Approved

At the meeting of the Faculty Council Medicine
No. 3 of 15. 04. 2014

Dean of the Faculty Medicine No.2
PhD, associate professor _____ M. Betiu

Approved

At the meeting of the chair of Neurosurgery
No. 2 of 15 SEPT 2014

Head of the chair,
PhD, professor _____ G. Zapuhlih

Syllabus for students of the

FACULTY OF MEDICINE No.2

Name of the course: **Neurosurgery**

Code of the course: **S.11.O.105**

Type of course: **compulsory**

Total number of hours – 35

lectures — 11 hours, practical lessons ---- 24 hours

Number of credits provided for the course: 2

Lecturers teaching the course:

Professor, Chairman	Grigore Zapuhlh
associate professor	Vasile Galcarschi

Chisinau 2014

I. Aim of the discipline

The discipline aims are to understand the role of the nervous system in diseases of great medical and social importance, such as stroke (ischemic and hemorrhagic), injuries to head and spine, diseases of peripheral nervous system, tumors and others, which are common in medical practice.

This leads to the following goals and objectives in teaching neurosurgery:

a) acquiring of practical dexterity in patient's examination in order to locate and identify the nature of the disease process.

b) proper evaluation of additional information obtained during the investigation: electrophysiological, radiological, CT, MRI.

c) making of clinical diagnosis of neurosurgical diseases commonly encountered in medical practice, which offers the possibility of a treatment.

II. Objectives obtained in teaching the discipline

At the level of knowledge and understanding

- etiology and pathogenesis of the most common neurosurgical diseases
- correlation between etiology, pathogenesis and clinical features
- differential diagnosis in neurosurgery
- main instrumental, imaging and laboratory tests
- principles of treatment in neurosurgery

At the level of application

- The Neurological Examination
- Fundamentals of Neuro-Imaging
  - Plain X-ray
  - Computed Tomography
  - Angiography
  - Magnetic Resonance Imaging
- Lumbar puncture
- Emergency treatment in brain injuries, brain stem dislocation, vascular disorders
- First aid and transportation of spine injured patients

At the level of integration

- understanding of the importance of neurosurgery in medical practice
- flexible interpretation of the neurosurgical disorders
- relationship between neurosurgery and other medical sciences.

- implementation and integration of the neurosurgical knowledge in daily practice
- decision making in neurosurgical treatment

III. Provisional terms and conditions

Neurosurgery is a medical branch, referring to studying, investigation, prevention, diagnosis and surgical treatment of organic and functional disorders of the nervous system.

Neurosurgery course and practical lessons are designed to enable students to acquire a certain amount of theoretical and practical knowledge. At the end of Neurosurgery course the student must know the diagnosis of neurosurgical diseases and to understand the general principles of neurosurgical interventions.

IV. Main theme of the course

I.GENERAL SKILLS, DEGENERATIVE PATHOLOGY

(lecture - 2 hours, seminars and practice - 4 hours)

1. Neurosurgery in general.

1. The importance of separate studying of neurosurgery from neurology.
2. The most important steps of development of neurosurgery in the world and in Moldova.
3. Prestigious neurosurgical schools and the role of greatest neurosurgeons in the development of neurosurgery.
4. Subspecialties of Neurosurgery.
5. The future of neurosurgery.

2. Fundamentals of Neuro-Imaging

1. Recognition of spine fractures and dislocations.
2. Differentiation on computerized images between blood, air, fat, CSF, and bone.
3. Recognition specific disease entities such as epidural, subdural, intracranial hematoma, subarachnoid hemorrhage, brain tumors, and hydrocephalus.

3. Fundamentals of neurosurgical practice

1. The most important neurosurgical procedures.
2. Surgical approaches to the cranium.
3. Surgical approaches to the spine and peripheral nerves.
4. Hemostasis in neurosurgery.

4. **Diagnosis and Management of Nontraumatic Neck and Back Problems**

1. Diagnosis and understanding of the natural history and management principles of whiplash and soft tissue injury.
2. Recognition of the broad categories of spinal pain and radicolopathy:
3. Signs and symptoms (including cauda equina syndrome);
4. Common causes, diagnosis and management (cervical and lumbar disc herniation, osteoarthritic disease, spondylolisthesis);
5. Differential diagnosis and management (including metastatic disease and primary spinal tumors).

6. Recognition of the broad categories of myelopathy:
7. Signs and symptoms (including comparison of acute and chronic spinal cord injury);
8. Common causes, diagnosis and management (cervical and lumbar disc herniation and osteoarthritic disease);
9. Differential diagnosis and management (including transverse myelopathy, metastatic disease and primary spinal tumors).
10. The value of electrophysiology and neuroimaging in diagnosis of spine pathology.
11. Principles of microsurgical treatment of degenerative pathology of the spine.

II. HEAD INJURIES AND BRAIN ABSCESS

(lecture - 2 hours, seminars and practice - 4 hours)

1. **Diagnosis and Management of Head Trauma**

1. Understanding and assignment the Glasgow Coma Score.
2. Recognition of the presentation of brain herniation syndromes in the setting of trauma.
3. Initiation of the management of elevated intracranial pressure in head trauma.
4. Recognize and initiate management of concussion, brain contusion and diffuse axonal injury.
5. Recognition and initiation of the management of acute subdural and epidural hematoma, including surgical indications.
6. Recognition and initiation of the management of penetrating trauma including gunshot wounds.
7. Recognition and understanding of the principles of management of open, closed and basilar skull fractures, including cerebrospinal fluid leak, and chronic subdural hematoma (in children and adults).

2. Diagnosis and Management of Brain Abscess

1. Recognition of the clinical stages and manifestations of abscess and focal infections due to local spread, hematogenous disease associated with immune deficiency, and how they differ from the mimic tumors.
2. Understanding of the general principles in the treatment of abscess and focal intracranial infections (open, puncture, draining).

III. INJURIES TO THE SPINE AND PERIPHERAL NERVES

(lecture - 2 hours, seminars and practice - 4 hours)

1. **Diagnosis and Management of Spinal Cord Injury**

1. The emergency room diagnosis and interpretation of radiologic studies in spinal trauma.
2. Classification and pathogenesis of spinal cord injury
2. Initiation of the management of spinal cord injury including immobilization, steroids and systemic measures.
3. Understanding of the definition and subsequent management principles of the unstable spine.
4. Understanding of management principles in spinal cord injury including indications for decompressive surgery and treatment of the medical

complications associated with cord injury (skin, bladder, bowel movement, respiratory).

2. **Diagnosis and Management of Peripheral Nerve Injury and Entrapment**
    1. Diagnosis of traumatic nerve injury (laceration, stretch and compression) and understand indications and general strategies of treatment.
    2. Recognition of the signs and symptoms of common nerve entrapment (carpal tunnel syndrome, ulnar nerve entrapment, thoracic outlet syndrome and meralgia paresthetica), their etiology, conservative management strategies and indications for surgical intervention.
    3. Principles of microsurgical treatment of nerve injury.

IV. BRAIN TUMORS AND CEREBRAL PARASITOIDS

(lecture - 2 hours, seminars and practice - 4 hours)

1. Diagnosis and Management of Brain Tumor

1. Knowledge of the relative incidence and location of the major types of primary and secondary brain tumors.
2. Understanding of the general clinical manifestations (focal deficit and irritations, mass effect; supratentorial vs. infratentorial) of brain tumors.
3. Recognition of specific syndromes: extra-axial (cerebellopontine, pituitary, frontal….) and intra-axial, in brain tumor presentation.
4. Review of diagnostic tools that are currently used for evaluation (laboratory tests, radiology, biopsy).
5. Understanding of broad treatment strategies (surgery, radiosurgery, radiation, and chemotherapy) in the treatment of tumors.

2. Intracranial hypertension

1. Understanding of the pathophysiology of elevated intracranial pressure, cerebral perfusion and the influence of blood pressure, blood gases, and fluid and electrolyte balance.
2. Recognition of the clinical manifestations of acute brain herniation including the Cushing reflex, midbrain effects and vital signs.
3. Understanding of the impact of focal mass lesions, structural shifts and their consequences.

3. Echinococosis. Cysticercosis.

V. VASCULAR PATHOLOGY

(lecture - 2 hours, seminars and practice - 4 hours)

1. Vascular pathology.

1. Knowledge of the major causes of intracranial hemorrhage: vascolopathy in the aged (hypertension and amyloidosis), aneurysm, vascular malformation, tumor and coagolopathy.
2. Recognition of the symptoms and signs of subarachnoid, cerebral and cerebellar hemorrhage.
3. Application of diagnostic tools in evaluation of acute headache (CT and MRI, role of lumbar puncture).

4. Understanding of the natural history and broad treatment strategies (surgery, radiosurgery, interventional radiology as well as treatment of vasospasm) of intracranial aneurysms and vascular malformations.
5. Recognition of the symptoms and signs of anterior and posterior circulation ischemia emphasizing carotid disease and contrasting it with hemorrhagic stroke.
6. Differentiation among the types of ischemic stroke: embolic, hemodynamic, lacunar.
7. Categorization of etiologic factors of brain ischemia including atherosclerosis, cardiac disease, arterial dissection, fibromuscular dysplasia, vascolitis, venous thrombosis and hematologic disease.
8. Understanding of the treatment options in ischemic disease and their indications, including medical management, risk factor modification and surgical therapy.
9. Diagnosis and monitoring of carotid occlusive disease using noninvasive methods and understand indications for angiography and carotid endarterectomy.

VI. PEDIATRIC NEUROSURGERY

(lecture - 1 hour, seminars and practice - 4 hours)

1. **Diagnosis and Management of Hydrocephalus, Craniostenosis, Congenital Cerebral pathology and Spinal Dysraphism**

1. Recognition of the symptoms and signs of hydrocephalus in children.
2. Recognition of the symptoms and signs of hydrocephalus in adults.
3. Understanding of common etiologies of hydrocephalus in children and adults, and differentiation between communicating and obstructive hydrocephalus.
4. Understanding of treatment strategies for hydrocephalus (shunting procedures).
5. Recognition of common syndromes of spinal dysraphism, their neurologic manifestations and broad principles of management.
6. Recognition of the symptoms and signs of craniostenosis
7. Recognition of the symptoms and signs of meningocele.
8. Principles of surgical treatment of congenital pathology.

V. Recommended literature:

- *A. compulsory:*

1. Neurosurgery (European Manual of Medicine), Christianto B. Lumenta, Springer, 2010*
2. Handbook of neurosurgery, Mark S Greenberg, 7th edition, Thieme. 2010*

- *B. additional:*

1. Essential Practice of Neurosurgery, Kazadi K.N. Kalangu, Springer, 2009

* - available on the internet

VI. Teaching and learning methods

Neurosurgery is studied in a classic manner that includes lectures and practice. During lectures students receive basic information in etiology, pathogenesis, classification, clinical features, diagnosis and treatment options for different neurosurgical diseases.

These topics are discussed on practice, the knowledge acquired during lectures is tested. Patients are clinically examined; different imaging studies are presented and discussed. On demand teacher presents videos, specialized articles, books. Attention is payed to standalone examination of patients by students.

VII. Suggestions for individual activity

The self-training and self-education of students is done in different ways depending on the objectives or the proposed tasks.

An important method of self-training is reading. Reading is a research, an investigation that also assimilates the content of a book, a paper. Understanding of the proposed syllabus is based on the correct decoding of the message by perception, analysis, synthesis, generalization and application of the studied material. Reading also involves individual expression, which signifies difficult personal effort using the maximum tension forces. To achieve the proposed objectives, individual study needs certain conditions: traditional means - pencil and paper, advanced techniques (Internet, etc) and lecture notes.

VII. Methods of assessment

During neurosurgery practice students are evaluated daily with marks from 10 to 0 based on oral answer and testing skills. Students with an average mark above 5 and no absences are admitted to the colloquium. The colloquium consists of oral answer and written tests. There are 100 tests (simple and multiple choice). The colloquium is passed if the final mark is above 5.

IX. Language of study

Romanian, Russian, English, French