



## Methods employed in Neurosurgery

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### ABSTRACT

Neurosurgery is the medical specialty concerned with the diagnosis and treatment of patients with injury to, or diseases/disorders of the brain, spinal cord and spinal column, and peripheral nerves within all parts of the body. The specialty of neurosurgical care includes both adult and pediatric patients. Dependent upon the nature of the injury or disease a neurological surgeon may provide surgical and/or non-surgical care.

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## Introduction

Neuroradiology methods are utilized in modern neurosurgery diagnosis and treatment. They include computer assisted imaging computerized tomography (CT), resonance imaging (MRI), positron emission tomography (PET), magnetoencephalography (MEG), and stereotactic radiosurgery. Some neurosurgery procedures involve the utilization of intra-operative MRI and functional MRI [1].

In conventional open surgery the neurosurgeon opens the skull, creating an outsized opening to access the brain. Techniques involving smaller openings with the help of microscopes and endoscopes are now getting used also. Methods that utilize small craniotomies in conjunction with high-clarity microscopic visualization of neural tissue offer excellent results. However, the open methods are still traditionally utilized in trauma or emergency situations.

## Microsurgery

Microsurgery is employed in many aspects of neurological surgery. Microvascular techniques are utilized in EC-IC bypass surgery and in restoration carotid endarterectomy. The clipping of an aneurysm is performed under microscopic vision. Minimally-invasive spine surgery utilizes microscopes or endoscopes. Procedures like microdiscectomy, laminectomy, and artificial disc replacement believe microsurgery [2].

Using stereotaxy neurosurgeons can approach a moment target within the brain through a minimal opening. this is often utilized in functional neurosurgery where electrodes are implanted or gene therapy is instituted with high

level of accuracy as within the case of paralysis agitans or Alzheimer's disease . Using the mixture method of open and stereotactic surgery, intraventricular hemorrhages can potentially be evacuated successfully.

Conventional surgery using image guidance technologies is additionally becoming common and is mentioned as surgical navigation, computer-assisted surgery, navigated surgery, and stereotactic navigation. Almost like a car or mobile Global Positioning System (GPS), image-guided surgery systems, like Curve Image Guided Surgery and StealthStation, use cameras or electromagnetic fields to capture and relay the patient's anatomy and therefore the surgeon's precise movements in reference to the patient, to computer monitors within the OR . These sophisticated computerized systems are used before and through surgery to assist orient the surgeon with three-dimensional images of the patient's anatomy including the tumor. Real-time functional brain mapping has been employed to spot specific functional regions using electrocorticography (ECoG) [3].

Minimally invasive endoscopic surgery is usually utilized by neurosurgeons when appropriate. Techniques like endoscopic endonasal surgery are utilized in pituitary tumors, craniopharyngiomas, chordomas, and therefore the repair of spinal fluid leaks. Ventricular endoscopy is employed within the treatment of intraventricular bleeds, hydrocephalus, colloid cyst and neurocysticercosis. Endonasal endoscopy is sometimes administered with neurosurgeons and ENT surgeons working together as a team [4].

Repair of craniofacial disorders and disturbance of spinal fluid circulation is completed by neurosurgeons who also occasionally team with maxillofacial and plastic surgeons. Cranioplasty for craniosynostosis is performed by pediatric neurosurgeons with or without plastic surgeons. Neurosurgeons are involved in stereotactic radiosurgery along radiation oncologists in tumor and AVM treatment. Radiosurgical methods like Gamma knife, Cyberknife and Novalis Radiosurgery are used also. Endovascular surgical neuroradiology utilize endovascular image guided procedures for the treatment of aneurysms, AVMs, carotid stenosis, strokes, and spinal malformations, and vasospasms. Techniques like angioplasty, stenting, clot retrieval, embolization, and diagnostic angiography are endovascular procedures [5].

A common procedure performed in neurosurgery is that the placement of ventriculo-peritoneal shunt (VP shunt). In pediatric practice this is often often implemented in cases of congenital hydrocephalus. the foremost common indication for this procedure in adults is normal pressure hydrocephalus.

### Conclusion

Neurosurgery needs to play a vital role in combating this disease, both hemorrhagic and ischemic stroke, as well as the still relatively unaddressed problems of spinal disorders and pain in the developing world. Without addressing these shortfalls, the economy and its medical system cannot develop.

### References

1. Arentz M, Yim E, Klaff L, Lokhandwala S,

Riedo FX, Chong M, et al. Characteristics and outcomes of 21 Critically Ill Patients with COVID-19 in Washington State. *J American Medi Asso* 2020; 323:1612-1614.

2. Goulding JMR, Levine S, Blizard RA. Dermatological surgery: a comparison of activity and outcomes in primary and secondary care. *Br J Dermatol* 2009; 161:110-114
3. Louis DN, Ohgaki H, Wiestler OD, Cavenee WK, P.C. Burger PC. The 2007 WHO classification of tumours of the central nervous system. *Acta Neuropathol* 2007; 114:97-109.
4. Guay J, Parker MJ, Gajendragadkar PR, Kopp S. Anaesthesia for hip fracture surgery in adults. *Cochrane Database Syst Re* 2016; 2: CD000521
5. Vidan M, Serra JA, Moreno C, Riquelme G, Ortiz J. Efficacy of a comprehensive geriatric intervention in older patients hospitalized for hip fracture: a randomized, controlled trial. *J Am Geriatr Soc.* 2005; 53: 1476-1482