Skull base surgery

The skull base is an important and challenging area for surgeons. Success in skull base surgery depends on various factors such as pre-operative evaluation, appropriate surgical technique, anesthesia duration, intraoperative neurophysiological monitoring and wound care.

Surgery done to remove both benign and cancerous growths, and abnormalities on the skull base, or the top few vertebrae of the spinal column.

It is a subspecialty encompassing multiple specialties (neurosurgery, otolaryngology, maxillofacial surgery, and plastic surgery). A variety of external approaches have been described that access the anterior, lateral, and posterior cranial base from multiple transcranial and transfacial directions.

Facts about skull base surgery

These are some of the growths and conditions that may be treated by skull base surgery:

Cysts that develop from birth.

Growths caused by infections.

see Skull base tumor surgery

Trigeminal neuralgia.

Craniopharyngiomas.

Craniosynostosis.

Cerebrospinal fluid fistulas.

Intracranial aneurysm.

Arteriovenous malformations.

Types of skull base surgery

Numerous minimally invasive approaches to the skull base have been successively developed. Knowledge of the surgical nuances of a specific approach may facilitate approach selection.

Skull base surgery can be done in two main ways. Although the preferred method is endoscopic, open surgery is also an option, depending on the type of growth that needs to be removed and its location:

Endoscopic or minimally-invasive skull base surgery. This type of surgery usually does not require a large incision. An ENT surgeon may make a small opening inside the nose to allow a neurosurgeon to remove a growth through a thin lighted tube called an endoscope. An MRI is a type of picture taken of

the skull base using magnets and a computer and may be done by a radiology specialist while the surgical specialists are operating to help them make sure all of the growth has been removed.

Traditional or open skull base surgery. This type of surgery may require incisions in the facial area and in the skull. Parts of bone may need to be removed so that the growth can be reached and removed. An operating room microscope is often used for this type of surgery.

Endoscopic skull base surgery

see Endoscopic skull base surgery.

Because this is such a difficult area to see and reach, skull base surgery may be done by a minimally invasive endoscopic procedure in which instruments are inserted through the natural openings in the skull—the nose or mouth—or by making a small hole just above the eyebrow. This type of surgery requires a team of specialists that may include ENT (ear, nose, and throat) surgeons, neurosurgeons, and radiologists.

Before endoscopic skull base surgery was developed, the only way to remove growths in this area of the body was by making an opening in the skull. Under some circumstances, this type of surgery may be necessary.

Symptoms

Symptoms will depend on the size, type, and location of the growth or abnormality, and may include:

Facial pain

Headache

Dizziness

Visual problems

Numbness

Weakness of the face

Hearing loss or ringing in the ears

Nasal congestion or frequent sinus infections

Diagnosis

The diagnosis of growths or abnormalities that may require skull base surgery is based on the symptoms and a physical exam. Because this area cannot be seen directly, these exams and imaging studies are important parts of the diagnosis:

Brain imaging studies. Special tests, such as MRI, MRA, PET and CT scans.

Other tests. Your balance, vision, and hearing may all be checked.

Treatment

In addition to endoscopic and open skull base surgery, these treatments may be needed, depending on the type of growth or abnormality of the skull base:

Chemotherapy

Radiation therapy. X-ray treatment may be used to control a growth in the skull base that cannot be completely removed by surgery.

Gamma knife. This is a special type of radiation therapy that uses precise X-ray beams to target a growth in the skull base.

Managing after skull base surgery

After skull base surgery, you will be closely cared for by your medical team. Some people need continued therapy, and many will need repeated testing to make sure that a growth is not coming back over time. Because this type of surgery can be very stressful, it's also important to get support from friends and family.

Approaches

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Training

The methodology for surgical training in the anatomic laboratory described in this article has proven to be very effective, producing a depiction of anatomic landmarks as well as 3D visual feedback that improves the study, design, and execution in various neurosurgical approaches. The Dextroscope as a virtual surgery simulation system can be used as a preoperative planning tool that can allow the neurosurgeon to perceive, practice reasoning, and manipulate 3D representations using the transsphenoidal perspective acquiring specifically visual information for endoscopic endonasal approaches to the skull base. The Dextroscope also can be used as an advanced tool for analytic purposes to perform different types of measurements between surgical landmarks before, during, and after dissection ¹⁾.

A challenging area in skull base surgery is microsurgery of the tuberculum sellae and sphene-orbital lesions.

Complications

see Skull base surgery complications.

Books

see Skull Base Surgery books

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de Notaris M, Palma K, Serra L, Enseñat J, Alobid I, Poblete J, Gonzalez JB, Solari D, Ferrer E, Prats-Galino A. A Three-Dimensional Computer-Based Perspective of the Skull Base. World Neurosurg. 2014 Dec;82(6S):S41-S48. doi: 10.1016/j.wneu.2014.07.024. Review. PubMed PMID: 25496634.

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