help approaching the tumor and avoiding vascular damages [3)].

Monitoring

Intraoperative neurophysiological monitoring for Skull base tumor surgery.

1)
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