



## Assessment of Clinical-Neurological and Neurovisual Status of Seizure Syndrome After Hemorrhagic Stroke

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Article History	Abstract
Received: 06 June 2023 Revised: 05 Sept 2023 Accepted: 13 Dec 2023	<i>This article presents the results of clinical-neurological and neurovisual assessment of seizure syndrome after hemorrhagic stroke. When the disease lasts for a long time, it causes depression and anxiety in patients, while severe mental illness is not diagnosed in patients. Seizure syndrome after a hemorrhagic stroke affects the patient's mental state, daily activities, and behavior in society.</i>
<b>CC License</b> CC-BY-NC-SA 4.0	<b>Keywords:</b> hemorrhagic stroke, seizure syndrome, patients, EEG, ischemic stroke

### 1. Introduction

All over the world and in Uzbekistan, it is observed that the post-stroke seizure syndrome is reaching high percentage indicators. Cerebrovascular diseases are the most common causes of paroxysmal conditions, accounting for 25% of the cause of seizure syndrome in people over 60 years of age. Stroke accounts for 10% of the cause of seizure syndrome in young and middle-aged adults. Post-stroke seizure syndrome, according to the classification developed by G. Barolin and E. Scherzer in 1962, is as follows: 1) a seizure leading to the development of a stroke; 2) early seizure - during the first 7 days of stroke development; 3) late seizure developing 7 days after the stroke. Epilepsy leads to increased injuries of patients, slow recovery of functions, deepening of cognitive and emotional disorders, and a decrease in the quality of life. In Uzbekistan, these aspects of the post-stroke seizure syndrome are not given enough importance, the nature of the disease, the lack of diagnosis and rehabilitation measures, patients are condemned to live with seizures for many years, and the quality of life decreases [1.3.5.7.9.11.13.15].

In the treatment of post-stroke seizure syndrome, neglecting the pathogenesis of the disease, clinical-neurological features, and the use of incorrect tactics during an attack require consideration of effective treatment methods. Therefore, a modern approach to the diagnosis and treatment of post-stroke epilepsy, improvement of the correct diagnostic and therapeutic approach is a requirement of the present time. The purpose of the study. Study of the clinical-neurological characteristics of seizures after hemorrhagic stroke, comparative evaluation of the effectiveness of monotherapy and complex treatment methods.

### 2. Materials And Methods

General clinical-objective, laboratory, neuropsychological, neurophysiological, neurovisual examination methods were used to achieve the expected goal of the research. The research work was carried out at the Bukhara branch of the Republican Scientific Center for Emergency Medical Care. Our study included 104 patients with post-stroke seizure syndrome (76 men and 28 women) who applied to the center between 2016 and 2022.

The inclusion criteria for the study are as follows:

1. Patients with hemorrhagic stroke
2. The patient is over 25 years old

Patients were selected as follows:

1. Patients previously diagnosed with IKTS
2. Patients with observed GI and observed TS up to 14 days

### 3. Patients with GI and TS after 14 days

Exclusion criteria for the study:

1. Patients with ischemic stroke
2. Patients with brain tumor
3. Demyelinating diseases of the central nervous system have been identified
4. Obvious cognitive disorders, psychomotor agitation were observed
5. Decompensation of cardiovascular diseases

Blood clinical and biochemical analyzes were carried out in the laboratory department of the Bukhara branch of RShTYoIM. Neurophysiological examination, EEG monitoring was carried out in the clinic. Brain MSCT examination was conducted at the Bukhara branch of RShTYoIM. Brain MRI and EEG were performed at the Carmen Plus clinic. Consent for the study was obtained from all patients. The obtained data are obtained by statistical processing on a personal computer Pentium-4 with a program developed in the EXCEL package with the statistical function of the library. Differences in mean values are statistically significant at the  $R < 0.05$  level. Regression analysis was used for otsenki influence of potential factors of risk and postroeniya leveling of prognosis, kachestvo 11 models were tested with the help of ROC-analyza, interpretive indicator of the area under the curve (AUC). Pri prinyatii reshenia o ravenstve group (pri otsutstvii differ) and kachestve threshold znacheniya determined  $p = 0.05$ . The statistical significance of the difference is  $p < 0.05$  [2.4.6.8.10.12.14.16.18.20].

### 3. Results and Discussion

Patients participating in the study were divided into 2 groups. Group 1 - the main group consisted of 104 patients who had seizure syndrome after hemorrhagic stroke.

Group 2 - 30 patients with seizure syndrome were taken as a control group.

In the acute period after hemorrhagic stroke, seizures were observed in 21 patients. The rest of the patients had previous seizures or tardive seizures. Pathogenetic and clinical characteristics were studied among the groups.

The following cases were analyzed:

1. Hemorrhagic stroke risk factors
2. Hemorrhagic stroke severity
3. Location of the bleeding center.

In both groups of patients, risk factors were studied in order to evaluate the influence of epileptic attacks on the risk of development in GI, and the following results were obtained (Table 3.1). Arterial hypertension, TIA, PIKS, diabetes, cerebral vascular atherosclerosis, pulsating arrhythmia, hypercholesterolemia, cerebral vascular aneurysm were taken as risk factors.

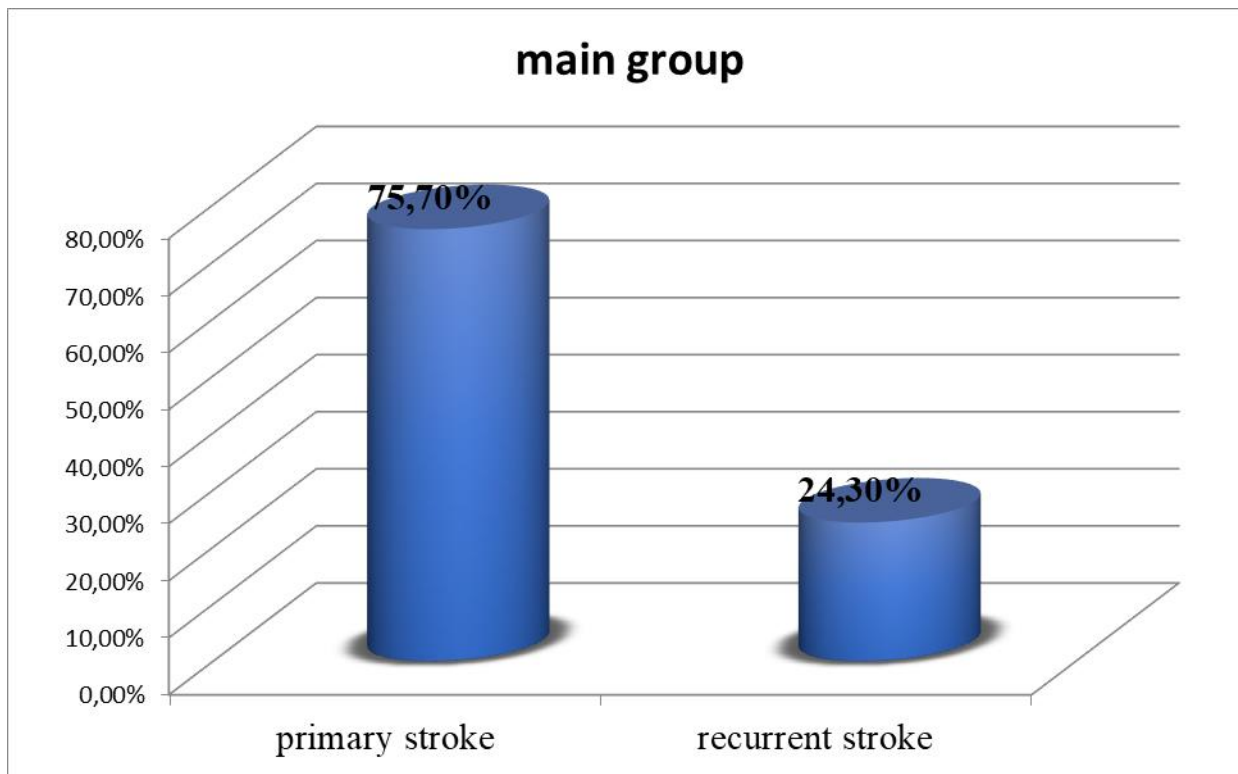
**Table 1: Risk factors in study groups**

Risk factor	Main group		Control group	
	n	%	n	%
Arterial hypertension	100	96.15	18	60.00
TIA	18	17.31	-	-
PIX	13	12.50	1	3.33
Diabetes	25	24.03	2	6.66
Atherosclerosis of cerebral vessels	84	80.76	10	33.33
ischemic heart disease	85	81.73	3	9.99
Fluctuating arrhythmia	22	21.15	-	-
Hypercholesterolemia	54	51.92	3	9.99
Aneurysm of cerebral vessels	4	3.84	-	-

In the main group of patients, arterial hypertension 100(96.15%), TIA 18(17.31%), PIKS 13(12.50%), diabetes 25(24.03%), cerebral vascular atherosclerosis 84(80.76%), UIK 85(81.73%), 22(21.15%), hypercholesterolemia, 4(3.84%), 4(3.84%), 4(3.84%), 4(3.84%), 4(3.84%), 54(51.92%) hypercholesterolemia, arterial hypertension 18(60.00%), 1(3.33%), diabetes in the control group. 2 (6.66%), cerebral vascular atherosclerosis 10 (33.33%), 3 (9.99%), hypercholesterolemia, 3 (9.99%).

Among the risk factors, arterial hypertension, atherosclerosis of cerebral vessels, and IUD prevailed in patients and indicates the need for prevention. Patients were divided into subarachnoid hemorrhage, parenchymatous hemorrhage, and parenchymatous-subarachnoid hemorrhage according to the localization of hemorrhage. In the main group of patients, parenchymatous hemorrhages accounted for 45.9%, subarachnoid hemorrhages for 32.5%, and subarachnoid-parenchymatous hemorrhages for 21.6%. Subarachnoid-parenchymatous hemorrhage has a high percentage of post-stroke seizures.

Postictal neurological deficits were evaluated in patients with seizures. Postictal symptoms include speech disorders (slurred speech, fast, slurred speech), reduced auditory memory, disorientation, and Todd's palsy. The effect of stroke recurrence on seizure frequency was studied.



**Figure 2:** Effect of stroke recurrence on seizure frequency

In patients of the main group, compared to patients of the comparison group, it was found that seizures were 16.6% more frequent in recurrent stroke. Thus, seizure attacks after hemorrhagic stroke make up high percentages, and this indicator is observed especially often after repeated strokes. When the seizures observed in the acute period of the stroke were analyzed according to the clinical signs of epileptic attacks, it was found that the clinical signs appear according to the location of the stroke center. According to the classification proposed by Barolin (1962), attacks were divided according to the time of the stroke. Seizures observed from day 7 to day 21 of stroke were taken as evening attacks.

**Table 2:** Types of seizure syndrome after hemorrhagic stroke

Seizure type	Main group
A previous seizure	22 (33.84%)
Early seizures	43(66.16%)
Evening seizure	9(13.84%)
A simple partial seizure	6(9.23%)
Complex partial seizure	24(36.92%)
Secondary generalized seizure	35(53.85%)
Recurrent seizures	9(13.84%)

In the patients of the main group, there were 33.84% seizures, early seizures 66.16%, late seizures 13.84%, simple partial seizures 9.23%, complex partial seizures 36.92%, secondary generalized seizures 53.85%, recurrent seizures 13.84%. Secondary generalized seizures predominated in the main group of patients.

**Table 3:** Results of the NIHSS scale in the study groups

	Main group		Control group		Criterion Manna-Whitney	
	M	m	M	m	Z	P
NIHSS (score) before treatment	13,45	0,36	13,44	0,47	-0,142	0,887
Criterion znakovyx rangov Wilcoxon	Z	-7,023	-5,452			
	P1	0,000	0,000			

The results of the NIHSS scale in the main group patients were 13.45±0.36 points before treatment, and in the control group patients were 13.44±0.47 points (R<0.05).

Every patient included in the study group underwent a CT scan on the first day of referral. Based on the results of MSKT inspections, the following cases were evaluated:

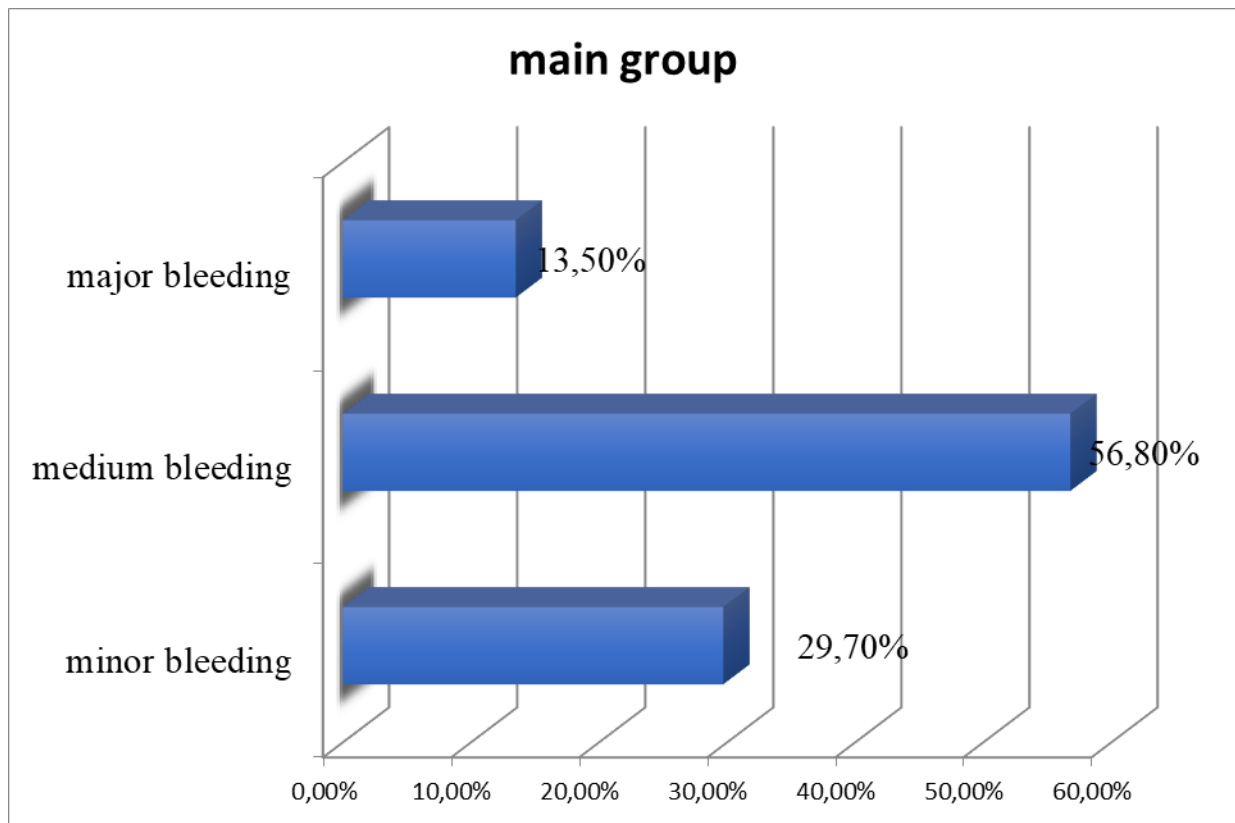
1. Stroke subtypes: subarachnoid hemorrhage, parenchymatous hemorrhage, subarachnoid-parenchymatous hemorrhage.
2. Clarity of focal changes in the brain, focal size. According to the size, hematomas were divided into the following groups:
  - Small hemorrhages (hematoma <20ml)
  - medium-sized hematoma (hematoma 20-50 ml)
  - Large hematoma (hematoma >50 ml)
3. The location of the focus in relation to the cortical and subcortical systems of the brain (cortical, subcortical, cortico-subcortical)
4. The location of the focus on the parts of the brain (forehead, temple, top, nape, several sections).

It was found that subcortical system foci are more frequent when examining the brain sections. Cervical hemorrhages were more common in the main group patients (P<0.05). Thus, the observation of extensive subarachnoid-parenchymatous hemorrhage in several sections is a predictor of the development of seizures in the acute period of GI. Isolated hemorrhages observed in the posterior region of the brain have a relatively small effect on the risk of seizures [15.16.17.18.19].

In the main group of patients, the location of the hemorrhagic focus was in the forehead area in 13.5%, in the temple 43.3%, in the top 13.5%, in the nape of the eck 18.9%, and in several parts in 10.8%.

When the location of the focus was studied according to cortex and subcortical systems, parenchymatous hemorrhages in the main group of patients were 45.9%, subarachnoid hemorrhages 32.5%, subarachnoid-parenchymatous hemorrhages were 21.6%. Therefore, parenchymatous and subarachnoid hemorrhages predominate in the main group of patients.

When the foci sizes were studied, the main group of patients had small hemorrhages in 29.7%, medium hemorrhages in 56.80%, and large hemorrhages in 13.5%.



**Figure 3:** Clarity of focal changes

When examining according to the location of the focus in the brain substance, in the patients of the main group, cortical location was 27.1%, subcortical location was 40.5%, cortical-subcortical location was 32.40%. In order to diagnose seizure syndrome, all patients underwent EEG examination.

In the patients of the comparison group, the dominant alpha rhythm was 5.13%, the alpha rhythm frequency was 10-11 Hz in no case, alpha rhythm instability was 97.44%, well-defined beta rhythm was 28.21%, bilateral-synchronous theta rhythm was 56.41%, delta rhythm was 58.97%, acute-slow wave in 56.41%, acute wave in 20.51%, spike wave in 7.69%, generalized seizure attacks in 10.26%, focal seizures in 100% cases.

**Table 4:** EEG readings in study groups before treatment

EEG	Main group			Control group			Chi-square Pearson	
	abs	M(%)	m	abs	M(%)	m	c2	P
Dominant alpha rhythm	11	10,58	3,02	2	5,13	3,53	1,959	0,202
Alpha rhythm frequency is 10-11 Hz	6	5,77	2,29	0	0,00	0,00	3,820	0,081
Alpha rhythm disturbance	101	97,12	1,64	28	97,44	2,53	0,023	1,000
Well defined beta rhythm	49	47,12	4,89	11	28,21	7,21	8,955	0,003
B/s theta activity	82	78,85	4,00	22	56,41	7,94	18,832	0,000
Delta rhythm	77	74,04	4,30	23	58,97	7,88	7,753	0,021
sharp- slow wave	77	74,04	4,30	22	56,41	7,94	10,088	0,001
sharp wave	26	25,00	4,25	8	20,51	6,47	0,670	0,413
spike wave	14	13,46	3,35	3	7,69	4,27	1,783	0,182
polyspike wave	6	5,77	2,29	0	0,00	0,00	3,820	0,081
generalized seizures	40	38,46	4,77	4	10,26	4,86	20,973	0,000

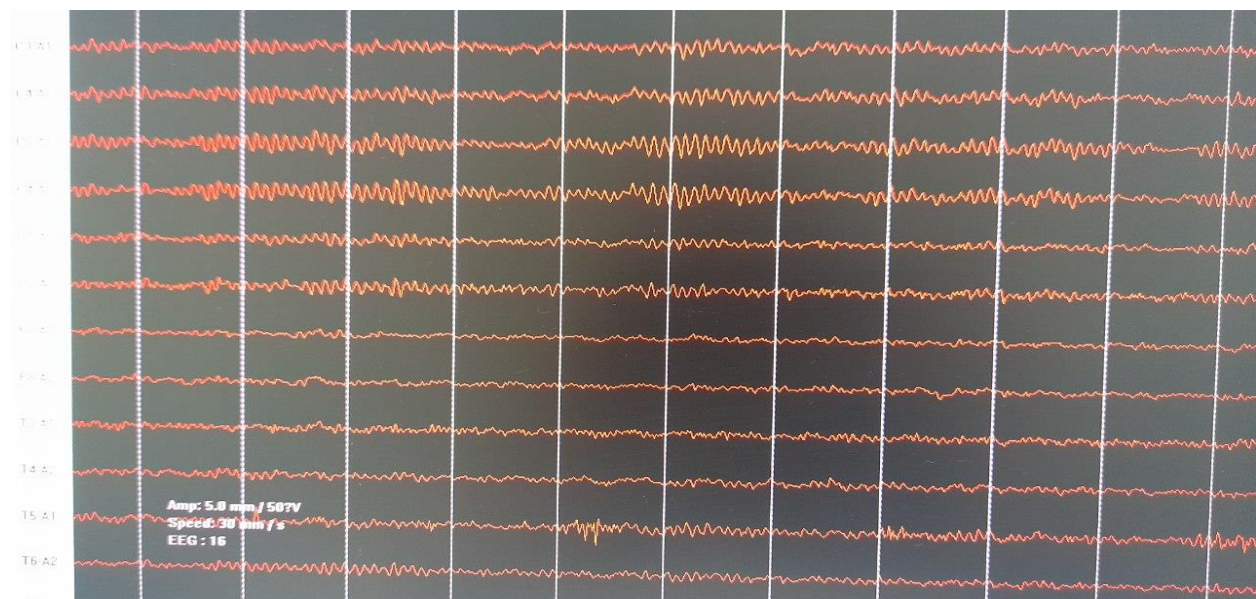
фокал тутқаноқлар	101	97,12	1,64	30	100,00	0,00	1,853	0,290
	104			30				

In the main group of patients, dominant alpha rhythm 10.58%, alpha rhythm frequency 10-11 Hz 5.77%, alpha rhythm instability 97.12%, well-defined beta rhythm 47.12%, bilateral-synchronous theta rhythm 78.85%, delta rhythm 74.04%, sharp-slow wave 74.4 %, acute wave 25.00%, spike wave 13.46%, polyspike wave 5.77%, generalized seizure attacks 38.46%, focal seizures were observed in 97.12% cases. In focal seizures, epiactivity corresponds to the site of the stroke.

Low-amplitude rhythms were observed in 28 (43.07%), 14 (50%) mild strokes, 8 (28.57%) moderate strokes, and 6 (21.43%) severe strokes. Decreased reactivity to functional tests (eye opening-closing, rhythmic photostimulation, phonostimulation, hyperventilation) was observed in 31 (47.69%) of the main group patients. Of them, 10 (32.25%) had mild strokes, 13 (41.93%) had moderate strokes, and 8 (25.82%) had severe strokes. Specific EEG patterns - asymmetry, discharge - reduction were observed in 33 (50.77%) of which 9 (27.28%) corresponded to mild stroke, 10 (30.30%) to moderate stroke, and 14 (42.42%) to severe stroke. Periodic rhythmic generalized slow rhythms were observed in 60 (92.31%) mild strokes in 25 (41.66%), moderate strokes in 24 (40.00%), severe strokes in 11 (18.34%) cases. Periodic regional deceleration was found in 8 (14.5%) patients with severe stroke. A normal EEG was not observed in any patient with seizures.

The data obtained in this way showed that in the acute period of a stroke, periodic rhythmic diffuse slowing and periodic regional slowing dominate the EEG picture.

Patient R. the woman is 67 years old. Hemorrhagic stroke of the right temporal branch was diagnosed. The patient had focal seizure symptoms in the right temporal lobe.



EEG conclusion: focal epiactivity of the right temporal branch in the form of polyspike. Medium-diffuse changes in brain bioelectricity.

EEG characteristic: alpha rhythm 9 Hz, disorganized, exaltation is detected in the occiput (up to 115  $\mu$ V), irregular. Wave asymmetry is detected in the area of the forehead. In the left temporal lobe, slow waves are detected in the form of delta and theta rhythm. The pathological focus is in the area of the left temple. Beta activity is regular in the front, slow activity in the form of theta rhythm up to 40  $\mu$ V is detected in the forehead area. During hyperventilation, rhythms in the delta range were recorded in the forehead and left temporal area [20.21].

#### 4. Conclusion

Changes in the autonomic nervous system (in our example, increased tone of the sympathetic nervous system) in patients with post-hemorrhagic stroke seizure syndrome require correction. Based on the above information, the autonomic nervous system tests are used to determine the tone of the sympathetic and parasympathetic nervous system. The results of the MMSE scale were  $12.75 \pm 0.36$  points in the main group patients and  $12.97 \pm 0.47$  points in the comparison group patients, indicating moderate dementia. Among patients of the main group, moderate dementia was 77.88%, severe dementia was 22.12%. In the patients of the control group, 16.66% had no cognitive disorders, 63.33% had mild dementia, and 20.01% had moderate dementia. Thus, moderate and severe

dementias are observed in seizure syndrome after hemorrhagic stroke, and are distinguished from cognitive disorders in other etiological seizure syndromes.

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