NEUROSURGERY — MCh

(3 YEAR COURSE FOR POST MS)

- **AIM OF TRAINING**

The student at the end of course should have acquired knowledge, skills, aptitude and attitudes to be able to function as an independent clinician and a teacher acquainted with research methodology.

- **PROGRAM OUTCOME**

The student at the end of course:

1. Should be well acquainted with the current literature on relevant aspects of the basic, investigative, clinical and operative neurosciences.

2. Should have learned indications and performance skills of common neurosurgical operations.

3. Should have acquired performance skills and ability to interpret relevant clinical investigations.

4. Should be able to diagnose, plan investigations and treat common conditions in the speciality by relevant current therapeutic methods.

5. Should be acquainted with allied and general clinical disciplines to ensure appropriate and timely referral.

6. Should be capable of imparting basic neurosurgical training.

7. Should be able to identify, frame and carry out research proposals in the relevant speciality.

- **ELIGIBILITY**
  M S (Gen. Surgery) degree of an Indian University recognized by the NMC or D.N.B. (Gen. Surgery) from recognized centre.
  (As per guidelines received from competent authority)

- **Mode of Selection**
  Twice a year on All India INI CET/ SS Examination basis
  (As per guidelines received from competent authority for conducting admission process)

- **TRAINING SYSTEM**

The training shall be exclusively on whole time in service basis, on residency pattern for 3 years.

- **TRAINING METHODS**

1. Clinical teaching in the OPD, Emergency and Operation theatres.

2. Clinical teaching in rounds in Neurosurgery Ward, ICU and bed side presentations.

3. Special teaching sessions like Neuroradiology rounds, Neuro-ophthalmalogy round, Neuropathology meetings, combined Neurology-Neurosurgery case discussions.

4. Seminars, journal clubs, mortality, morbdility meetings in department.

5. Treatment planning sessions pre-op and postop .

6. Assisting and performing neurosurgical operations.

7. Paper presentations at conferences.

8. Preparation of manuscript for publication.

- **COURSE CONTENT**

1. Clinical Neurosurgery including
   History taking, physical examination, diagnosis, selection and planning of relevant investigations, appropriate treatment and rehabilitation of patients with neurosurgical disorders including those presenting as emergencies.

2. Essentials of clinical Neurology especially with reference to disorders common in India and those likely to present to the Neurosurgeons.

3. Basic medical sciences relevant to the practice of Neurosurgery.

4. Surgical Neuropathology and the essentials of the Pathology of Neurological disorders likely to present to the Neurosurgeon.

5. Performance and interpretation of Neuroradiological procedures, such as carotid arteriography and myelography. Familiarity with the technique of selective arteriography (DSA) and its interpretation.

6. Principles and interpretation of common Neurophysiological, Neuro-ophthalmological, Neuro- otological and Neuroendocrinological tests especially with reference to Neurosurgical disorders.

7. Principles and interpretation of computerized axial tomography, MRI and other modern investigations.

8. Performance of common neurosurgical operations in the supra and infra-tentorial compartments, in the spinal canal and on the peripheral nerves – initially under supervision and later independently.

9. Ability to use the operating microscope is mandatory.

10. Familiarity with various types of anaesthesia used in neurosurgery their indications and contraindications, the use of ventilators and techniques of monitoring and resuscitation.

11. Pharmacology of various drugs used in Neurosurgery.

12. Knowledge of the history of neurological surgery and its allied disciplines with special reference to India.

13. Knowledge of recent advances in the field of neurological surgery.

14. Preparation of papers for presentation at scientific conferences and for publication.

15. Introduction to the techniques involved in the organisation and development of a department, its subsections and newer facilities.

16. It is desirable to have microsurgical laboratory training where candidates learn dissection/suturing of fine arteries/nerves under microscope and skull base dissections.

17. Development of proper attitudes towards patients, subordinates, colleagues and seniors.

18. Should have basic knowledge about application of computers and robotics in neurosurgery.

Syllabus:

- **Introduction to Neurological Surgery**
- Historical Overview of Neurosurgery

- **Basic science**
- Surgical Anatomy of Brain
- Molecular Biology Primer for Neurosurgeons
- Neuroembryology

- Stem Cell Biology in Central Nervous System
- Neurons and Neuroglia
- Cellular mechanisms of brain energy metabolism
- Blood brain barrier
- Cerebral edema
- Physiology of the cerebrospinal fluid and intracranial pressure
- Neurosurgical epidemiology and outcomes assessment

- **Approach to the patient**
- Altered consciousness
- Neuroophthalmology
- Neurotology
- neurourology
- Neuropsychological testing

- **Radiologic Fundamentals**
- Computed tomography and magnetic resonance imaging of the brain
- Radiology of spine
- Physiologic evaluation of the brain with magnetic resonance imaging
- Molecular imaging of the brain with positron emission tomography

General Neurosurgery

- **Perioperative care**
- Neuroanaesthesia: preoperative evaluation
- Avoidance of complications in neurosurgery
- Intracranial pressure monitoring
- Principles of neurocritical care
- **General principles and surgical techniques**
- Surgical planning: overview
- positioning for cranial surgery
- Patient positioning for spinal surgery
- positioning in peripheral nerve surgery
- Incisions and closures
- Advantages and limitations of cranial endoscopy
- Thoracoscopic spine surgery
- Cranioplasty

Geriatric neurosurgery

- Evaluation of adult hydrocephalus
- Production and flow of cerebrospinal fluid

- **Adult hydrocephalus**
- Clinical evaluation, shunting, the role of endoscopic third ventriculostomy
- **Subdural hematomas**
- Pathophysiology of Subdural hematomas
- Medical and surgical management of chronic subdural hematomas
- **Infections**
- Basic science of central nervous system infections
- Postoperative infections of the head and brain
- Postoperative infections of the spine
- The use and misuse of antibiotics in neurosurgery
- Brain abscess
- Meningitis and encephalitis
- Acquired immune deficiency syndrome
- Parasitic infections
- Surgical risk of transmittable diseases

Epilepsy

- Basic science of epilepsy
- Epilepsy surgery overview
- Electrophysiological properties of the mammalian central nervous system
- Approach to the patient
- Diagnosis and classifications of seizures and epilepsy
- Antiepileptic medications: principles of clinical use
- Preoperative evaluation for epilepsy
- Neuroradiological evaluation for epilepsy surgery
- Evaluation of patients for epilepsy surgery
- Intraoperative mapping and monitoring for cortical resections
- Intracranial monitoring
- Surgery for extratemporal lobe epilepsy
- Standard temporal lobectomy
- Selective amygdalohippocampectomy
- Tailored resections for epilepsy
- Topectomy and multiple subpial transection
- Hemispheric disconnection procedures
- Vagus nerve stimulation for intractable epilepsy
- Radiosurgical treatment of epilepsy
- Deep brain stimulation for epilepsy
- Epilepsy surgery: outcome and complications

Functional neurosurgery

- Overview: introduction ,Basic science of movement disorder
- Anatomy and synaptic connectivity of the basal ganglia
- Rationale for surgical interventions in movement disorders
- Neuropathology of movement disorder
- Neurology of movement disorder
- Clinical overview of movement disorder
- Patient selection criteria for deep brain stimulation in movement disorders
- Functional imaging in movement disorders
- Surgery for movement disorders
- Surgical management of tremor
- Pallidal interventions for parkinson's disease
- Subthalamic deep brain stimulation for parkinson's disease
- Subthalamotomy in parkinson's disease: indications and outcome
- Deep brain stimulation for dystonia
- Deep brain stimulations: mechanism of action
- Emerging and experimental neurosurgical treatments for parkinson's disease
- Selective peripheral denervation for cervical dystonia
- Surgery for psychiatric disorders
- A history of psychosurgery
- Surgical intervention for spasticity
- Treatment of intractable vertigo

Neuro-Oncology

- Brain tumors: general considerations
- Basic science of neurooncology
- Brain tumors: an overview of current histopathologic classifications
- Brain tumor immunology and inmmunotherapy
- Brain tumor stem cells
- Proliferation markers in the evaluation of gliomas
- Molecular genetics and the development of targets for glioma therapy
- Growth factors in glial tumors
- The genetic origins of brain tumors
- Invasion in malignant glioma

- Angiogenesis and brain tumors: mo0lecular targets and molecular scalpels
- Barriers to delivery of therapeutics to brain tumors
- Epidemiology of brain tumors
- Gene- and viral – based therapies for gliomas
- Clinical features: neurology of brain tumor and paraneoplastic disorders
- Radiologic features of central nervous system tumors
- Endovascular techniques for tumor embolisation
- Brain tumors during pregnancy
- Principles of chemotherapy
- Brain tumour outcome studies: design and interpretation
- Frame and frameless stereotactic brain biopsy
- Basic principles of cranial surgery for brain tumors
- Basic principles of skull base surgery
- Surgical complications of brain tumors and their avoidance
- Navigations for brain tumors
- Endoscopic approaches to brain tumors
- Intraoperative magnetic resonance imaging
- **Intrinsic tumours**
- Low grade gliomas: astrocytoma, oligodendroglioma, and mixed glioma
- Malignant gliomas: anaplastic astrocytoma, glioblastoma multiforme, gliosarcoma
- Unusual gliomas
- Primitive neuroectodermal tumors
- Pineal tumors
- Medulloblastoma
- Intracranial ependymoma in adults
- Hemangioblastomas
- Central nervous system lymphoma
- Metastatic brain tumors
- **Extrinsic tumors**
- Meningiomas
- Meningeal sarcomas and meningeal hemangiopericytomas
- Acoustic neuroma
- Pituitary tumors: Functioning and non-functioning
- Craniopharyngioma
- Epidermoid, dermoid, and neurenteric cysts
- Neoplastic meningitis
- Ventricular tumors

- Overview of skull base tumors
- Chordomas and chondrosarcomas
- Glomus tumors
- Neoplasm of paranasal sinuses
- Esthesioneuroblastoma
- Triageminal schwannomas
- Juvenile nasal angiofibroma
- Osseous tumors
- Tumors of the orbit
- Skull tumors
- Scalp tumors
- Nonneoplastic disorders mimicking brain tumors
- Pseudotumor cerebri
- Sarcoidosis, tuberculosis, and xanthogranuloma
- Demyelinating disease

Pain

- Pain: general historical considerations
- Anatomy and physiology of pain
- Molecular basis of nociception
- Nonsurgical therapy
- Approach to the pateient with chronic pain
- Pharmacologic treatment of pain
- Management of pain by anesthetic techniques
- Treatment of trigeminal neuralgia
- Evidence- based approach to the treatment of facial pain
- Trigeminal neuralgia: diagnosis and nonoperative management
- Percutaneous procedures for trigeminal neuralgia
- Stereotactic radiosurgery for trigeminal neuralgia
- Microvascular decompression for trigeminal neuralgia
- Surgical procedures for nontrigeminal pain
- Neurosurgical management of intractable p[ain
- Neuro modulation
- Evidence based neuro stimiulation for pain
- Peripheral nerve stimulation for neuropathic p[ain
- Spinal canal stimulation
- Motor cortex stimulation
- Destructive procedures
- Evidence based fo destructive procedures.

- Diagnosis and management of painful neuromas
- Dorsal root entry zone lesions
- Percutaneous cordotomy and trigeminal tractiotomy – nucleotomy

Pediatric neurosurgery

- Overview and approach
- Neuroanesthesia in children
- Neuro critical care in children
- Cranial developmental abnormality
- Normal and abnormal embryology of brain
- Encephalocele
- Dandy walker syndrome
- Arachnoid cyst
- Chiari malformations
- Craniopagus twins
- Craniosynostosis
- Genetics of craniosynostosis
- **Craniosynostosis**
- Sysndromic craniosynostosis
- Endoscopic treatment of craniosynostosis
- Plagiocephaly
- **Hydrocephalus**
- Hydrocephalus in chil;dren: approach to patient
- Infantile post hemorrhagic hydrocephalus
- Cerebrospinal fluid physiology
- Experimental hydrocephalus
- Ventricular shunting procedures
- Neuroendoscopy
- Cerebrospinal fluid devices
- Shunt infections and their treatment
- **Pediatric cranial and intracranial tumors**
- General approaches and consideration for pediatris brain tumors
- Optic pathway hypothalamic gliomas
- Thalamic tumours
- Corod plexus tumours
- Pediatric craniopharyngiomas
- Suprotentorial hemesperic tumours
- Ependymoma
- Medulloblastoma in children

- Cerebellar astroicytomas
- Brainstem gliomas
- Intracranial germ cell tumours
- Familial tumours (neurocutaneous syndromes)
- Skull tumours and fibrous dysplasia
- **Vascular diseases**
- Moya moya diseases
- Vein of Galen Aneurysmal Malformation
- Head and Brain Trauma
- Management of Severe Head Injury in Children
- Child Abuse
- Growing Skull Fracture
- Birth Head Trauma
- Birth Brachial Plexus Injury
- **Spine Disorders in Children**
- Myelomeningocele and Myelocystocele
- Lipomyelomeningocele
- Split Spinal Cord
- Tethered Spinal Cord: Fatty Filum Terminal, Meningocele Manqué and Dermal Sinus Tracts
- Development Abnormalities of the Craniocervical Junction
- Achondroplasia and Other Dwarfisms
- Cervical Spine Disorder
- Intramedullary Spinal Cord Tumors in Children
- Spinal Tumors in Children
- Thoracolumbar Spinal Disorders in Pediatric Patients
- Vertebral column and Spinal cord Injury in children
- Cerebral Palsy, Spasticity, and Dystonia
- Clinical Features and Management of Cerebral palsy
- Intrathecal Baclofen Therapy for Cerebral palsy

Peripheral Nerve

- General principles in Evaluating and Treating Peripheral Nerve Pathology, Injury, and entrapments and Their Historical context
- Basics Science of Peripheral Nerve Disorders
- Pathophysiology of Surgical Nerve Disorders
- Approach to the Patients with peripheral Nerve Disorders
- Peripheral Nerve Examination Evaluation and biopsy
- Electrodaiognostic Evaluation of peripheral Nerves:

- Electromyography and Nerve conduction Studies
- Peripheral Neuropathies
- Operative Neurophysiology of Peripheral Nerves
- Image for peripheral Nerve Disorders
- Management of Peripheral Nerve Entrapment
- Distal Entrapment Syndromes: Carpal Tunnel, Cubital tunnel, Peroneal and Tarsal tunnel
- Thoracic Outlet Syndrome
- Piriformis Syndrome,Obturator Internus Syndrome,pudendal Nerve Entrapment and other pelvic entrapments
- Management and repair of peripheral nerve in juries
- Techniques and options in nerve reconstructions and repair
- Management of acute peripheral nerve injuries
- Early mangenmnent of brachial plexus injuries
- Secondary procedures for brachial plexus injuries
- Nerve injuries of the lower extremity
- Management of peripheral nerve tumors
- Bening tumors of the peripheral nerves
- Surgery for malignant peripheral nerve sheath tumors
- Management of pain and complications in peripheral nerve surgery
- Pain, complications, and latrogenic injury in nerve surgery

Radiation

- General and historical consideration of radiotherapy and radiosurgery
- Basic science of radio techniques
- Principle of radiation therapy
- The radiobiology and physics of radiosurgery
- Fractionated radiation therapy for malignant brain tumors
- Fractionated radiation therapy for benign brain tumors
- Fractionated radiation therapy for spine tumors
- Interstitial and intra cavitory radiations of brain tumors
- Techniques of radiosurgery
- Proton radiosurgery
- Linear acceleratory radiosurgery : technical aspect
- Gamma knife radiosurgery
- Image guided robotic radiosurgery: the cyber knife
- Intracranial stereotactic radiosurgery
- Radiosurgery of malignant and benign tumors
- Radiosurgery for intracranial vascular ,malformations

- Radiosurgery for functional disorders
- Extra cranial stereotactic radiosurgery
- Stereotactic radiosurgery for the treatment of spinal metastasis
- Radiosurgery for benign spine tumours and vascular malformations

Spine

- Overview and historical considerations of basic science of the spine
- Concepts and mechanism of spinal biomechaniques
- Biomaterials and biomechanics of spinal orthoplasty
- Principles of translation of biologic therapies in spinal cord injuries
- Current status and future directions of management of spinal cord injuries
- Intraoperative monitoring of spinal cord and nerve roots
- Concepts of disc degenerations and re generations
- Bone metabolism and osteoporosis and its effects on spinal diseases and surgical treatments
- Approach to the patient
- Diffential diagnosis and initial management of spine pathology
- Diagnosis and management of discogenic lower back pain
- Metabolic and other non-degenerative causes of low back pain
- Evaluation, indications, and techniques of revision spine surgery
- Infections of the spine
- Fungal and tubercular infections of spine
- Degenerative disease of the spine
- Treatment of disc and ligamentous diseases of the cervical spine
- Posterior approach to cervical degenerative diseases
- Anterior approach for cervical spondylotic myelopathy
- Spondyloarthropathies,(including ankylosis spondylosis)
- Ossifications of the posterior longitudinal ligaments and other ensthesopathies
- Treatment of thoracic disc herniations
- Treatment of disc disease of the lumber spine
- Lumber spine stenosis
- Paediatric spondylolisthesis
- Adult thoracolumbar scoliosis
- Flat back and sagittal plane deformity
- Congenital and developmental anomalies of the spine
- Techniques for spinal procedures
- Basic principles of spinal internal fixations,

- Bone graft options, substitutes, and bone harvest
- Cervical and lumber arthoplasty
- Nucleoplasty
- Instrumentation in spinal surgery
- Anterior and posterior instrumentation in cervical, thoracic, and lumber spine
- Posterior, transforminal , and anterior lumber interbody fusion: techniques and instrumentation
- Tumors of the spine, craniovertebral junctions
- Spinal cord tumours in adults : benign and malignant and metastasis

Spinal trauma

- Assessment of cervical spine trauma
- Evaluation and management of craniocervical dissociations,
- Atlantoaxial rotatory subluxations and transvers ligament injuries
- Odontoid and hangman's fractures
- Thoracic spine fractures, lumber spine and sacral fractures,
- Osteoporotic fractures: vertebroplasty and kyphoplasty

Traumatic brain injury:

Epidemiology, biomechanical basis, neuropathology, animal models, neurochemical and patho mechanisms

- Regeneration and repair, and hypothermia
- Imaging of traumatic brain injury
- Management of traumatic brain surgery :pathophysiology, mild, moderate , severe concussions,
- Initial resuscitation, prehospital care , emergency room care, critical care, surgical managements
- Penetrating and traumatic head injuries
- Blast induced neurotrauma
- Cranial decompression after trauma
- Craniofacial injuries , CSF Fistulas
- Sequel, outcome and rehabilitation

Cerebrovascular neurosurgery

- Cerebral blood flow, metabolism, ischemia,
- Acute medical management of ischemic/ hemorrhagic stroke, intraoperative cerebral protection, circulatory arrest, deep hypothermia, transcranial Doppler USG, neurovascular imaging

- Occlusive vascular diseases: carotid occlusive diseases, endartectomy, angioplasty , stenting,
- Blunt cerebrovascular injury
- Non-atherosclerotic carotid lesions
- Extra cranial vertebral artery diseases
- Adult moya moya diseses
- Cerebral venous and sinus thrombosis
- Nonlesional spontaneous intracerebral haemorrhage
- **Intracranial aneurysms:** Genetics
- Natural history of cerebral aneurysms
- Pathobiology of intracranial aneurysms
- Surgical decision making for treatment of intracranial aneurysms
- Perioperative management of subarachnoid haemorrhage
- Cerebral vasospasm
- Surgical approaches to intracranial aneurysms, microsurgery of paraclinoid aneurysm
- Intracranial ICA aneurysms
- Microsurgery for Acoma aneurysms, DACA aneurysms, mca aneurysms ,
- Microsurgery of VA, PICA, VB junction aneurysms
- Basilar trunk aneurysms, basilar apex aneurysms,
- Endovascular approaches to intracranial aneurysms
- Endovascular coiling , stenting of intracranial aneurysms
- Endovascular hunterian ligation
- Microsurgical management of giant intracranial aneurysms
- Infectious intracranial aneurysms
- Revascularisation techniques for complex intracranial aneurysms
- Multimodality management of complex cerebrovascular lesions
- Traumatic cerebral aneurysms
- **True arteriovenous malformations**
- Pathobiology, natural history, therapeutic disiopn making, endovascular, microsurgical and radiosurgical management
- **Arteriovenous fistulas**
- Carotid-cavernous fistulas, other intracranial Dural AV fistulas,
- **Cavernomas:** natural history, genetics, locations, management
- AVM AND AVF of spine; classifications, endovascular treatment
- Pregnancy and vascular lesions

Minor surgical procedures
(ASSIST/OBSERVE -PERFORM)

1. Twist drill
2. Burr holes
3. Ventricular tapping/drain
4. Lumber puncture/drain
5. Tracheostomy/ intubation
6. Scalp suturing
7. Scalp debridement
8. Cervical immobilisation/HALO
9. Skull traction for cervical spine injury
10. Lumber cast/pop
11. Central/IJV/Subclavian line insertion

Major surgical procedure
(ASSIST/OBSERVE -PERFORM)

1. Decompressive craniotomy/ Hemicranectomy
2. Emergency craniotomy + evacuation of SDH, EDH, Contusions
3. Emergency craniotomy + evacuation of IC Bleed/Haematoma
4. Surgery for depressed skull fractures
5. Spinal Decompressive Laminectomy
6. Spine fixation surgery for traumatic spine injury
7. Elective craniotomy + excision of glioma
8. Elective craniotomy + excision of meningioma
9. Surgery for spina bifida /LLTC
10. Ventriculo-Peritoneal Shunt/Thecoperitoneal shunt
11. Anterior cervical discectomy/fusion
12. Lumber Microdiscectomy / laminectomy
13. Sylvian fissure opening under microscope- aneurysm surgery
14. Endoscopic nasal surgery for pitutory tumours

Instruments:
- Hudson brace /perforators
- Dandy's haemostatic arteries
- Raney clips
- Tumour holding forceps
- Byonet dissecting forceps
- Self- retaining mastoid retractors

- bone roungers
- bone elevators
- Bone hole making forceps
- Needle Holder
- Trephine burr
- Aneurysm clip applicators
- VP shunt subcutaneous tunneller
- Casper vertebral spreader
- Aneurysmal needle
- Crutchfield skull holder tongs
- Pituitary ring curette
- Sugita 4 pin head fixation system
- Mayfield 3 pin head fixation
- Leyla retractor system
- Cavitron Ultrasonic Surgical Aspirator (CUSA)
- High speed pneumatic/electric drill
- Samy's knife
- Blunt hook
- Fish hooks
- Twist drill
- Brain cannula
- Chhabra VP shunt
- kerrison punch upbite/downbite
- Intervertebral disc byonet forceps
- Arachnoid knife

Tubes/Catheters/Medicines

- Ommaya reservoir large/small
- Chhabra/Ceredrain /Programmed VP Shunt
- Asculap titanium aneurysm clips
- External ventricular drain
- Lumber spinal drain
- Syringosubarachnoid shunt
- Aneurysm coils
- Tracheostomy tube
- Endotracheal tube
- Surgicel
- Gel foam
- IV fluids (RL, NS, DNS, Dextran 40)
- Sutures (Vicryl, Silk, Ethilon, Prolene,)

• Betadine/ Betascrub
• Savlon/ Spirit/Hydrogen Peroxide
• Inj. Phenytoin, Levetiracetam, Valproate
• Inj. Mannitol20%, Lasix, Neurotol
• Inj. Methylprednisolone, dexamethasone,
• Inj. Midazolam, Lorazepam, Propafol
• Syp Glycerol, Syp Kesol, Tab Sobasis forte
• Tab Tolvaptan , Tab fludrocortisone
• Inj vit K, Inj Tranexamic acid
• Crepe bandage
• LP Needle 18- 26 G
• Romovac suction drain

Radiology

- Skull X-Ray: moth eaten/ Metastases
- Skull X-Ray: enlarged / ballooned sella
- Skull X-Ray: Fracture, peumocephalus
- Skull X-Ray: metastatic calcifications, thinning of bones.
- Cervical spine X-Ray: fractures, collapse, dislocations
- Dorsal spine X-Ray: deformity, scoliosis, kyphosis.
- Lumber spine x ray : spondylosis, llisthesis, collapsed
- CT brain: EDH, SDH, Contusions, ICH,SAH , MLS, herniations
- CT Spine: fractures, stenosis, calcified disc, OPLL, OYL
- MRI brain – tumours, meningioma, PNET, AVM, TB, infarcts
- MRI Spine- IDEM, ED, IMSOL, TB, PIVD, Canal Stenosis,CSM
- CT Angio – aneurysm, AVM, dissection, aberrant vessels
- MRI angio+ venography – CVST, Aneurysm, AVM,
- DSA- Aneurysm, AVM, Cross compression test.
- Functional MRI , PET , SPECT

SURGICAL PATHOLOGY

- Astrocytoma/GBM
- Meningioma
- Medulloblastoma
- Ependymoma
- Choroid plexus papilloma
- Intraventricular Neurocytoma

- Myxopapillary Ependymoma
- Cerebral abscess, TB, Fungal, Bacterial
- Neurocysticercosis, diffuse variety
- Multiple cerebral metastasis
- Fibrous dysplasia
- Optic Nerve Glioma
- Craniopharyngioma
- Pituitary adenoma

TRANING ON SUB-SPECIALITY OF NEUROSCIENCES

Neuro-Anaesthesiology

There should be didactic lectures which may be a common programme for the anaesthesiology and Neurosurgery postgraduates once a month.

The major thrust in these would be the resuscitation management of coma, life-support systems, monitoring of patients and the interaction of anaesthetic drugs with systemic diseases and neurosurgical disease conditions.

Neuroradiology

There should be combined Neurosurgery & radiology rounds or meetings once a month.

Clinical Neurology/ Neurophysiology

Candidates should have 1 month (in the 3rd year) training under Neurology department to familiarize themselves regarding common neurological disorders.

During this period candidate should also familiarize themselves with the technique and interpretation of EEG/EMG/NCV and evoked potentials.

Neuropathology

It is suggested that there should be combined Neuro-pathology meetings once a month for the techniques of grossing, staining procedures, brain cutting, autopsy methods and tissue processing

including frozen sections and should be able to identify histological features of the common neurosurgical disorders.

Neuro-Biochemistry/ Neuroimmunology

In regard to both above it is felt that there should be a capsuled course of didactic lectures which should run every alternate year or so to familiarize the trainees with the elements and techniques of neuro-chemistry and neuro-immunology.

TEACHING/LEARNING ACTIVITIES:

Case Presentations (Long and Short)

Journal Club

Seminars

Recent Advances

Neurosurgery Audit /Mortality - Morbidity Audit

Preop/Postop Sessions

Dissertation Review

Grand Round

Bed side presentations

Clinico-Pathology Conference

Clinical Meeting

Skill labs / cadaver labs

Academic:

Case presentations, Journal Club, Pre-op sessions: Once in month

Recent Advances, Seminars, mortality, clinical meetings, Didactic Lectures: Once in month

Combined Seminar, Grand Round, Skills Lab, Cadaveric Lab: Once a month

Dissertation Review: Once in 6 months

Neurosurgery Audit: once in 6 months.

Mortality and Morbidity Review Board, Clinical Meeting, Clinicopathological Conference: as and when scheduled

The student will take active part in graduate training program.

Clinical:

Out-Patient Department, Neurosurgical Wards, Intensive Care unit, emergency ward, emergency operation theatre, routine neurosurgical OT

Social Commitment:

He / She will also participate in various National Health Programmes and community initiatives.

DISSERTATION:

The super specialisation dissertation will orient the student to the principles of research methodology; will instil an element of inquiry, with development of a research aptitude. Process for dissertation should to be completed within six months of admission to MCh Neurosurgery Program. The topic of dissertation should be approved and cleared by institute ethic committee. It is desirable to have publication out of dissertation itself, before candidate appears for final examination.

Submission of Dissertation:

The Dissertation will be submitted at least six months prior to the scheduled examination, i.e. by 31st December for June examination and by 30th June for December examination.

VISIT TO OTHER INSTITUTIONS

It is desirable to visit other recognized neurosurgical centres to observe/ train in specialised neurosurgical procedures as and when needed.

LOG BOOK

The student will maintain Log-Book which will contain details of all the teaching/learning activities, Seminars, journal clubs, Preop sessions, mortality, morbdility meetings number of cases examined in Outpatient Department, ward procedures, minor and major operative procedures done / assisted / observed and presentations at conferences.

He / She will submit the completed Log-Book, signed by the concerned PG Guide, Unit Head, to the Head of the Department by the end of every month.

ESSENTIAL PRE-REQUISITE FOR APPEARING FOR M Ch (NEUROSURGERY) EXAMINATION

1. Minimum 80% attendance in each year of training.
2. Approval of Dissertation
3. Minimum of four satisfactory six monthly progress reports
4. Minimum one scientific paper presentation at International / National / State Neurosurgery Conference
5. Minimum one research paper – published / accepted for publication / sent for publication in a peer-reviewed indexed scientific Journal.

FORMATIVE ASSESSMENT:

Theory:

Time	Marks	Total
At end of first year (Paper I)	100	500
At end of second year (Paper II)	100	
Preliminary (3 Papers of 100 marks each)	300	

- Pattern for Paper I and Paper II: Marks: 100 Duration: 3 hours 10 questions of 10 marks each
- The Prelim Examination will be conducted in accordance with the pattern of the final examination for theory.

Practical:

Time	Marks	Total
At end of first year (Practical I)	100	500
At end of second year (Practical II)	100	
Preliminary	300	

- Pattern for Practical I and Practical II
    1. Long Case 50 marks
    2. Operative Procedure discussion :30 marks
    3. Radiology, Surgical Pathology 20 marks

SIX MONTHLY PROGRESS REPORTS:

The progress of the student will be monitored with the help of a six monthly structured report.

The report will contain details pertaining to attendance, teaching, learning activities, clinical duties, teaching assignments, practical work, papers / posters presented, research publications and progress of dissertation work.

The performance of the student will be graded by the Guide and the Head of the Department.

- The Prelim Examination will be conducted in accordance with the pattern of the final examination. It will be conducted 3 months before the final Professional exam.
- A minimum of 50 % marks is mandatory in Theory and Practical separately, in order to be eligible to appear for the Professional Examination.
- Sample question papers will be provided for students.

SUMMATIVE ASSESSMENT:

Timing of Examinations:
At the end of 36 months of training (for post MS).

1. **Theory Papers** – (400 marks)

   (Equally distributed for each paper)

   Four papers –

   1. Basic Neurosciences and allied sciences (applied) – 100 marks
   2. Brain surgery – 100 marks
   3. Spine surgery and peripheral nerve surgery – 100 marks
   4. Recent advances – 100 marks

3. **Practical Examinations** - (500 marks)

   Distributed as follows:

   a) Clinical - 1 long case (100 marks) + 2 short case (50 marks each)

   b) Operative demonstration for MCh - (200 marks)
   (Surgery will be done by faculty and assisted by student)

c) Radiology, Pathology, instruments and general viva - (100 marks)

Theory		Practical		Total
400	+	500	=	900

In order to be declared successful at the Professional Examination, the candidate must score:
a. Minimum 40% marks in each theory paper and overall 50% in theory.
b. A minimum of 50% marks in practical examination.

RECOMMENDED BOOKS:

1. Yeomans and Winn textbook of neurological surgery 8th edition 2023 (4 volume set)

2. Schmidek and Sweet: Operative Neurosurgical Techniques 2 vol set

3. Oxford Textbook of Neurological Surgery

4. Atlas of neurosurgical techniques

5. Operative Neurosurgery by A.H Kaye & P Black

6. Microneurosurgery by M. G. Yasargil (4 volume)

7. Anne G. Osborn's Brain – imaging, pathology and anatomy

8. Textbook of Head Injury By Dr Mahapatra

9. Oxford Textbook of Neuro-Oncology

10. Brazis's Localization in Clinical Neurology

11. Dejong's The Neurological Examination

12. Neurosurgery, editors RH Wilkins and SS Rengachary

13. Sami's essentials in neurosurgery

14. Textbook of Operative Neurosurgery, editors Ramamurthi R, Sridhar K, Vasudevan MC.

15. Textbook of Neurosurgery, Editors Ramamurthi B, Tandon PN

RECOMMENDED JOURNALS:

1. Neurology India NI

2. American Journal of Neurosurgery JNS

3. British Journal of Neurosurgery BJNS

4. World Neurosurgery

4. Neurosurgery Clinics of North America

5. Surgical Neurology

6. Journal of Neurosciences in rural practice

7. Journal of Neurology Neurosurgery and Psychiatry

8. Journal of Cerebrovascular Sciences

9. Journal of Spine Surgery

10. Acta Neurochirurgica- the European journal of neurosurgery

LOGBOOK

General Instruction:

This logbook is intended to be record of your basic surgical training with particular reference to your operative experience.

1. You are requested to list, in chronological order, the training posts, which you have held.

2. You are required to record all surgical operation in which you have been personally involved during your tenure of the listed training posts. Your head of unit must countersign each page of this record at the end of every two months. Minor operations are to be listed separately.

3. The operation record includes the date of operation, the patient's hospital number and age/sex, the nature of the procedure and an indication of whether it was performed, assisted or observe. Emergency operations are to be entered separately.

4. Significant postoperative complications are to be recorded.

For examples: Wound dehiscence, Wound infection respiratory complications, Cardiac complications, Cerebral complications: CSF leak, Meningitis, Intracranial Haemorrhage, infarcts, Arterial thrombosis, haematoma, bed sore, Deep venous thrombosis, Renal failure, Pulmonary Embolism, urinary complications.

5. The death of the patient within thirty days of operation is to be recorded by capital D/red ink.

6. Consolidated experience: At the end of each training post (or part of a training programme), you must record consolidated lists of your operative experience on the separate pages provided.

7. Minor surgery: Procedure such as insertion of a central venous line, burr holes, twist drill, ventricle tap, and insertion of lumber drain, EVD, chest drain, are to be separately recorded. Only procedures, which have been performed /assisted personally, are to be recorded.

8. Academic activities: You are required to record the various academic activities in which you have been involved in each of your training posts. This record must include publications and contributions to clinical and scientific meetings, attendance at meeting and training courses, and involvement in research projects.

The purpose of this logbook is to have an audit of Residents performance as well as ensuring adequate surgical training, before obtaining MCh degree in Neurosurgery.

Name of Candidate:

Age/sex:

Permanent address:

Registration number:

Residency Period:

Dissertation topic:

Guide/co-guide:

ANNEXURE I:

POSTING DETAILS: Year wise 1st year, 2nd year, 3rd year

Postings:	**Jan**	**Feb**	**March**	**April**	**May**	**June**
Emergency/casualty posting:						
NS Ward posting:						
NS Trauma ward						

posting						
NS ICU posting						
Operation theatre posting: Routine NS OT:						
Emergency NS OT:						
OPD postings						
Remark:						
Signatures:						

Postings:	**July**	**Aug**	**Sept**	**Oct**	**Nov**	**Dec**
Emergency/casualty posting:						
NS Ward posting:						
NS Trauma ward posting						
NS ICU posting						
Operation theatre posting: Routine NS OT:						
Emergency NS OT:						
OPD posting:						
Remark:						
Signatures:						

Signature: Date:

Head of Department's signature

ACADEMIC ACTIVITIES

1. **Seminars:**

Date	Topic	Remark	Signature

2. **Journal clubs**

Date	Topic	Remark	Signature

3. Pre-op sessions

Date	Topic	Remark	Signature

4. Case presentations (long/ short):

Date	Topic	Remark	Signature

5. Clinical meets:

Date	Topic	Remark	Signature

6. Mortality meets

Date	Topic	Remark	Signature

7. Grand round

Date	Topic	Remark	Signature

8. Recent advances

Date	Topic	Remark	Signature

9. Details of Conference attended:

Date	Name of conference	Title of presentation	Oral/poster	Remark	Signature

10. Details of Publications:

Date of publication	Name of journal	Title of paper	Impact factor	Remark	Signature

ANNEXURE II:

OPERATION RECORDS

Major Neurosurgeries performed:

Sr no	Date	Admission no	Name	Age /sex	Diagnosis	Status preop	Surgery name	Complication

Major Neurosurgeries assisted:

Sr no	Date	Admission no	Name	Age /sex	Diagnosis	Status preop	Surgery name	Complications

Minor neurosurgeries performed:

Sr no	Date	Admission no	Name	Age/sex	Diagnosis	Status preop	Surgery name	Complications

Minor Neurosurgeries assisted:

Sr no	Date	Admission no	Name	Age/ sex	Diagnosis	Status preop	Surgery name	Complications

Signature

Head of Department's signature

Date

PERFORMANCE RECORD

NAME

Present Address

Permanent Address

Date of Birth

Mobile number

Email address:

Under graduate education Institution/ University

Post graduate education institute/university

PG Thesis topic:

PG Guide/ Teacher:

Registration number and date:

Topic of MCh dissertation:

MCh guide/ co-guide:

Residency period:

Specimen Signature

Total numbers of

Major surgeries:

Minor surgeries:

Total numbers of Academic activities performed:

Total numbers of conferences attended:

Total numbers of papers/posters presented:

Total numbers of publications:

Total Days of leave during residency with dates:

Signature:

Unit Head

Signature of Head of Department

CERTIFICATE FOR ACADEMIC ACTIVITIES

This is to certify that DR. _____ _____has been involved in the academic activities as given in ANNEXURE I of the LOG BOOK

Name & Signature

Guide

Name & Signature

Prof. & head

CERTIFICATE FOR NEUROSURGICAL EXPERIENCE

This is to certify that Dr. _____ has been involved in neurosurgical procedures in various capacities as mentioned below. The details of these are attached in LOG BOOK as ANNEXURE II

Major Neurosurgeries performed: ____

Major Neurosurgeries assisted: _____

Minor Neurosurgeries performed: ____

Minor Neurosurgeries assisted: _____

Neurosurgeries observed: _____

Name & Signature

Guide

Name & Signature

Prof. & head