Intracranial hypertension/ PGS

Intracranial hypertension

Intracranial hypertension is a life-threatening condition. Intracranial hypertension is the major mechanism of secondary cerebral injury. The intracranial space is a tightly bounded and closed compartment, which consists of brain tissue (80%), cerebrospinal fluid (10%) and vascular filling (10%). This content remains constant and each change in one of these compartments must be associated with a compensatory change in the other. Compensation mechanisms are limited. Processes that increase intracranial pressure are referred to as **intracranial expansion processes** . Intracranial SOL (space-occupying lesion).

Clinical signs of intracranial hypertension syndrome:

- **headache** - often worse lying down (especially in the morning after waking up) and when using an abdominal press, not responding to common analgesics
- **pain behind the eyes** or when the bulbs move
- **vomiting** - sudden, sometimes without nausea (projectile vomiting)
- **vertiginous states**
- **vision problems** - blurred vision, diplopia, loss of vision
- **focal symptoms** according to the location of the pathology
- **meningeal symptoms**
- **rise in blood pressure** and slowing of the heart rate
- **impaired consciousness** (quantitative or qualitative)

As the condition progresses, the compensatory mechanisms are depleted, the brain is pushed into the physiological holes and **cone symptoms develop** . Due to the anatomical arrangement, brain cones (herniations) have typical localizations.

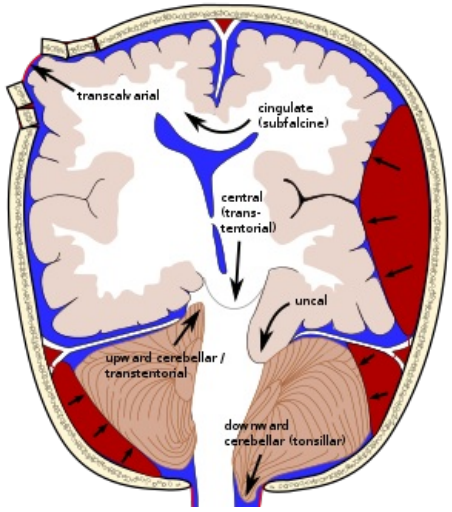
Brain herniation

Descending transtentorial herniation - lateral

Temporal or uncal cone, especially during temporal foci, etc.

Clinical manifestations:

- **ipsilateral mydriasis** with extinct photoreaction to **complete paresis n. III**
- at lateral pressure on the trunk brain **disorder of consciousness with contralateral hemiparesis** , **decerebral convulsions ,** at the progression of the **involvement of the respiratory and circulatory centers**
- when the trunk is pushed to the opposite side, **mydriasis** can also develop here by oppression of the tentorium , which is then **contralateral** , while **hemiparesis is ipsilateral** to the cone.
- under tentator pressure on the posterior cerebral artery in her basin



Cerebral herniation: 1 - uncal, 2 - central, 3 - cingular, 4 - transcalvarary, 5 - cerebellar, 6 - tonsillar

Descending transtentorial herniation - central

Axial - especially with a symmetrical increase in intracranial pressure, diencephalic and mesencephalic movement caudally - leads to mechanical damage to the brain, due to the tearing of the perforating vessels with multiple hemorrhages or infarcts of the cerebral cortex

Clinical manifestations:

- **quantitative impairment of consciousness** , **decortication rigidity** with spastic manifestations, **decerebration** during progression , **respiratory disorders**
- **diencephala lesions** - miotic pupils, responsive
- **mesencephalic lesions** - pupils of medium width or mydriatic, fixed

Ascendant transtentorial herniation

Clinical manifestations:

- **nausea , vomiting**
- progressive **impairment of consciousness** without localization symptoms
- development of **obstructive hydrocephalus**

Occipital herniation

Tonsillar - cerebellar tonsils pressed into the foramen occipitale magnum, thus compressing the oblongate.

Clinical manifestations:

- **headache , dizziness , vomiting**
- **opisthotonus**
- **paresthesia of both HK**
- there is a risk of **rapid progression** - with involvement of the respiratory and vasomotor center, bilateral mydriasis and a decrease in muscle tone

Subfalcial herniation

Gyrus cinguli pressed under the falx cerebri.

Clinical manifestations: mostly silent, but compression of the anterior cerebral artery and infarction in its basin may occur .

Examination during suspension for intracranial hypertension

- **CT brain** event. **Brain MRI** - a sovereign method; changes in the size of the ventricular system, extinction of subarachnoid spaces, displacement of midline structures, focal expansion.
- **Eye background examination** - congestive papilla event. with hemorrhages on the eye background.
- **EEG** - non-specific diffusion abnormalities (mostly slowing of activity).

The most common causes of intracranial hypertension syndrome

- **intracranial tumors** - primary, metastatic
- **hematomas** - spontaneous or traumatic
- **extensive ischemia**
- **hydrocephalus** - non-communicating, communicating (normotensive hydrocephalus - clinically: spastic gait disorder, urinary incontinence, organic *psychosyndrome*)
- **cerebral pseudotumor**
- **diffuse swelling of the brain of** various etiologies - CNS inflammation , toxic, drug-induced, hypoxic, hypoosmolar, metabolic - metabolic ketoacidosis , hepatic encephalopathy , uremia
- **brain abscess**
- **brain trauma**

Therapy

In addition to targeted therapy, monitoring and **control of heart rate** , **blood pressure** , **respiration** , **SpO 2** , **ECG** , **temperature** and **central venous pressure** is an essential part of the treatment of patients with intracranial hypertension , monitoring of **intracranial pressure** (ICP sensors , ultrasound) is also appropriate about patients.

The main strategy of **targeted treatment** is to suppress especially vasogenic component of cerebral edema by short-term **increase of blood osmolality** and creation of osmotic gradient between vascular compartment and interstitium (mannitol and other **osmotically** active substances), in indicated cases **treatment with corticoids** , mandatory **hyperventilation** , **performance** - see diagram. It is also important to prevent the development of secondary cerebral damage due **to tissue hypoperfusion (hypoxia), ie to maintain sufficient cerebral perfusion .**

CNS Tumors

CNS tumors are one of the possible causes of **intracranial hypertension** . For CNS tumors, it is generally true that the designation is benign, relative to the confinement of the intracranial space and the relatively constant distribution of the individual compartments. Nervous system tumors can be both **primary** and **metastatic** . If a CNS tumor is suspected, metastatic origin should be considered (about 20% of patients with malignancy have metastatic brain involvement).

Incidence

2–19 diseases / 100,000 inhabitants / year

age dependence

Division

according to location, size and degree of malignancy (TNM and GMT staging system)

according to the histological picture up to 4 degrees - according to the presence of atypia of cell nuclei, increased mitotic activity, endothelial proliferation and the presence of necrotic changes. *0 changes*

Degree

1 = no change

2 = one change

3 = two changes

4 = three changes

Clinical signs

1. Generalized - intracranial hypertension syndrome (see above)

2. Focal from local tissue damage

3. Bearing remote - conical (see above)

Symptoms leading to suspected CNS tumor

Cefalea (persistent, worse at night and in the morning than in the afternoon, associated with nausea or vomiting or diplopia or weakness)

Personality changes (memory disorders, behavior, concentration, confusion)

Epileptic symptoms (first symptom in ¼ tumors)

Development of focal symptoms

Slow progression (sudden onset of bleeding, decompensation of cerebral edema , hydrocephalus)

WHO classification of CNS tumors

I. tumors of neuroepithelial tissue	
astrocytic	**astrocytoma gr. I – III , astrocytoma gr. IV (gliobl. Multiforme)**
oligodendroglial	**oligodendroglioma**
ependymal	**ependymoma**
chorioid plexus	papilloma, papillocarcinoma
neuronal	ganglioma, gangliocytoma
primary neuroectodermal	**medulloblastoma**
II. nerve sheath tumors	**neurinoma** , neurofibroma
III. meningeal tissue tumors	**meningioma**
IV. tumors of vascular origin	hemangiomas
V. germ cell tumors	germinoma, choriocarcinoma, embryonic carcinoma
VI. primary malignant lymphomas	
VII. malforming tumors	**craniopharyngeal** , cysts, lipomas
VIII. vascular malformations	telangiectasia, AV malformations, caverns.
IX. pituitary tumors	**adenomy**
X. local tumors	chord, chemodectom, chondroma
XI. metastatic tumors	**carcinomas** , **sarcomas** , **NH lymphomas**

Metastatic processes in the CNS

Dural

Leptomeningeal

Multiple intracranial

Solitary

The most common primary tumors metastasizing to the CNS are ca - lung , breast , Grawitz 's tumor and malignant melanoma .

Auxiliary examinations

CT

MRI

Angiography

Perimyelography (PMG)

Scintigraphy

FIVE

MRI spectroscopy

Biopsy

Search for a primary tumor in case of metastatic disease

Therapy

Targeted treatment of CNS tumors is beyond the scope of this publication. It is part of an interdisciplinary collaboration between a neurologist, neurosurgeon, radiologist, radiotherapist and neurooncologist. The principles of the procedure are general procedures in the care of a neurological patient, and targeted treatment is usually a combination of surgical solution and radiation therapy and possibly cytostatic chemotherapy.

The acute condition is the development of intracranial hypertension syndrome, see the procedure above. In patients with metastatic disease or patients with advanced edema, more corticoids in intravenous or oral form (dexamethasone) come to the fore.

Individual treatments for CNS tumors

- Microsurgery
- Stereotactic operation
- Laser, UZ
- Traditional radiotherapy
- Fractionated radiotherapy
- Radiosensitive substances (oxygen)
- Stereotactic radiosurgery
    - (Gamma Knife, Linear accelerator)
    - (Interstitial brachytherapy)
    - (Boron Neutron Capture Therapy)
- Chemotherapy
- Interstitial chemotherapy
- Intrathecal infusion

(only oligodendroglioma and CNS lymphomas are chemosensitive in adulthood, and medulloblastoma in childhood)

Differential diagnosis of CNS tumors

Traumatic lesions	▪ chronic subdural hematoma
Inflammatory lesions	▪ brain abscess ▪ encephalitis
Vascular lesions	▪ ischemic stroke (progressive stroke) ▪ intraparenchymal hemorrhage ▪ AV malformation ▪ aneurysm
Cerebral pseudotumor	
Other	▪ demyelinating disease attack, arachnoid cyst, headaches of non-tumor etiology, decompensation of neurodegenerative diseases,...

Kategorie:Onkologie Kategorie:Neurologie Kategorie:Neurowiki