Curriculum for
M.Ch Neurosurgery (3-year course)

A) AIM OF TRAINING

The candidate at the completion of training would be expected to have acquired knowledge, skills, aptitude and attitudes to be able to function as an independent clinician / consultant and a teacher acquainted with research methodology.

Objectives:

The end product:

1. Should be well acquired 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.

B) TRAINING SYSTEM

Full time, based on the residency pattern.

C) ELIGIBILITY

Essential:

M.S. (General. Surgery only) degree of an Indian University recognized by the Medical Council of India or any other examination recognized for the purpose by the MCI.

Desirable:

Rotation in Neurosurgery for at least 2 weeks during postgraduate clinical training. Prior experience of working in a recognized Neurosurgery department
Mode of selection
Once a year, through an all India competitive examination. This would comprise of a written test followed by a departmental assessment, in line with University guidelines.

*The eligibility criteria and selection of candidates will be in accordance with University guidelines.*

D) TRAINING METHODS

1. Clinical teaching in the outpatient clinics, emergency room and operation theatres. Clinical teaching rounds in ward and bedside presentations.
2. Special teaching sessions like Neuroradiology discussion, Tumour boards, Neuro-endocrine clinics, interdepartmental case discussions with Neurology.
4. Treatment planning sessions.
5. Assisting and performing neurosurgical operations.
6. Paper presentations at conferences.
7. Preparation of manuscript for publication.
8. Training in an experimental microsurgical laboratory (desirable)
9. Classes for undergraduates and junior residents undergoing training in Neurosurgery

E) 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 including anatomy, physiology, biochemistry, pharmacology and epidemiology.
4. Surgical Neuropathology and the essentials of the Pathology of Neurological disorders likely to present to the Neurosurgeon.
5. Principles, technique and interpretation of Neuroradiological procedures like CT and MRI scans, angiography and interventional procedures.
7. Performance of common neurosurgical operations in the supra and infra-tentorial compartments, in the spine and on the peripheral nerves – initially under supervision and later independently. Ability to use the operating microscope is mandatory.
8. Familiarity with various types of anaesthesia used in neurosurgery their indications and contraindications, the use of ventilators and techniques of monitoring and resuscitation.
9. Pharmacology of various drugs used in Neurosurgery.
10. Knowledge of the history of neurological surgery and its allied disciplines with special reference to India.
11. Knowledge of recent advances in the field of neurological surgery.
12. Preparation of papers for presentation at scientific conferences and for publication.
13. Introduction to the techniques involved in the organization and development of a department, its subsections and newer facilities.
14. It is desirable to have microsurgical laboratory training where candidates learn dissection/suturing of fine arteries /nerves under microscope and skull base dissections.
15. Development of proper attitudes towards patients, subordinates, colleagues and seniors.
16. Should have knowledge about computers and their applications in clinical practice.

F) SUB-SPECIALTY TRAINING:

Neuro-Anaesthesiology:

There should be didactic lectures, covering anaesthetic techniques in Neurosurgical procedures, critical care management of an unconscious patient, resuscitation, ventilators and other life support systems. Neurosurgery trainees would also be expected to know the basics of anesthetic drugs and their interaction with systemic diseases and neurosurgical disease. Neurosurgery trainees would continue their training in the operation theatre by discussions with the Anaesthesiologists during the training period.

Neuroradiology:

Combined weekly Neuroradiology rounds or meetings. Candidates will rotate with Radiology for two weeks in the second year of training.

Medical Neurology and Neurophysiology:

Candidates should have 2 months (1 month in the second year and 1 month in the fourth year of the course) training in Neurology to familiarize themselves with common
neurological disorders. During this period candidate should also familiarize themselves with the technique and interpretation of EEG / EMG / NCV and evoked potentials.

**Neuropathology:**

There should be a 4 week rotation in Neuropathology during the third year, during which they should be familiarized with 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. In addition, participation in regular clinicopathological conferences through the training period is essential.

**Neuro-chemistry, Neuro-immunology:**

There should be an encapsulated course of didactic lectures to familiarize the trainees with the elements and techniques of neuro-chemistry and neuro-immunology.

**G) CLINICAL ROTATIONS**

1. Neurology – total 2 months, one month in the first year of the course and another month in the second year of the course. Candidates are expected to familiarize themselves with common neurological disorders. During this period candidate should also familiarize themselves with the technique and interpretation of EEG / EMG / NCV and evoked potentials.

2. Neuro-radiology – 2 weeks in the first year of training

3. Neuropathology – 4 weeks in the second year of training

**H) TRAINING IN OTHER INSTITUTIONS**

Candidate in the third year should visit other neurosurgical centers recognized by MCI for at least 4 weeks to be able to observe their practices and understand the difference in approaches to various neurosurgical problems.

It is desirable to have training in certain special areas at another center, when facilities like microsurgical lab training and interventional Neuro-radiology are not available within the parent department or institute.
I) ESSENTIAL PRE-REQUISITE FOR APPEARING FOR THE M.Ch (Neurosurgery) FINAL EXAMINATION:

1. Logbook of work done (surgical procedures performed / assisted, case presentation and other academic activities), rotations, internal assessment report.

2. Publications / paper based on review of available clinical material from the department.

3. One laboratory oriented project / prospective research related to Neurosurgery / thesis completed in all respects for publication preferably published. The thesis / dissertation should be in accordance with University guidelines.

4. Attendance as per rules of the institute – minimum 80% in each year of the course

J) EVALUATION OF M.Ch (Neurosurgery):

Thesis / dissertation will have to be submitted for evaluation by the completion of 2yrs and 6 months of the course

Timing of examinations

a) **Part 1** – at the end of 18 months of training
   Two papers on basic neurosciences including anatomy, physiology, pharmacology, pathology, biochemistry, clinical neurology, neuroradiology, 100 marks each
   *pass marks will be 50% overall*

   **Candidates will necessarily have to pass the above mentioned examination to be eligible to take the final examination**

b) **Part 2** - at the end of 3 years of training
   Four papers – Basic Neurosciences (applied), Clinical Neurology and Neurosurgery (2 papers), advances and operative Neurosurgery,
   100 marks each, total 400 marks
   *pass marks will be 50% overall*

   **Candidates will necessarily have to pass in the theory examinations to be eligible to take the final practical examination and viva voce**
Practical examinations
Distributed as follows
1. Practical clinical examination comprising of long and short cases
total 300 marks

2. Radiology, pathology, operative procedures and general viva
total 200 marks

Minimum pass marks will be 50%
Sample Paper I- Basic Neurosciences

Write short notes on

1. Microsurgical anatomy of the 3rd cranial nerve
2. Regulation of muscle tone and its abnormalities
3. Pharmacology and use of diphenylhydantoin
4. Microsurgical anatomy of the fourth ventricle
5. Pathology of pineal tumours
6. Blood brain barrier in health and disease
7. Embryology and pathology of split cord malformations
8. Internuclearophthalplegia
9. Vascular supply of the spinal cord
10. Sciatic nerve

Sample Paper II – Applied Neurosciences

Marks 100

1. Discuss the pathology, clinical features, diagnosis and management of a patient with Cushing’s disease. (20 Marks)

Write notes on

a. Management of raised intracranial pressure
b. Lipomeningocele
c. Arrested hydrocephalus
d. Complications of surgery for vestibular schwannoma
e. Carotid – cavernous fistula
f. Hangman’s fracture
g. Management of trigeminal neuralgia
h. Brain abscess
Sample Paper III – Neuroradiology and Operative Neurosurgery

Discuss the pathology, clinical features, diagnosis and management of intracranial germ cell tumours

Marks 20

Write notes on

Marks 80 (8 x 10)

1. Surgical approaches to lesions in the anterior third ventricle
2. Pituitary apoplexy
3. Neuro – navigation
4. Management of lumbar spondylolisthesis
5. Endovascular management of intracranial aneurysms
6. Magnetic resonance spectroscopy and its applications
7. Bone grafts and bone graft substitutes
8. Erbs palsy

Sample Paper IV – Recent advances in Neurosurgery

Marks 100 (10 x 10)

Write notes on

1. Minimally invasive spinal surgery
2. Controversies in the management of extra cranial carotid artery stenosis
3. Advances in chemotherapy for malignant gliomas
4. Management of brain metastasis
5. Electrophysiological monitoring during surgery for cerebellopontine angle lesions
6. Role of diffusion tensor imaging in neurosurgery
7. Idiopathic intracranial hypertension
8. Role of endoscopy in the management of hydrocephalus
9. Management of intractable pain
10. Thoracic disc herniation