Introduction to Neurosurgical Subspecialties:

Tumor and Skull Base Neurosurgery

Brian L. Hoh, MD\textsuperscript{1} and Gregory J. Zipfel, MD\textsuperscript{2}

\textsuperscript{1}University of Florida, \textsuperscript{2}Washington University
Tumor / Skull Base Neurosurgery

- Brain tumor / skull base neurosurgeons treat patients with:
  - Intrinsic primary brain tumors
    - Astrocytoma, ependymoma, oligodendroglioma, pineal region tumor, craniopharyngioma, hemangioblastoma, etc.
  - Extrinsic brain tumor tumors
    - Meningioma, schwannoma, pituitary adenoma, etc.
  - Skull tumors
    - Chordoma, chondrosarcoma, etc.
  - Brain metastases

Rhoton collection
Tumor / Skull Base Neurosurgery

• Fellowship not required, but some neurosurgeons opt for further specialized training in neurosurgical oncology and/or skull base surgery via fellowship
  • Skull base fellowship
  • Surgical Neuro-Oncology fellowship
  • Postdoctoral lab fellowship
Case Illustration #1

- 36 yo female with headaches and diplopia; large petroclival meningioma on MRI
Case Illustration #1

Subtemporal approach with petrosectomy

Post-op MRI

(-) Gad

(+) Gad
Case Illustration #2

- 72 yo right handed female with large right insular tumor presented with headache
Case Illustration #2

- Gross total resection was achieved via right pterional transsylvian approach using continuous transcranial MEP/SSEP monitoring
- Pathology = glioblastoma
Case Illustration #3

• 45 year old right-handed woman presented with transient expressive aphasia and found to have 6 cm left inferior frontal FLAIR hyperintense tumor pushing Broca’s area posteriorly
Case Illustration #3

• A gross total resection was achieved using left frontal awake craniotomy with speech mapping

• Pathology = grade II oligodendroglioma, *IDH1* and *TERT* mutant

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**TUMOR TYPE: BRAIN OLIGODENDROGLIOMA**

Genomic Alterations Identified†

*IDH1 R132H*

*NRAS G13R – subclonal*, Q61K

*MUTYH G382D*

*TERT* promoter -124C>T
Case Illustration #4

- 51-year-old left-handed female who presents with 1-2 months of increasing paresthesias and weakness in her right hand and forearm, headaches, and an increasingly unstable gait.
Case Illustration #4

- MRI of the brain showed a large, extra-axial mass with an origin at the anterolateral dura of the lower clivus and foramen magnum. Severe lower brainstem and upper cervical spinal cord compression was noted.
Case Illustration #4

• A gross total resection was achieved through a far lateral approach, which includes a retrosigmoid craniotomy, C1 laminectomy, and partial right occipital condyle removal.

• Pathology revealed a grade 1 meningioma
Case Illustration #5

• 42-year-old right-handed female presents with progressive mild headaches and bitemporal hemianopsia. Pituitary hormone laboratories were within normal limits.
Case Illustration #5

- A gross total resection was achieved through an endonasal endoscopic transsphenoidal approach in collaboration with otolaryngology. Her visual field deficits improved completely, and she had no new hormonal deficits.

- Pathology revealed a typical pituitary adenoma.
Case Illustration #6

- 49-year-old right-handed female who had progressive hearing loss and a new headache, which prompted an MRI.
Case Illustration #6

• A near gross total resection was achieved through a retrosigmoid approach with internal acoustic canal drilling by otolaryngology. A small amount of tumor adherent to facial nerve was left. The patient had a transient right facial nerve weakness (House Brackmann grade II), which improved to normal within 1 month.

• Pathology revealed a vestibular schwannoma.
Subspecialization within Neuro-oncology and Skull Base Neurosurgery

- Intra-axial tumors: gliomas, metastasis
- Meningiomas and skull base meningiomas in particular
- Skull Base pathologies from head and neck cancers.
- Neuro-endocrinology/neuro-endoscopy
- Vestibular schwannomas
Conclusions

• Neuro-oncology is a fascinating field where more understanding of tumor development and treatment are required.

• Skull base neurosurgery is a challenging and varied field that addresses tumors along the base of the skull.