

REASONS AND RISK FACTORS OF HEMORRHAGIC STROKE

Liliya B. Novikova¹, Anait P. Akopian¹, Marsel S. Mustafin¹, Raushaniya F. Latypova^{1*}, Azat Z. Suleymanov¹

¹Department of Neurology and Neurosurgery IDPO, Bashkir state medical university, Ufa, Russia

ABSTRACT

Background: The most important are the strokes, the structure of which was hemorrhagic stroke meets 4-5 times less often than ischemic stroke, however, is characterized by a high fatality rate and disability compared to ischemic stroke. Hemorrhagic stroke can manifest in the form of spontaneous (no traumatic) subarachnoid hemorrhage, intracerebral, extradural and subdural hematoma, or a combination of these pathological conditions. The aim: to analyze the structure of hemorrhagic stroke, complications and surgical treatment in patients with the hemorrhagic stroke. **Methods:** Analysis of 168 case histories of patients with hemorrhagic stroke being treated in neurosurgical department of Emergency Hospital (BSMP) in the Republic of Bashkortostan in 2015. All patients underwent clinical-instrumental and laboratory examination, CT angiography and MRI of the brain and indications for cerebral angiography of the blood vessels of the brain to exclude arterial aneurysms and arteriovenous malformations. **Results:** According to the histories of hemorrhagic stroke by type subarachnoid hemorrhage was 83 (49, 4%) patients, intracerebral hematoma 65 (38,7%), subarachnoid hemorrhage in combination with intracerebral hematoma in 17 (10,1%). Of all cases of subdural hematomas - 3 (1,8%) one of them was combined with intracerebral hematoma. The reason for hemorrhagic stroke - 71 (42,2%) patients was aneurysmal disease of the brain. In the case of the subarachnoid hemorrhage of the aneurysm identified in 53 (63,9%) patients, patients with intracerebral hematoma in 13 (20%) and subarachnoid hemorrhage in combination with intracerebral hematoma in 5 (29,4%). Localization of aneurysms most often had the pool of middle cerebral artery - 27 (38%) cases. Upon receipt of concomitant diseases in patients most often were: hypertension 63 (37,7%). Neurosurgical intervention were made 127 (75,5%) patients. 48 (37,8%) patients were made minimally invasive surgery. **Conclusion:** Causes and risk factors of hemorrhagic stroke most often was aneurysmal disease of the brain, hypertensive disease and anomalies of cerebral vessels. In the surgical treatment of hemorrhagic stroke is a preference for minimally invasive high-tech techniques.

KEYWORDS

Hemorrhagic Stroke, Intracerebral Hematoma, Neurosurgery

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INTRODUCTION

Cerebrovascular disease (CVD) is a topical medical and social problem due to high morbidity, disability and mortality. The most important are the strokes, the structure of which was hemorrhagic stroke (HS) meets 4-5 times less often than ischemic stroke (IS), however, is characterized by a high fatality rate and disability compared to IS [3,5]. According to 2001 overall mortality in stroke was 40.4%, with a significant predominance of HS - up to 50%, and the disability reaches 75%. According 2015, the mortality related to HS in the republic of Bashkortostan amounted to 48%.

HS can manifest in the form of spontaneous (nontraumatic) subarachnoid hemorrhage (SAH), intracerebral hematomas (ICH), spontaneous (nontraumatic) extradural and subdural hematomas,

or a combination of these pathological conditions. SAH is 5-10% of cases of HS. The main cause of SAH is the rupture of cerebral aneurysm or arteriovenous malformation. The presence of an aneurysm or vascular malformation cerebral confirmed by contrast angiography and MRI, CT-angiography. ICH among the most common lateral (putaminal) hemorrhage – 55% of cases, medial (thalamic) hemorrhages account for 10% [1]. In the last decade with HS actively used neurosurgical treatment methods, the task of which is to remove blood clots with minimal damage to the parenchyma of the brain, reducing the risk of complications such as intracranial hypertension, intraventricular hemorrhage (IVH) and dislocation structures of the brain. Despite the continuous development and enhancement of hi-tech neurosurgical methods for the treatment of HS, the introduction of advanced diagnostic and therapeutic measures, mortality in HS remains unacceptably high. In this regard, the medical science is the task of improving the tactics of management of patients with

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* Address for Correspondence: Raushaniya F. Latypova, 450006 Lenin Street-3, Ufa Russia. Tel.: +79625392617. Email: rau.lat@yandex.ru

HS [2,4].

METHODS

Analysis of 168 case histories of patients with HS being treated in neurosurgical office of Emergency Hospital (BSMP) in the Republic of Bashkortostan in 2015. The neurosurgical department is a division of the Regional Vascular Center in the service area which resides 1425000 people and accept stroke patients for surgical treatment of primary vascular departments of the Republic of Bashkortostan. The average age of patients was $52,6 \pm 12,5$ years, among them 90 (53,6%) women and 78 (46,4%) of men. Persons of working age women (until 55 years) and men (until 60 years) was 111 (66,1%). Mean arterial pressure at admission in the ward were: systolic $140,4 \pm 21,1$ (the data varied in a wide range from 90 to 210), diastolic of $86,9 \pm 11,4$ (data ranged from 60 to 120). All patients underwent clinical-instrumental and laboratory examination, CT angiography and MRI of the brain and indications for cerebral angiography (CAG) of the blood vessels of the brain to exclude arterial aneurysms and arteriovenous malformations (AVM).

Data processing was performed using Statistica 6.0.

RESULTS

Upon receipt of concomitant diseases in patients most often were: hypertension 63 (37,7%), ischemic heart disease 14 (8,4%) and postinfarction cardiosclerosis 4 (2,4%), atrial fibrillation 4 (2,4%). According to the histories of HS by type SAH was 83 (49,4%) patients, ICH 65 (38,7%), SAH in combination with ICH in 17 (10,1%). Of all cases of subdural hematomas (SH) - 3 (1,8%) one of them was combined with ICH (Fig. 1).

Among the HS with the formation of ICH in 83 (49,4%) cases, the localization of the hematoma was accounted for by the cerebral hemispheres in 77 (92,8%) and 6 (7,2%) cases in the cerebellum. Among the hemispheric localizations hematomas were putaminal 49 (63,6%) patients, median (thalamic) 16 (20,8%) patients, subcortical in 12 (15,6%). The reason for HS - 71 (42,2%) patients was aneurysmal disease of the brain. In the case of the SAH of the aneurysm identified in 53 (63,9%) patients, patients with ICH in 13 (20%) and SAH in combination with ICH in 5

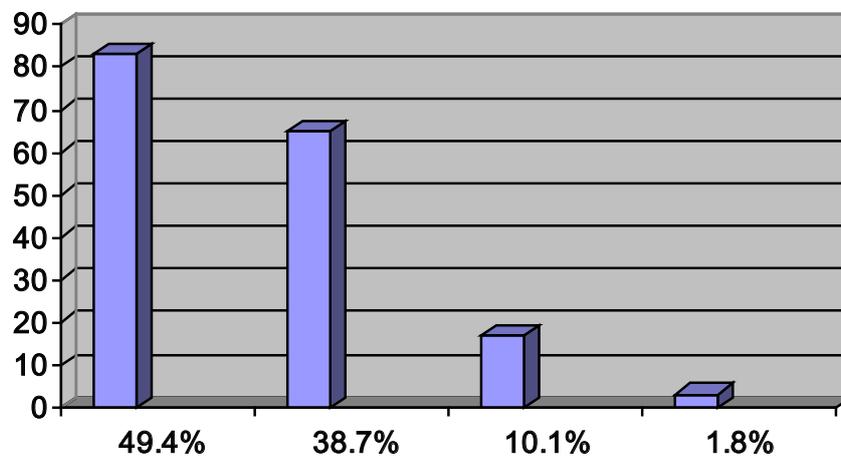


Fig.1. Types of hemorrhagic stroke

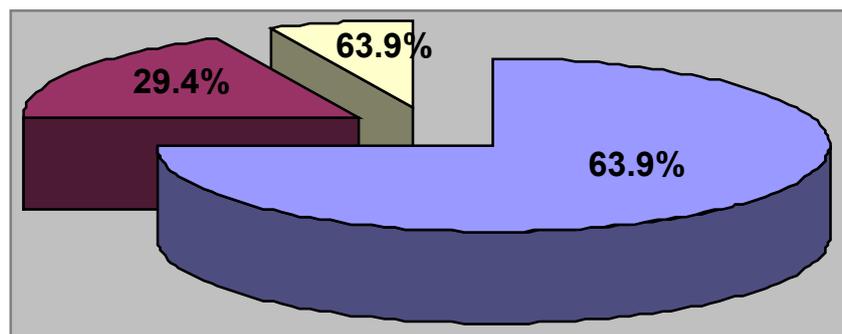


Fig.2. Percent of aneurysmal disease in types of hemorrhagic stroke

(29,4%) (Fig. 2).

Localization of aneurysms most often had the pool of middle cerebral artery - 27 (38%) cases, the internal carotid artery and 17 (23.9%) of the cases, the anterior cerebral and anterior communicating arteries 16 (22.5%) and less likely to pool the basilar, posterior cerebral and vertebral arteries, respectively - 6 (8,5%), 4 (5,6%), 1 (1,4%) (Fig.3).

In 3 (3,6%) patients the cause of SAH was AVM. Spontaneous SAH is not associated with the aneurysm was 27 (32.5%) patients. Analysis of complications of HS showed the presence of intraventricular hemorrhage in 35 (20,8%) patients, most of which was accounted for by the SAH 15 (42.9%) cases, less than ICH - 12 (34,3%) and SAH in combination with ICH - 8 (22,9%) of the cases. Neurosurgical intervention were made 127 (75,5%) patients. Depending on kinds of carried out surgical intervention all patients were divided into three groups.

The first group 37 (29.1%) included patients who underwent microsurgical removal of the hematoma with bone-plastic or decompressive craniotomy. The second group 48 (37,8%) included patients who underwent minimally invasive surgery (needle aspiration, endoscopic removal of the hematoma, embolization, local fibrinolysis). The third group 11 (8,7%) included patients who underwent only an external ventricular drainage or ventriculostomy for Arendt.

If aneurysmal disease of the brain, clipping was carried out 31 (32, 6%) patient. When puncture-aspiration technique all patients underwent sparing craniotomy

with a diameter of not more than 3 cm puncture of the hematoma was carried out under the control of neuronavigation with drainage tube with a diameter of 5 mm. the Average amount of postoperative hematomas was $38.7 \pm 20,6 \text{ cm}^3$. Surgical treatment is carried out at subcortical and putaminal the hematoma volume more than 20 cm^3 [4]. Dislocation of midline and brainstem structures of the brain was identified in 38 (22.6%) of patients, compression of the ventricles in 14 (8.3%). Secondary cerebral ischemia in SAH developed in 9 (5,4%) patients. In the postoperative period in 29 (23,2%) patients the condition was aggravated by the presence of edema and swelling of the brain. Patient outcomes depended on concomitant somatic pathology: hypostatic pneumonia, purulent tracheobronchitis, pleural effusion, cardiac decompensation, diabetes mellitus. In the analysis of coagulation were calculated average values, which have approximately equal number of patients met the state of hypocoagulation (prothrombin time $14,9 \pm 1,8$; activated partial thromboplastin time $33,6 \pm 9,9$) and coagulopathy (prothrombin time $14,7 \pm 1,3$, soluble fibrin monomer complex $6,4 \pm 2,9$).

DISCUSSION AND CONCLUSIONS

The analysis of case histories of patients hospitalized in the neurosurgical department on the occasion of hemorrhagic stroke, showed that the cause of the hemorrhagic stroke in 71 (42.3%) was the aneurysmal disease of the brain, cerebral vascular anomaly in the form of arteriovenous malformation - 7 (4.2%) cases.

In terms of surgical treatment preference for minimally invasive high-tech techniques: puncture endoscopic removal of hematomas under the control

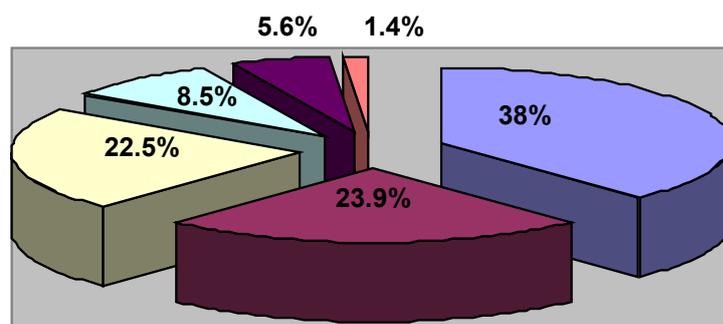


Fig.3. Vascular pool localization of aneurysms

of neuronavigation, fibrinolysis. When subarachnoid hemorrhage was used open intervention with decompression, rehabilitation subarachnoid spaces and cisterns of the brain and clipping of aneurysms. The success of surgical treatment of hemorrhagic stroke depends on the proper selection of patients, methods, and timing of surgery. In aneurysms of cerebral vessels only method of treatment of stroke and its secondary prevention is surgery.

To predict the course and outcome of the hemorrhagic stroke must be assessed combines:

- 1) data imaging studies to assess the extent and localization of intracerebral hematomas,
- 2) the presence and severity of dislocation syndrome, intraventricular hemorrhage,
- 3) to evaluate the neurological disorders (level of consciousness disorder, the presence of meningeal symptoms, the severity of autonomic disorders,
- 4) data research laboratory methods.

In our study, we obtained results that did not differ from published data from other studies. The novelty of this study lies in the fact that our hospital uses neurosurgical treatments, among which preference is given to high-tech minimally invasive techniques.

CONFLICT OF INTEREST

Authors confirm that this article content has no conflicts of interest.

ORCID

Raushaniya F. Latypova <http://orcid.org/0000-0001-7231-8534>

Azat Z. Suleymanov <http://orcid.org/0000-0002-3174-6265>

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