International Journal of Studies in Natural and Medical Sciences
Volume 02 Issue 05, May, 2023
ISSN (E): 2949-8848
Scholarsdigest.org

Evaluation of the Stage of Dislocation Syndrome in Supratentorial Brain Tumors

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Abstract
Indications for the volume of surgical intervention in supratentorial brain tumors are often determined by the severity of the dislocation syndrome, but there is no consensus on the degree or stage of this pathological phenomenon.
Purpose - to propose a scale for assessing the stages of the dislocation syndrome, taking into account the analysis of our own material and literature data.
Material and research methods. We retrospectively and prospectively studied the data of 95 patients with supratentorial brain tumors. Based on these data, we have proposed our own scale for determining the stage of dislocation syndrome in supratentorial brain tumors.
Conclusion. The proposed scale revealed a very good Alpha value and can be used to assess the stage of the dislocation syndrome.

Keywords: brain tumor, supratentorial localization, dislocation stage.

Introduction

The relevance of research. According to the definition of many authors, dislocation syndrome is a complex of signs of displacement of the cerebrum or cerebellum into anatomical intracranial fissures and foramens, followed by damage to the brainstem [2]. The scheme of the clinical course of the dislocation syndrome was widely recognized, in which, taking into account the depression of consciousness, stem reflexes, motor disorders and respiration, the course of the axial dislocation was divided into the early diencephalic, midbrain stage, the stage of the upper and lower parts of the bridge and the stage of the medulla oblongata [3]. And with lateral, temporo- tentorial dislocation, they identified the early and late stages of the oculomotor nerve, the stage of the midbrain, the upper and lower parts of the pons, and the medulla oblongata [4]. But taking into account the fact that any localization of the tumor can occur, and this scheme also does not take into account the size of intracranial anatomical reserves, this classification does not always adequately assess the patient's condition [1]

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The goal is to propose a scale for assessing the stages of the dislocation syndrome, taking into account the analysis of our own material and literature data.

Materials and research methods. Archival data of 45 patients with dislocation syndrome with supratential brain tumors were retrospectively studied . In doing so, we relied on the following points:

1. The dislocation syndrome in brain tumors has its own characteristics and differs from that in injuries or non-traumatic intracerebral hemorrhages. This causes the division of the dislocation syndrome into stages, in contrast to injuries or strokes, where division into degrees would be more appropriate. In this regard, we considered it necessary to approach the dislocation syndrome in supratentorial brain tumors from the side of the adaptive properties of the body and identified the adapted, non-adapted compensated, subcompensated and decompensated stages of the dislocation syndrome.
2. Intracranial reserve spaces are of great importance. Their exhaustion against the background of increased intracranial pressure explains the so-called "apoplexy" or " stroke-like " debuts of benign brain tumors.
3. Attention should be paid to the direction of dislocation. So, if lateral dislocation is observed with brain injuries and non-traumatic intracerebral hemorrhages, then with supratentorial tumors , given the variety of their localization, the direction of displacement can be any, and when choosing treatment tactics and clinical manifestations, it must be taken into account that the size of the tumor is not of paramount importance.

Results and its Discussion

Based on the above points, the proposed scale is presented as a sum of points, taking into account the direction of dislocation, intracranial spaces, and the most common signs of dislocation (Figure 1.)

Scale for assessing the stage of dislocation syndrome in supratentorial brain tumors

Direction of dislocation / localization of education	Intracranial anatomical reserve		Consciousness		The debut of disturbances of consciousness		Pupil Size / Photoreaction		Eyeball movements		motion sphere		Breath		Pulse/BP		Ocular fundus	
	Meaning	score	Meaning	B	Value	B	Value	B	Value	B	Value	B	Value	B	Value	B	Value	B
Lateral, temporo-tentorial displacement	Big	3	clear	5	Slowly progressing (≥15 days)	3	Avg. veli - chyny / live	5	Saved on command.	4	Movement saved.	5	Rivne	5	Normal/normal or ↑	4	Without ism	3
	Average	2	Stunning or behavioral changes	3			Anisocoria/ mild	4	OCR, OVR friendly / consumption. strabismus	3	contralateral paresis.	4	Often interrupted by deep breaths, yawns	4	Tachycardia / normal or ↑	3	Edema of the optic disc	2
	Minimum	1	Sopor	2	Rapidly progressing (14-7 days)	2	Anisocoria / abs	3			Counter. Plegia	3			Bradycardia / normal or ↑	2		1
			moderate coma	2	Acute (≤ 6 days)	1	Counterlat expansion . pupil/weak	2	OCR, OVR are not friendly / gaze paresis	2	Ipsilateral paresis.	2	Chain - Stokes	3	Tachycardia or bradycardia or arrhythmia/SBP below 80 mm Hg.	1	Stagnation of the ONH	
			deep coma	1			Counterlat / abs extension	1			Ips plegia	1	Tachypnea	2				
									ORC, OVR are absent	1			Bradypnea / gasping	1				

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Axial, central-transtentorial displacement	Big	3	clear	5	Slowly progressing (≥15 days)	3	Average / live	5	Saved on command.	4	Saved	5	Rivne	5	Normal/normal or ↑	4	Without ism	3
			Stunning or behavioral changes	4			Narrow/weak	4	Floating eye movements / divergence of axes	3	Counter. paresis / pleg	4	Often interrupted by deep breaths, yawns	4	Tachycardia / normal or ↑	3	Edema of the optic disc	2
	Average	2			Rapidly progressing (14-7 days)	2		3			Ypsilat paratonia	3			Bradycardia / normal or ↑	2		1
			Sopor				Wednesday _ or anisocoria/mild						Chain - Stokes	3			Stagnation of the ONH	
				3				2	Paresis of upward gaze	2	Decorticationrigidity	2			Tachycardia or bradycardia or arrhythmia/SBP below 80 mm Hg.	2		
	Minimum	1	moderate coma		Acute (≤ 6 days)	1	Wednesday _ or anisocoria/abs						Tachypnea	2				
				2				1	OCR, OVR are not friendly , otsust	1	Decerebrate rigidity	1	Bradypnea / gasping	1		1		
			deep coma				Extended / abs											
				1														

Figure 1. Scales for assessing the stage of dislocation syndrome in supratentorial brain tumors. A - for lateral displacement, B - for axial displacement.

The intracranial anatomical reserve is calculated from neuroimaging data. Consciousness is assessed classically - according to the Glasgow Coma Scale. Behavioral violations are scored as stunning. It should be noted that impaired consciousness in lateral dislocation occurs at later stages than in axial dislocation. This means that in the first case, stunning is estimated at 3 points, and with axial stunning - 4 points. And stupor and moderate coma, in turn, are evaluated at the same 2 points, which is due to a relatively fast transition.

Also important are the timing of the manifestation of the disease, that is, the debut of impaired consciousness. If the first signs of impaired consciousness occurred more than 15 days or are absent, this is assessed as a slowly progressive impairment of consciousness, if 14-7 days - rapidly progressive, less than 6 days - acutely progressive.

At pupil size and photoreaction should again take into account the direction of dislocation. So, given the early development of anisocoria in temporotentorial dislocation due to compression of the oculomotor nerve by the hook of the hippocampus , this sign is regarded as 1 point higher than in axial dislocation.

Floating movements of the eyeballs that persist in determining the oculocephalic reflex indicate the initial stage of axial dislocation, and the presence of gaze paresis - about the later ones.

Movement disorders in lateral, temporo- tentorial dislocation in the initial stages occur on the opposite side of the tumor. Further, in connection with the compression of the opposite leg of the brain on the opposite edge of the cerebellar tenon, motor disturbances occur on the side of the formation, and the corresponding points are set.

Respiratory activity, pulse and blood pressure are calculated as hyperfunction increases followed by hypofunction.

Points for assessing the condition of the fundus are set according to the results of ophthalmoscopy: in the absence of edema and stagnation - 3 points, in the presence of edema - 2 points, with stagnation - 1 point, respectively.

Summing up the above indicators, the dislocation is regarded as:

Adapted - 37-32 points

Unadapted with compensation - 31-26 points
Subcompensated - 25-19 points
Decompensated - 18 - 9 points.

Based on this scale, a prospective analysis of 46 patients with supratentorial brain tumors was performed. It was revealed that 20 patients (43.5%) were in the stage of adapted dislocation. In 15 patients (32.6%), an unadapted dislocation with compensation was observed. In 8 patients (17.4%), subcompensated dislocation, in 3 patients (6.5%), decompensated dislocation.

The assessment of the reliability of this method for diagnosing dislocation syndrome with the method for assessing the intracranial reserve revealed a very good value.

Table 1.

Reliability statistics

Cronbach's alpha	Cronbach's alpha based on standardized elements	N elements
.905	.908	2

Table 2.

Interelement correlation matrix

	Method for assessing intracranial anatomical reserve	Method for diagnosing dislocation syndrome
Method for assessing intracranial anatomical reserve	1,000	.831
Method for diagnosing dislocation syndrome	.831	1,000

Conclusion

With a direct assessment of the stage of dislocation syndrome in 46 patients, the proposed scale revealed a very good Alpha value. Cronbach = 0.905 and can be used to assess the stage of the dislocation syndrome, which in turn will allow choosing the optimal treatment tactics.

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