POLTAVA STATE MEDICAL UNIVERSITY

Anatomical and physiological features of the nervous system in children.
Semiotics of the main diseases of the nervous system in children.

Assoc. Professor
Soloviova Halyna

Plan of the lecture

- 1. The embryogenesis of the nervous system in children.
- 2. The examination of the nervous system in children.
- 3. The transient unconditioned reflexes of newborn.
- 4. Function of lumbar cerebrospinal fluid.
- 5. Diseases of the nervous system in children.

NERVOUS SYSTEM

- brain begins to develop at 4-6 months
- myelinization is completed by 6-12 months
- pineal body calcifies at 10 y/o

NERVOUS SYSTEM

Brain Growth

- rapid - infancy and childhood
- slowing - middle-childhood to 10 years
  - adolescence

  1/2 adult – 1 year old

  3/4 adult – 3 years old

  9/10 adult – 7 years old
- weight of the brain at 10 yrs. = adult

The seriousness of this problem

- depends on many factors, including the age of the patient,
- the normal range of language development for age,
- the parent-child interaction,
- functioning of the auditory system,
- and the intellectual level of the child

The examination

- Several methods may be used to assess **mental status,**
- **cognitive function,**
- and the level of **alertness,** depending on the age of the child.

Some transient unconditioned reflexes of newborn

Search reflex (Kussmaul's reflex)

up to 3-4 months

Protective reflex of the newborn

Reflex crawling (Bauer) and spontaneous crawling up to 4 months


Grasping reflex up to 3 - 4 months

Babinsky reflex

Peresa reflex

up to 3-4 months

Suckling reflex

up to 1-3-4 years

Moro Reflection **until 4-5th month**

Reflex support and automatic gait of newborns

up to 1-1.5 months

Lumbar Cerebrospinal Fluid:

- Cerebrospinal fluid (cerebrospinal fluid, cerebrospinal fluid) is a fluid that constantly circulates in the ventricles of the brain, the liquor-conducting pathways, subarachnoid (sub-paternic) space of the brain and spinal cord.

Lumbar Cerebrospinal Fluid function:

- Protects the brain and spinal cord from mechanical influences, ensures the maintenance of permanent intracranial pressure and water-electrolyte homeostasis.
- It supports the trophic and metabolic processes between the blood and the brain, the release of the products of its metabolism.
- Fluctuations of cerebrospinal fluid affect the autonomic nervous system.

Lumbar Cerebrospinal Fluid:

determination	New-born	child 1-3 mon.	child 4-6 мон.	child 6 мон.
Colour and transparency	xantochromic, transparent	transparent, transparent	transparent, transparent	transparent, transparent
Pressure, мм H_2O	50-60	50-100	50-100	80-150
Cels count 1 мкл	До 15-20	До 8-10	До 8-10	До 3-5
Type of cells	lymphocytes, neutrophils	lymphocytes	lymphocytes	lymphocytes
Protein, г/л	0,35-0,5	0,2-0,45	0,18-0,35	0,16-0,25
Pandi reaction	+or ++	+	-or+	-
Glucose, ммоль/л	1,7-3,9	2,2-3,9	2,2-4,4	2,2-4,4
Chlorides g/l	7-7,5	7-7,5	7-7,5	7-7,5

Hydrocephalus

- Is the disease in which there is an increase in brain spaces containing cerebrospinal fluid and the increase in brain spaces containing cerebrospinal fluid and the increase in the pressure of the cerebrospinal fluid.On the time of occurrence-congenital an acquired.
- On the course of disease-acute and chronic.
- On localization-external, internal

Hydrocephalus

- The head acquires spherical form.
- Cranial sutures are separate.
- The size of the anterior fontanel increases, The sizes of anterolateral fontanels also increase, they become protruded.
- The scalp becomes thinner.
- Scalp veins become prominent.
- Prominent overhanging forehead.
- Stuck-out ears.
- Suncet and half open eyes.

Weakness may be associated with muscle atrophy

- Muscle tone is tested by assessing the degree of resistance when an individual joint is moved passively

Spasticity

- **Spasticity** is characterized by an initial resistance to passive movement, followed by a sudden release called the **clasp-knife** phenomenon

Rigidity

- **Rigidity,** the result of a basal ganglia lesion, is characterized by constant resistance to passive movement of both extensor and flexor muscles

Hypotonia

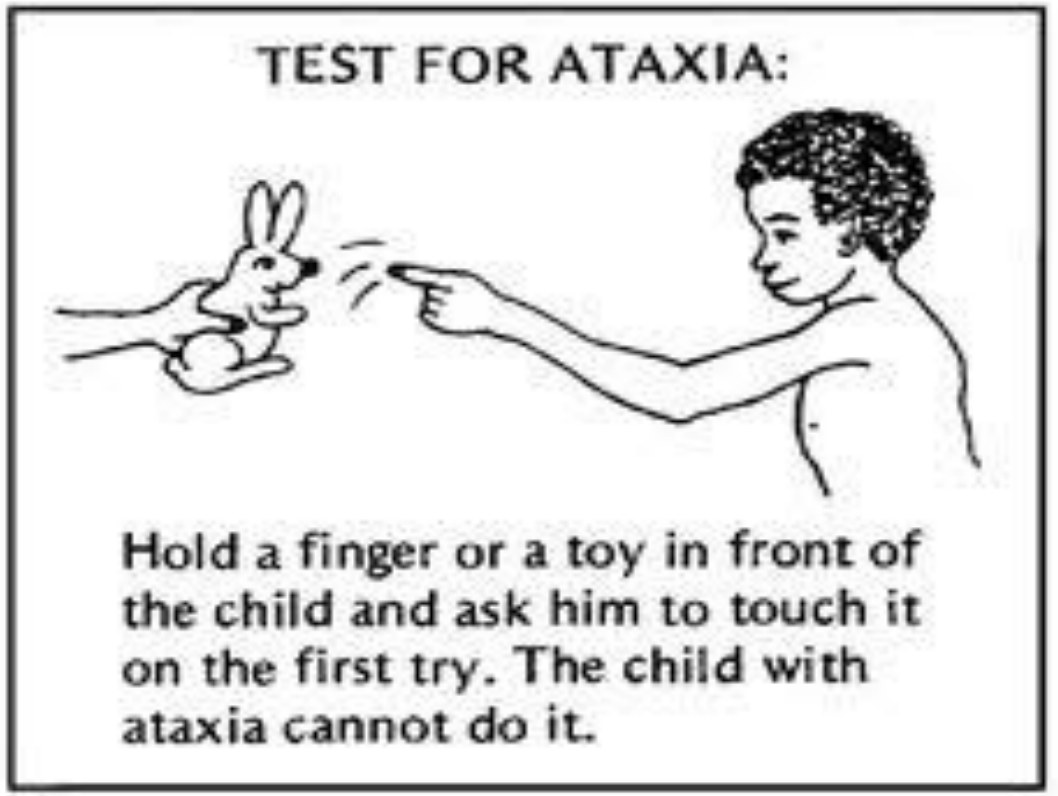
- **Hypotonia** refers to abnormally diminished tone and is the most common abnormality of tone in neurologically compromised premature or full-term neonates

Floppy

- Demonstration of hypotonia may reflect pathology of the cerebral hemispheres, cerebellum, spinal cord, anterior horn cell, peripheral nerve, myoneural junction, or muscle. An unusual position or posture in an infant is a reflection of abnormal tone. A hypotonic infant is **floppy** and may have difficulty in maintaining head support or a straight back while sitting

Ataxia

- **Ataxia** refers to incoordination of movement or a disturbance of balance. It may be primarily truncal or may be limited to the extremities



Romberg sign

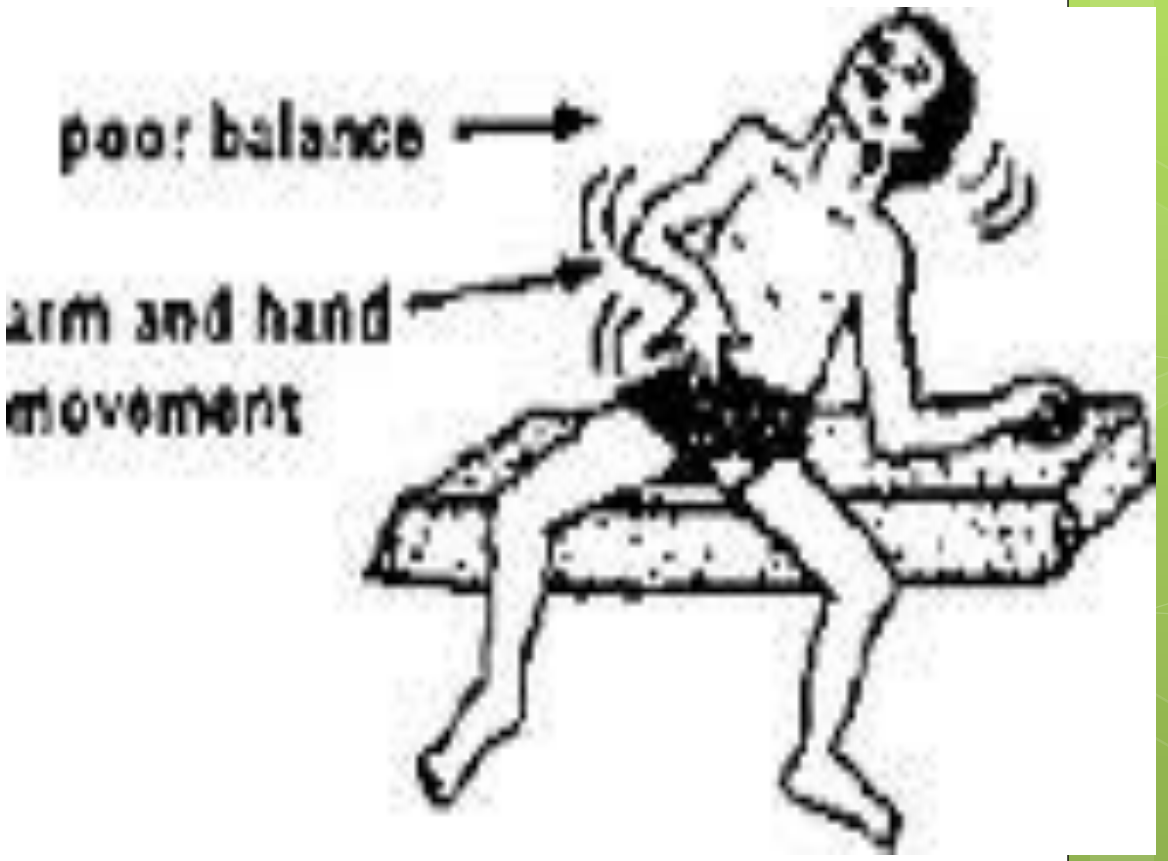
- Sensory ataxia is found with diseases of the spinal cord and peripheral nerves. In these disorders, the **Romberg sign** is positive

Chorea

- **Chorea** is characterized by irregular involuntary movements of the major joints, trunk, and the face that are rapid and jerky. Affected children are incapable of extending their arms without producing abnormal movements

Athetosis

- **Athetosis** is a slow, writhing movement that is often associated with abnormalities of muscle tone. It is most prominent in the distal extremities and is enhanced by voluntary activity or emotional upset.



Cerebral palsy

is a disease of the central nervous system in which one (or several) brain regions are affected, resulting in non-progressive disorders of motor and muscular activity, coordination of movements, functions of sight, hearing, and speech.

Cerebral palsy

- Symptoms at an early stage are characterized by a delay in motor development, the absence of extinction of certain unconditioned reflexes in accordance with age, abnormalities in muscle tone, the use of only one limb during manipulations.
- The formation of motor stereotypes of a pathological nature, deformities, are characteristic of the late residual stage since 3 years and older.

Cerebral palsy

- Against the background of burdened organic changes in the brain, secondary mental illnesses can develop.

- Cerebral palsy can be combined with mental retardation (MI), disorders of the personality's emotional-volitional sphere (autism spectrum disorder), epilepsy, and other mental illnesses.

- Often the psychic sphere in children with this disease

does not suffer, the intellect corresponds to the age norm, and such children can study in general education institutions or in inclusive classes.

Microcefaly

- Is the reduction of the size of the skull
- The child is born with such a head.
- The facial part of the skull is bigger than it as cranial part.
- The fontanel and sutures between the bones are often closed.
- Futher the facal skull prevails over the cerebral part. He head narrows upwards.
- Narrow and the low forehead, earlobes are big and located low.
- Intellectual undervelopment is usually observed.

Cephalogematoma

- a hemorrhage arising between the periosteum and the external surface of the cranial bones. The tumor is limited to the edges of one or another bone of the skull, often parietal, less often occipital. Disappears in 3 - 8 weeks. Treatment is usually not required: with suppuration – surgical treatment, antibiotics


Thank you for attention

Literature, was used in the lecture

- 1.Nelson Textbook of Pediatrics: 21th edition / Klegman S, Geme ST, Tasker W, 2021. – 1078 p. 2. Основи педіатрії за Нельсоном: переклад 8-го англ. видання : у 2 томах. Том 1 / Карен Дж. Маркданте, Роберт М. Клігман. – К.: ВСВ «Медицина», 2019. – XIV, 378 с. 2.Пропедевтична педіатрія : підручник для студентів вищих медичних навчальних закладів IV рівня акредитації / В. Г. Майданник [та ін.]. - 2-ге вид., випр. та допов. - Вінниця : Нова кн., 2018. - 871 с. : табл., іл. 3.Педіатрія : нац. підруч.: у 2 т. / Н.Г. Гойда, Р.О. Моісеєнко, Л.І. Чернишова, Ф.І. Лапій, В.В. Бережний та ін.; за ред. В.В. Бережного; Асоц. педіатрів України МОЗ України. - К. : [б. в.], 2013 -Т. 1. - 2013. - 1037 с. : табл., іл. 4.Педіатрія : підручник для студентів вищих медичних навчальних закладів IV рівня акредитації / О. В. Тяжка [та ін.] ; за ред. О. В. Тяжкої ; Нац. мед. ун-т ім. О. О. Богомольця МОЗ України. - 5-те вид., випр. та допов., оновлене. - Вінниця : Нова кн., 2018. - 1150 с. : табл., іл. 5.Педіатрія : національний підручник : у 2 т. / Д.Д. Іванов, С.В. Кушніренко, Д.А. Сеймівський [та ін.] ; за ред. В.В. Бережного; Асоціація педіатрів України. – К. : Сторожук О.В., 2013. – Т. 2. – 1021 с. 6. Extracorporeal Life Support Organization (ELSO). ELSO Guidelines for Neonatal Respiratory Failure Supplement to the ELSO General Guidelines. 2018 Dec [cited 2018 Jun 22]; 16. Snoek KG, Reiss IKM, Greenough A, Capolupo I, Urlesberger B, Wessel L, et al. Standardized Postnatal Management of Infants with Congenital Diaphragmatic Hernia in Europe: The CDH EURO Consortium Consensus - 2015 Update. Neonatology. 2016;110(1):66–74. 7. The Neonatal Inhaled Nitric Oxide Study Group. Inhaled nitric oxide in full-term and nearly full-term infants with hypoxic respiratory failure. N Engl J Med. 2018;336(9):597–604. Robertson C, Sokol GM, Solimano A, Singer J, et al. Early Inhaled Nitric Oxide Therapy for Term and Near Term Newborn Infants with Hypoxic Respiratory Failure: Neurodevelopmental Follow-Up. J Pediatr. 2017 Mar;150(3):235–240.e1.
- Інтернет – ресурси:
- Сайти МОЗ України: https://moz.gov.ua/protokoli Онлайн-платформа з протоколами на засадах доказової медицини Джерела клінічних настанов Інформаційні ресурси http://www.booksmed.com/pediatriya http://pediatriya.info http://health-ua.com/parts/pediatrics http://www.med-edu.ru/pediatr http://medi.ru/Doc/j01.htm http://www.mif-ua.com/archive/zhurnal-zdoroverebenka/numbers http://medkniga.ucoz.net/publ/pediatrija/40 http://www.medport.info/index.php?option=com_content&view=section&id=48&Itemid=73 http://youalib.com/медицина/педіатрія