Neurosurgical Oncology

I. Anatomy and surgical approaches
   A. Fundamental neuroanatomy
   B. Cortical and functional anatomy: eloquent cortex, motor mapping, language/speech
   C. Surgical approaches

II. Neuro-imaging modalities and differential diagnosis
   A. Tractography: white matter tracts, diffuse tensor imaging (DTI)
   B. Metabolic imaging: positron emission tomography (PET), MR spectroscopy, perfusion
   C. Functional Imaging: functional MRI, language mapping, motor mapping
   D. Differential diagnosis
      1. Tumor imaging characteristics
      2. Radiation necrosis
      3. Non-neoplastic mass lesions: multiple sclerosis, tuberculoma, fungoma, neurocysticercosis
   E. Intra-operative imaging: modalities, indications, extent of resection

III. Clinical presentation and non-surgical management
   A. Clinical presentation: signs and symptoms, syndromes (Gerstmann, SMA, Foster-Kennedy)
   B. Medical management: steroids and steroid withdrawal, anti-epileptics
   C. Radiation oncology
      1. Whole brain radiation and intensity-modulated radiation (gliomas, small cell, metastasis)
      2. Stereotactic radiosurgery and stereotactic radiation therapy (pituitary, meningioma, schwannoma, metastasis)

IV. Gliomas and primary CNS lymphoma
   A. High-grade gliomas: genetics, histopathology, imaging, surgical management, extent of resection, adjuvant therapy (Stupp protocol), prognosis
   B. Low-grade gliomas: genetics, histopathology, imaging, surgical management, adjuvant therapy, prognosis
   C. Other: juvenile pilocytic astrocytoma, pleomorphic xanthoastrocytoma, ganglioglioma, gliosarcoma, Lhermitte-duclos (dysplastic gangliocytoma of the cerebellum) - imaging, management, and prognosis
   D. Primary CNS lymphoma: clinical presentation, imaging, management, prognosis
   E. Large B cell lymphoma: clinical presentation, imaging, management, prognosis

V. Skull base tumors
   A. Meningioma: genetics, histopathology, classification, clinical presentation, imaging, surgical management/approaches, adjuvant therapies (radiation), prognosis
   B. Vestibular schwannoma: genetics, histopathology, clinical presentation, imaging, surgical management/approach, adjuvant therapy, intra-operative monitoring (BAERs)
   C. Other: epidermoid cyst, trigeminal schwannoma, glomus jugulare tumor, dermoid cysts, lipoma, paraganglioma, hemangiopericytoma

VI. Pituitary tumors
    A. Clinical syndromes: prolactinoma, Cushing's disease, acromegaly, MEN syndrome
    B. Pituitary adenoma: histopathology, imaging, clinical presentation (visual field defect, hypopituitarism, apoplexy), medical and surgical management
    C. Complications: DI, SIADH, panhypopituitarism, CSF leak, epistaxis
VII. Pineal region tumors
    A. Pineal parenchymal tumors: pineocytoma, pineoblastoma
        1. Imaging, presentation (Parinaud, nystagmus hydrocephalus), surgical management, adjuvant therapy
    B. Germ cell tumors: germinoma, embryonal carcinoma, choriocarcinoma, yolk sac endodermal sinus tumor, teratoma
        1. Genetics, histopathology, tumor markers, surgical management, prognosis
VIII. Intraventricular tumors
    A. Central neurocytoma: histopathology, imaging, management
    B. Ependymoma and subependymoma: histopathology, imaging, management
    C. Colloid cyst: histopathology, imaging, management
    D. Choroid plexus papilloma, choroid plexus carcinoma: histopathology, imaging, management
IX. Pediatric tumors
    A. Supratentorial: craniopharyngioma, pinealoma, DNET
    B. Infratentorial: pilocytic astrocytoma, medulloblastoma, ependymoma, DIPG, atypical teratoid rhabdoid tumor
    C. Other: neuroblastoma
X. Brain metastases
    A. Common primary tumors: lung, breast, melanoma, renal cell, adenocarcinoma incidence rates
    B. Surgical indications: solitary vs. oligo metastasis
    C. Medical Management: immune modulation therapies
    D. Leptomeningeal disease: imaging, management, prognosis
XI. Neurocutaneous syndromes
    A. Neurofibromatosis: NF-2, genetics, presentation, imaging, management, prognosis
    B. Von-Hippel Lindau: genetics, presentation, imaging, management, prognosis
    C. Tuberous sclerosis: genetics, presentation, imaging, management, prognosis
    D. Sturge-Weber: genetics, presentation, imaging, management, prognosis
    E. Cowden disease: genetics, presentation, imaging, management, prognosis
XII. Spinal cord tumors
    A. Chordoma
    B. Vertebral hemangioma
    C. Osteoid osteoma
    D. Other: schwannoma, meningioma, lipoma, filum terminale tumor, multiple myeloma
XIII. Complication management
    A. Intra-operative complications: mass effect, edema, hydrocephalus

B. Postoperative complications: infection, hydrocephalus, venous thrombosis