# Neurological examination of the neurosurgical patient

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### **E-learning**



További információ : GYIK : Segítség : Adatvédelem

### **E-learning**







In peripheral nystagmus, how is the direction of nystagmus determined?



Peripheral vestibular syndrome 4.) The cortical center of vestibular function is in the posterior central gyrus, in the arm region.

#### Examination of vestibular function

**Examination of nystagmus**: the eyes are first observed in resting position, then during following eye movements in all four directions, in both sitting and supine positions. The direction, frequency, amplitude, and nature (rhythmic or non-rhythmic) of nystagmus, and the influence of gaze, change of head and body position is described. Nystagmus may be examined with *rotational and caloric stimulation*. With rotation, both labyrinths are stimulated, whereas with caloric stimulation the two labyrinths can be examined separately.

With rotation, the endolymph in the lateral (horizontal) semicircular canals flows in the direction opposite to the direction of rotation. The slow component of the nystagmus is opposite to the direction of rotation, therefore it is in the same direction as the flow of endolymph; the quick component beats in the direction of rotation. When rotation is stopped, the direction of post-rotational nystagmus is inverted, thus the quick component now beats opposite to the direction of rotation. The direction of deviation and past-pointing is the same as that of the slow component.

With caloric stimulation, warm water is injected into the ear, which causes an ampullopetal flow of the endolymph in the lateral semicircular canal and a nystagmus beating in the direction of the stimulus. With cold stimulation, the direction of nystagmus is towards the opposite side. Caloric stimulation is suitable for determining whether the nystagmus is caused by a lesion to the vestibular organ. Caloric stimulation on the side of lesion produces no nystagmus, and causes no change in any on-going nystagmus.

The Romberg's test is used to differentiate peripheral and central vertigo.

#### **Description of normal findings**

Whispered words are well heard on both sides. Weber test is normal. Rinné test is positive on both sides. No nystagmus. No swaying in Romberg's test. No past-pointing in Bárány's test. No deviation when walking with eyes closed.

#### Nystagmus

Nystagmus is an involuntary, rhythmic eye movement with a slow and a quick component, occurring in the presence of dysfunction of the vestibular, cerebellar and the eye movement control system. Based on the relation of the quick component and the direction of gaze, nystagmus of peripheral vestibular origin may be of *1st degree* if the nystagmus appears only when looking in the direction of the quick component, *2nd degree* if it appears already when looking straight ahead (go to the video), and *3rd degree* if the nystagmus is present in any direction of the gaze. The direction of the quick component of the nystagmus may be *horizontal*, *vertical* (go to the video), *oblique* or *rotatory*. Nystagmus of peripheral vestibular origin is *rhythmic*. The slow component results from the activity of the intact side,







### The 4 questions to answer

- 1. Is there a neurological disease?
- 2. If yes, where is the lesion?
- 3. What pathological conditions may cause a lesion at this site?
- 4. In this patient which of these conditions is the most likely to be present?

### Case 1.

- 60 y/o man
- Car accident years before, with fracture of left scapula
- Abstinent to alcohol
- Quitted smoking 1 month ago (before that he smoked 2 packs per day)
- Clonisation in his left arm started during conversation
- No loss of consciousness

### On admission

- RR: 205/120 mm Hg
- No other signs of internal disease
- R. decreased visual acuity
- R. larger pupil
- L. central (upper motor neuron) facial laesion
- L. severe paresis of upper extremity, with exaggerated deep tendon reflexes, Trömner and Hoffmann signs.
- No other signs

## MRI



### Case 2.

- 61 y/o woman
- 24 years ago ovariectomy due to benign tu
- 10 y hypertension
- 3 y surgery for duodenal ulcer
- 1 y planocellular lung cancer discovered at screening surgery, chemoth.
- CT control no recidival tumor
- One week ago left extremities became weak, weakness worsened 2 days ago

### On admission

- RR: 165/90 mm Hg
- Alopecia (chemoth)
- Cushingoid face
- Scar of chest surgery
- Left central facial paresis
- Left sided faciobrachial mild hemiparesis
- Normal reflexes
- Alert, oriented

### Non-contrast CT



### Postcontrast and native CT



## Other patient. Primary lung cancer. Neurosurgery indicated??



### Case 3.

- 37 y/o woman
- History unknown
- Found in the morning comatose in her bed
- Does not communciate
- RR: 116/78
- T: 38 °C
- Periodical nystagmus to the left
- Repeated epileptic seizures (status epilepticus)
- No other focal signs

## MRI



### MRI and MRA





zp.

### Angioma known since 40 years. Neurosurgery indicated?



### Patient history

- Chronic alcohol consumption
- Epileptic seizure
- Head injury
- CT

### **CT** examination



### **CT** examination





neuro- = nervelogia = knowledge of soemthing,  $\lambda \epsilon \gamma \omega$  (*lego*), to speak

# Neurology





- Central nervous system
  - Brain
  - Spinal cord
- Radices, plexus, nerves
- Neuromuscular junction
- Muscles

# Neurology and neurosurgery

### Dsieases of the central nervous system

- Tumors
- Cerebral abscess
- Cerebrovascular disorders
  - Cerebellar hemorrhage
  - Cerebellar infarct
  - Intracerebral hemorrhage
  - AVM
  - Aneurysm
- Traumatic lesions
  - Subdural and epidural hemorrhage
  - Other central nervous system trauma (commotion, etc)
- Spinal cord compression

### Peripheral nervous system disorders

- Acustic neurinoma
- Carpal tunnel syndrome (and other peripheral compression syndromes)
- Some cases of radicular compression caused by intervertebral disk herniation

### Cerebrovascular disorders

Jetter



### Carotis endarterectomy





www.carotid.net

# Intracerebral hemorrhages: where is the limit?



















### STICH trial

Figure 1 Operation rate for each country for patients for whom the neurosurgeon was 'certain' about treatment option



# A STICH RESULTS(Lancet 2005;365:387-397)

- Good outcome:
  - Early surgery: 26,1%
  - Early medical treatment: 23,8 %



# Surgery for NPH





### Tasks in general practice

- Take the history and perform exam.
- Consider a neurological disease.
- Answer the 4 questions.
- Organize diagnostic procedures.
- Decide on treatment.
- Educate and help relatives of patient

# Taking the hisory

- Not enough time.
- What exactly mean the patient and the relative on the complaint?
- Do you suspect a neurological disease?
- Is there an emergency?

### What to consider at history

- Age
- Clarifying the symptoms
- Mode of onset and progression
- Chronological sequence of events
- Value of negative information
- Exclude irrelevancies
- Drugs
- Heteroanamnesis (interviewing relatives)

### The 4 questions to answer

- 1. Is there a neurological disease?
- 2. If yes, where is the lesion?
- 3. What pathological conditions may cause a lesion at this site?
- 4. In this patient which of these conditions is the most likely to be present?

# If you suspect a neurological disease

- Think over what to do with the patient.
- Can you take the responsibility to treat this patient?
- Is it necessary to send the patient to a neurologist?
- How urgent it is?

Organizing the diagnostic procedures

- Is it an emergency?
- If yes, where to send the patient?
- If not, how far can I get in the diagnostic process?
- What ancillary investigations to ask for, and from whom?
- Where do they perform these investigations?
- If the appointment is at a distant time, is it safe to wait?

Ancillary invstigations to confirm or refute the suspected diagnosis

- Methods examining structure
  - X-ray, CT, MRI, ultrasound
- Imaging methods examining function – fMRI, SPECT, PET, ultrasound
- Electrophysiological methods

   EEG, ENG, EMG, evoked responses
- Examination of the cerebrospinal fluid
- Immunological, genetic and molecular biological investigations
- Cytology and pathological investigations
- Consultations with other specialities

### Previous practice (until the 1980-ies)



1. day: cisternal CSF



2. day: percutan carotid angiography





### PNEUMOENCEPHALOGRAM

### MR IMAGING

# ICH



### Arteria cerebri anterior



### **Carotid Ultrasound**





## **Transcranial Doppler**



### Visual evoked response

















### CSF examination



## Pathology



### **ISCHEMIC STROKE**

INTRACEREBRAL HEMORRHAGE

Hegedűs, 2001

### EMERGENCY IN NEUROLOGICAL DISEASES

Unexpected (street, home, workplace), sudden onset conditions Expected (inhospital, dg known) emergency situations

- stroke
- epileptic seizure
- head injury
- loss of consciousness due to unknown cause

• etc

### repeated epileptic seizures

- breathing disorder in myasthenia
- breathing disorder in ALS
- breathing disorder in periphreal disorders (Guillain-Barré)

• etc

Admit to general emergency unit

Directly admit to specialized unit:

- STROKE
- NEUROTRAUMATOLOGY
- Etc

Transfer to specialized/ intensive unit

















### Mild traumatic brain injury

1./ Characteristic history?

2. / When to perform neuroimaging (CT or MRI) and when is it not necessary?

3. / What are the criteria to decide on hospitalization or discharge home?

4./ What are the late consequences of MTBI?

# Mild traumatic brain injury

- Blunted force, closed skull injury
- Associated with LOC < 20 min and/or retrograde amnesia</li>
- Glasgow Coma Scale between 13-15,
- No focal neurological signs,
- No signs of intracranial damage (eg. epileptic signs), and
- Nothing pathological can be seen by CT

# Commotio cerebri (cerebral concussion )

- Relatively short (max 1 h) LOC after skull injury with
- amnesia (retreograde or anterograde) but
- without other signs of brain injury and
- neuroimaging (CT, MRI) reveals no pathological findings,
- there is no blood in the CSF.

### Contusio cerebri (cerebral contusion):

- Skull taruma is usually (but not always) assocaited with longer LOC (sometimes days),
- cerebral lesions refelected by appropriate focal neurological signs,
- neuroimaging reveals focal hemorrhages in the brain tissue and
- the CSF is usually stained with blood

# Compressio cerebri (cerebral compression)

- Compression on the brain caused by a consequence of injury (subdural or epidural haematoma, contusion hemorrhage and edema)
- LOC associated with the injury might be followed by a transient period with alert state ("lucidum intervallum"),
- The increasing intracranial pressure due to the increasing space occupation might result in cerebral herniation.



### 4. ábra

Epilepsziás rosszullét során elszenvedett koponyasérülés következményei: az állományban jobb oldalon <u>frontobasalisan</u>, <u>parietalisan</u> és <u>temporalisan</u> többszörös <u>contusiós</u> vérzések (fehér nyilak), <u>bal oldalon</u> a <u>falx</u> mellett és <u>frontalisan</u> kis <u>subduralis</u> <u>haematomák</u> (fekete nyilak)

### Indications of neuroimaging (CT or MRI) after head injury

- Always if  $GCS \leq 13$ ,
- If GCS ≥ 14 and during injury
  - amnesia
  - LOC
  - vomiting
  - suspected cranial fracture
  - coagulation disorder in history
  - with concomittant anticoagulant treatment
  - if focal signs are seen
  - if post traumatic epileptic seizure occurs
  - severe or increasing headache
  - anisocoria
  - multiple trauma

# Conditions of discharge in patients with low risk

- normal CT,
- GCS = 15,
- at most only very mild complaints (headache or dizziness),
- no LOC,
- no amnesia,
- no neurological or cognitive signs,
- no any other significant complaint or sign,
- supervision at home can be organized.



#### Membership

Patient Care & Practice Mgmt.

Coding & Reimbursement

Practice Guidelines

#### Guidelines

Guideline Resources

Development Process

Projects in Process

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CME & Professional Education

Research Activities

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- Stroke <u>AAN and AHA joint guideline on Anticoagulation and Antiplatelet</u> Agents in Acute Stroke (.pdf).
- Parkinson's Disease Initial Treatment of Parkinson's Disease (.pdf).
- Dementia

AD can be reliably diagnosed; early diagnosis is possible and important. While AD is not curable, there are treatment and care options available today.

- Detection of Dementia-Mild Cognitive Impairment: (.pdf) AD and MCI differ from normal aging. Patients with MCI should be identified and monitored, as progression to AD is likely.
- <u>Diagnosis of Dementia</u> (.pdf) The clinical criteria for AD are reliable and valid. <u>data (.pdf)</u>
- Management of Dementia (.pdf)
   Cognitive and behavioral symptoms can be treated.
   Caregiver programs are effective. data (.pdf)
- Summary Version for Physicians, Summarizes all three.