

Neurosurgical procedure classification

Neurosurgical procedures are broadly classified based on the anatomical region, purpose, or type of intervention. Here's an organized classification:

1. Based on Anatomical Region #### a. Cranial Procedures

1. **Craniotomy:** Surgical opening of the skull (e.g., tumor resection, aneurysm clipping).
2. **Craniectomy:** Removal of a portion of the skull, often for decompression.
3. **Stereotactic Procedures:** Image-guided interventions (e.g., biopsy, deep brain stimulation).
4. **Ventricular Surgery:** Insertion of shunts, third ventriculostomy.
5. **Epilepsy Surgery:** Lobectomies (e.g., temporal lobectomy), lesionectomy.
6. **Trauma Management:** Evacuation of hematomas (subdural, epidural), skull fracture repair.

b. Spinal Procedures

1. **Decompressive Surgery:** Laminectomy, foraminotomy.
2. **Stabilization Surgery:** Spinal fusion, instrumentation.
3. **Disk Surgery:** Discectomy, microdiscectomy.
4. **Tumor Resection:** Removal of intramedullary, intradural-extramedullary, or extradural tumors.

c. Peripheral Nerve Surgery

1. **Decompression:** Carpal tunnel release, ulnar nerve decompression.
2. **Nerve Repair/Transfer:** Post-trauma or injury reconstruction.
3. **Tumor Resection:** Schwannomas, neurofibromas.

2. Based on Purpose #### a. Diagnostic

1. **Biopsy:** Tissue sampling for pathology (stereotactic or open).
2. **Endoscopy:** Neuroendoscopy for ventricular or skull base visualization.

b. Therapeutic

1. **Tumor Resection:** Benign or malignant.
2. **Aneurysm Repair:** Clipping or coiling (with interventional radiology).
3. **Functional Surgery:** Deep brain stimulation (DBS), vagus nerve stimulation (VNS).
4. **Trauma:** Hematoma evacuation, decompressive craniectomy.

c. Palliative

1. **Cordotomy:** For intractable pain.
2. **CSF Diversion:** Ventriculoperitoneal (VP) shunt for hydrocephalus.

3. Based on Intervention Type #### a. Open Surgery

1. Craniotomy.
2. Spinal laminectomy.

b. Minimally Invasive

1. Endoscopic procedures.
2. Keyhole craniotomies.

c. Image-Guided

1. Stereotactic radiosurgery (e.g., Gamma Knife, CyberKnife).
2. Stereotactic biopsy.

d. Robotic-Assisted

1. Robotic trajectory planning for tumor or seizure focus ablation.

e. Endovascular

1. Embolization of arteriovenous malformations (AVMs).
2. Aneurysm coiling.

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4. Based on Disease Type #### a. Tumors

1. Gliomas, meningiomas, metastases.
2. Pituitary adenomas (via transsphenoidal approach).

b. Vascular Disorders

1. Aneurysms, AVMs, dural arteriovenous fistulas.
2. Ischemic or hemorrhagic stroke management.

c. Degenerative Disorders

1. Lumbar/cervical stenosis.
2. Herniated discs.

d. Functional Disorders

1. Parkinson's disease: Deep brain stimulation.
2. Epilepsy: Temporal lobectomy, responsive neurostimulation (RNS).

e. Trauma

1. Acute epidural, subdural, or intraparenchymal hemorrhage evacuation.

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5. Special Techniques #### a. Skull Base Surgery

1. For lesions at the base of the skull (e.g., clival chordomas, acoustic neuromas).

b. Pediatric Neurosurgery

1. Chiari malformation decompression.
2. Surgery for congenital disorders (e.g., spina bifida repair).

c. Neuroendoscopy

1. Third ventriculostomy, colloid cyst removal.

Non-invasive Neurosurgical procedure

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