

# Brain herniation

A **brain herniation** (pressure cone) is a protrusion of the brain tissue. A certain area of the brain is pushed out of its typical location due to the influence of various pathological processes, for example edema. These lesions increase intracranial pressure. There is ischemia of the brain, damage in the area of the herniation, and often also **oppression of vital structures** in the places where the herniation pushes through.

On the surface of the brain, the border of the protrusion is visible as an indented groove. Larger or longer-lasting herniations can be congested, subsequently hemorrhagic to necrotic.

## Overview

Type of herniation	What?	Where?	Pushes on
Central	stem rostrum + diencephalon	into the tentorial opening	and cerebri posterior and trunk arteries
Interhemispheric	gyrus cinguli	under the falx cerebri	a. cerebri anterior
Temporal	uncus gyri hippocampi	to the back pit	n. oculomotorius, a. cerebri posterior
Tonsillar	cerebellar tonsils	foramen magnum	elongated spinal cord

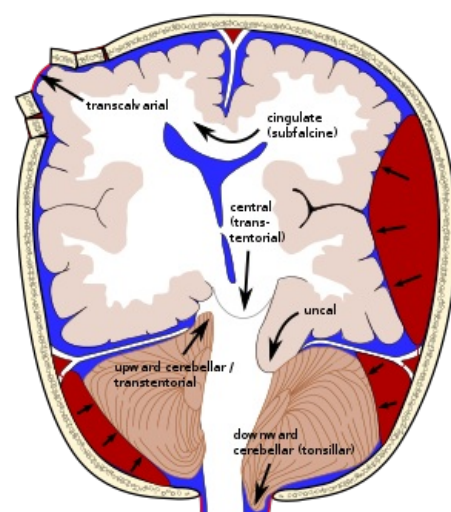
## Cingular (interhemispheric) herniation

In the case of cingulate herniation, the gyrus cinguli (the gyrus surrounding the medial corpus calosum) is pushed under the falx cerebri. This typically occurs with unilateral processes in the frontal lobe. Diagnostically, it is visible both on CT and on angiography, when we denote the movement of the a. cerebri anterior below the falx as **signum falcis**. Clinically, it usually has no noticeable symptoms. However, there may be compression or kinking of the a. cerebri anterior, subsequent ischemia deepens the symptomatology (palsy DK...)

## Central herniation (transtentorial)

In central herniation, the rostral part of the trunk and diencephala is pushed into the tentorial foramen (after the clivus). There is compression of the posterior cerebral artery and trunk arteries. It arises from a lesion in the supratentorial space. It gradually leads to rostrocaudal deterioration of stem functions. We distinguish the following clinical stages for this herniation:

1. **Diencephalic** disorder manifests itself first as symmetrical bilateral miosis (central sympathetic disorder - hypothalamus), followed by disturbances of consciousness according to the Glasgow Coma Scale [[Glasgow depth of unconsciousness scale](GCS)] ] 9-14. A pull on the stalk of the pituitary gland causes diabetes insipidus, pyramidal irritation phenomena on DK (Babinski) and a hypertonic state. In the worst case, **decortication** (flexion) occurs. Breathing is spontaneous with yawns and sighs, later Cheyne-Stokes. This impairment is 95% reversible.
2. **Mesencephalon** disorder is accompanied by bilateral mydriasis (parasympathetic disorder - Edinger-Westphal nuclei) and impaired consciousness according to GCS 4-9. Decerebral rigidity (extension, opisthotonus) appears.  
 ⚠ **Has a 95% death rate.**
3. Disruption of the **pont** manifests itself as loss of muscle tone = atony, because the connection to the cerebellum does not work. The pupils are unresponsive; mydriatic. tachypnea occurs.
4. Disruption of the **medulla**, which contains vitally important centers, is manifested by a drop in blood pressure (regulatory pressure center) and respiratory arrest (respiratory center).



Brain herniation: 1 - uncal, 2 - central, 3 - cingulate, 4 - transcalvarial, 5 - cerebellar, 6 - tonsillar

## Temporal herniation

Displacement of the uncus gyri hippocampi into the posterior cranial fossa is referred to as temporal herniation. It occurs in rapidly expanding processes compressing the temporal lobe (epidural hematoma). The first on the wound is N. III, there is homolateral mydriasis, then contralateral hemiparesis either with oppression of the cortex or pyramidal tract. As long as the patient has a mydriatic one pupil, it is still relatively fine, then it continues to press on the mesencephalon and bilateral mydriasis occurs. Further progression corresponds to the picture described for central herniation.

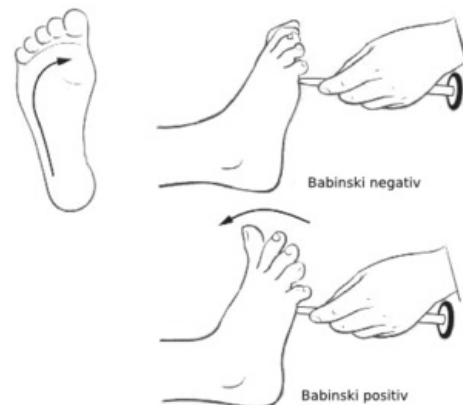
## Occipital Conus

An occipital conus is a herniation of the tonsils cerebellum through the foramen magnum. There is oppression of the spinal cord long. It can arise as a terminal phase of central or temporal herniation or it is during expansive processes in the posterior cranial fossa. Clinically, we find headaches, double vision (diplopia), limb weakness, coordination disorders (ataxia), irritation phenomena. Opposition of the neck (pseudomeningeal syndrome) is also often seen. Decomensation of the condition can be sudden.

**⚠ Skips the stages of deterioration and goes straight to death because the vital centers are oppressed.**

## Fungus cerebri

Fungus cerebri is a special type of herniation. It occurs **after brain operations**, when the edematous brain pushes into the trepanation hole and raises the skull bones.



Pyramidal irritation phenomena on DK – Babinski

## Links

### Source

- BENEŠ, Jiří. *Studijní materiály* [online]. ©2010. [cit. 2009]. <<http://jirben.wz.cz>>.

### References

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- POVÝŠIL, Ctibor – ŠTEINER, Ivo, et al. *Speciální patologie*. 2. edition. Praha : Galén : Karolinum, 2007. 430 pp. ISBN 978-80-246-1442-7.