International Journal of Brain and Cognitive Sciences 2022, 10(1): 1-7
DOI: 10.5923/j.ijbcs.20221001.01

Comparative Evaluation of the Results of Conservative and Surgical Treatment of Patients with Hypertensive Intracerebral Hemorrhages (HIH)

Maksudova L. B.[1], Gafurov B. G.[2]

[1]Republican Research Center of Emergency Medicine, Tashkent, Uzbekistan
[2]Center for the Development of Professional Qualifications of Medical Workers, Tashkent, Uzbekistan

Abstract The authors carried out a comparative analysis of the results of conservative and surgical treatment of 140 patients with hypertensive intracerebral hemorrhages (52 female and 88 males). The mean age was 58.8±14.0 years. The results of the study showed that the 30-days survival rates in patients with hypertensive intracerebral hemorrhages depended on many factors and required a multimodal approach in choosing one or another treatment method.

Keywords Hypertensive intracerebral hemorrhages, Comparative analysis

1. Introduction

The incidence of hypertensive intracerebral hemorrhages averages 20 cases per 100,000 population, with a lethal outcome exceeding 40%, and most of the surviving patients have a persistent neurological deficit with an unsatisfactory functional outcome [19]. To this day, the question of choosing the tactics of treating patients with HIH remains debatable, namely, a conservative or surgical approach in a particular case. In the world literature, there are many conflicting data on the viability of the medulla around the hematoma. The advantage of surgical treatment is justified by the fact that after removal of the hematoma, the perfusion of the medulla around the hematoma bed improves due to its evacuation [8,10-12,15,16,20]. However, the results of numerous randomized studies contradict the above theory, since the surgical intervention itself is an additional factor of aggression, which causes aggravation of vascular spasm, an increase in edema around the hematoma bed, which leads to a persistent unsatisfactory functional outcome [5,7,21]. In one of the recent prospective randomized trials, better 30-day survival rates in patients with HIH were observed with conservative treatment compared with surgery.

The lack of consensus in the approach and choice of treatment tactics, the lack of knowledge of CT morphometric parameters of HIH, a comparative assessment of 30-day survival after conservative and surgical treatment shows the relevance and debatability of this direction.

Received: Nov. 17, 2022; Accepted: Dec. 5, 2022; Published: Dec. 14, 2022
Published online at http://journal.sapub.org/ijbcs

2. Material and Methods

We carried out a retrospective analysis of 140 patients with HIH of the brain. (Table 1). Of these, 52 (37.1%) patients were female and 88 (62.9%) male, aged 15 to 88 years. The mean age was 58.8±14.0 years. All patients underwent a neurological examination and an assessment of the severity of the condition using the National Institutes of Health Stroke Scale (NIHSS) and the modified Rankin scale (mRs) (Table 1). The level of consciousness was assessed using the Glasgow Coma Scale (GCS) (Table 1). After studying the anamnesis and physical examination, all patients underwent multislice computed tomography (MSCT). MSCT morphometry included an assessment of such indicators as the location and volume of the hematoma, the presence of a breakthrough of blood into the ventricular system, the state of the bypass cistern, deformation or expansion of the ventricular system and its size, displacement of the midline structures of the brain, perifocal edema around the hematoma, if any, and secondary brain changes (Table 1). When assessing the spread of IVH, we used the modified Graeb scale (mGS) (Table 2). The inclusion criteria for this study were as follows:

- hematoma volume up to 40 cm^3;
- the presence of compression of the bypass tank;
- the presence of compression of the ventricular system;
- the presence of displacement of median structures.

The exclusion criteria were the following:

- refusal of surgical intervention (refusal of the patient's relatives and patients with impaired level of consciousness according to GCS <7 points).

All patients included in the study were divided into two

groups: the 1st group of patients underwent conservative treatment and the 2nd group of patients underwent surgical intervention. The evaluation of the results of conservative and surgical treatment was carried out on the basis of the 30-day survival rates of patients using the Kaplan-Meier method.

Table 1. Characteristics of patients with hypertensive intracerebral hemorrhages

Criteria for evaluation	Total	
	n	%
Average age of patients	58.8 ±14.0	
Men	88	62.9
Women	52	37.1
GCS at admission	11.8 ±2.7	
NIHSS at admission	11.5 ±5.3	
mRS average score at admission	3.4 ±0.9	
Hemorrhage morphometry		
Lobar localization	26	18.6
Medial localization	37	26.4
Lateral localization	22	15.7
Posterior cranial fossa	twenty	14.3
thalamus	ten	7.1
mixed	25	17.9
Breakthrough in the ventricular system	67	47.8
Average hemorrhage volume	19.7 ±13.6	
mGS average score	3.6 ±1.8	
Characteristics of concomitant pathology		
Hypertonic disease	140	100
Diabetes	26	18.5
ischemic heart disease	68	48.6

Table 2. The severity of intraventricular hemorrhages according to the mGS scale

Localization	Number of points
Lateral ventricles (each ventricle is counted separately)	0 - no blood
	1 - traces of blood or minor hemorrhage
	2 - less than half of the ventricle is filled with blood
	3 - more than half of the ventricle is filled with blood
	4 - the ventricle is filled and distended with blood
The third and the fourth ventricles	0 - no blood
	1 - Presence of blood, the ventricle is not enlarged
	2 - The ventricle is filled and distended with blood
Number of points	0 - 12

3. Results and Discussions

The large-scale STICH II study did not find strong evidence to support the hypothesis of improved outcomes after early surgery compared with conservative treatment in the category of patients with an impaired GCS level of consciousness <14 points. However, there was a statistically significant positive result in the direction of early surgery compared with conservative therapy in patients with a GCS level of consciousness >13 points without signs of IVH and lobar localization [13]. However, there is a trend of expectant management by some surgeons in patients with less severe neurological deficits and CT morphometry parameters, the absence of high mGS scores, pronounced compression of the bypass cistern and brain mass effect, as well as correctable arterial hypertension [13]. We carried out a comparative analysis of the 30-day survival of patients with IVH depending on the volume of IVH, the level of consciousness and CT morphometry, which were analyzed according to the inclusion criteria in this study after conservative and surgical treatment. Of the 60 patients with conservative treatment of IVH, in 70% (n=42) cases, the volume of IVH was up to 10 cm^3, in 18.3% (n=11) cases - 11-20 cm^3, in 6.6% (n=4) cases - 21-30 cm^3, in 5% (n=3) the volume of HVMK was from 31 to 40 cm^3. Evaluation of 30-day survival rates in patients with IVH depending on the volume showed that in patients with IVH volume up to 10 cm^3, 30-day survival was 0.91, with a volume of 11-20 cm cm^3 - 0.5, with a volume of 31-40 cm^3 - 0. An analysis of 30-day survival rates in patients with HIH after surgery showed a trend towards an increase in survival rates as the volume of HIH increased, which indicates the effectiveness of surgical intervention. Thus, in patients with HIH volumes up to 10 cm^3, 11–20 cm^3, and 21–30 cm^3, the 30-day survival rate was 0.5, 0.71, and 0.81, respectively. It should be noted that the 30-day survival rate in the subgroup of patients with HIH volume of 31-40 cm^3 after surgery increased to 0.4 compared with conservative therapy. These results indicate a significant correlation between the volume of HIH and 30-day survival. ($p<0.05$) (Table 3 and Figure 1 A and B).

One of the important indicators in predicting 30-day survival is the assessment of the patient's level of consciousness since the start of a particular treatment method. An analysis of the literature also indicates higher survival rates in patients with HIH with a higher GCS score [1-3]. The results of our study showed that in the subgroup of patients with conservative treatment of HIH, a GCS level of consciousness of 15 points was observed in 6.4% (n=9) of cases, in which the 30-day survival rate was 0.51, GCS score of 14 was observed in 16 .4% (n=23) cases with a 30-day survival rate of 0.89, GCS score of 13 – 10% (n=14) cases with a survival rate of 0.66, GCS 30-day survival rates 12 points (7.8% (n=11)) - 0.91, in the group of patients with GCS 11 points or less (2.1% (n=3)) the survival rate was 0.33. In the subgroup of patients after surgical treatment, the 30-day survival rate was characterized as follows: with a GCS of 15 points (2.8% (n=4)) - 0.75, with a GCS of 14 points (2.1% (n=3)) - 1.0, with GCS 13 points (19.3% (n=27)) - 0.54, with GCS 12 points (7.1% (n=10)) - 0.7 and with GCS 11 points and less than (25.7% (n=36)) - 0.55 (Table 3 and Figure 2 A and B).

Table 3

Characteristic	Number of patients	30 day survival after conservative treatment	30 day survival after surgery	R
HIH volume				
up to 10 cm ^{3}	fifty	0.91	0.5	< 0.05
11-20 cm ^{3}	35	0.58	0.71	
21-30 cm ^{3}	21	0.5	0.82	
31-40 cm ^{3}	34	0	0.4	
GCS level of consciousness				
15 points	13	0.51	0.75	
14 points	26	0.89	1.0	
13 points	41	0.66	0.54	
12 points	21	0.91	0.7	
11 points or less	39	0.33	0.55	
The presence of IVH on the mGS scale				
0 points	52	0.92	0.94	< 0.05
1 points	7	0.75	1.0	
2 points	16	0.66	0.9	
3 points	9	0.5	0.57	
4 points	fifteen	0.85	0.37	
5 points	6	0	0.5	
6 points	12	0.33	0.44	
7 points	ten	-	0.3	
8 points	13	0	0.29	

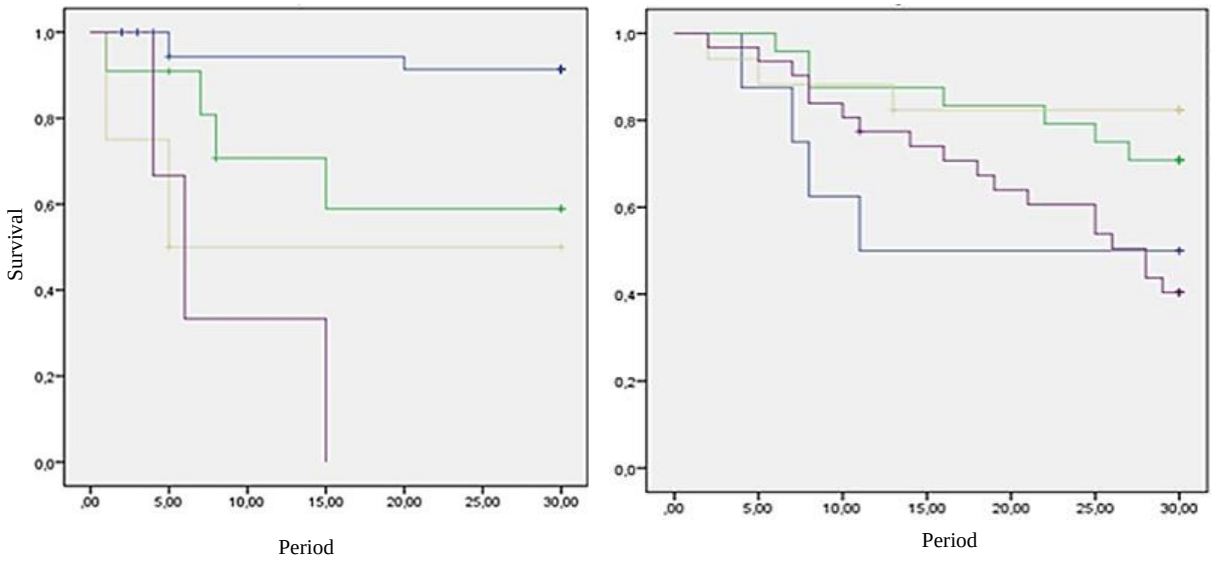

Figure 1 (A). 30-day survival in patients with conservative treatment, depending on the volume of MVMC

Figure 1 (B). 30-day survival in patients with surgical treatment, depending on the volume of MVMC

Patients with MVMC volume up to 10 cm ^{3}
Patients with CVMC volume up to 11-20 cm ^{3}
Patients with CVMC volume up to 21-30 cm ^{3}
Patients with MVMC volume up to 31-40 cm ^{3}

Figure 1

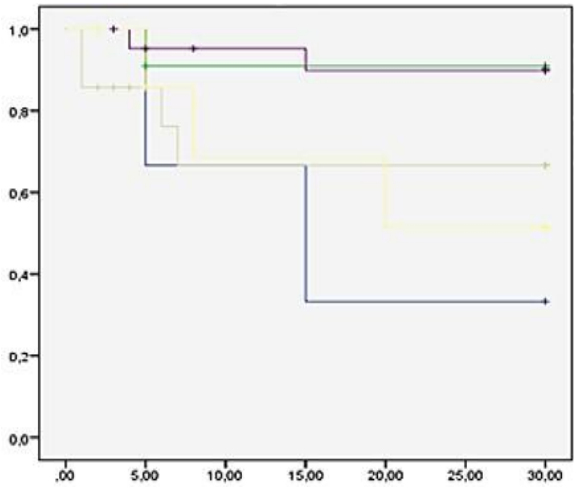

Figure 2 (A). 30-day survival in patients with conservative treatment, depending on the level of consciousness according to GCS

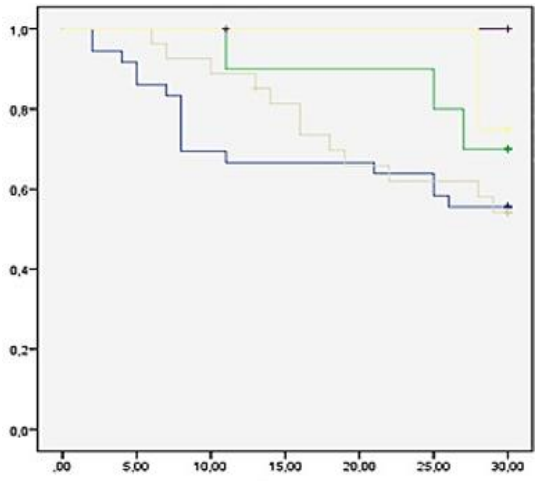

Figure 2 (B). 30-day survival in patients with surgical treatment, depending on the level of consciousness according to GCS

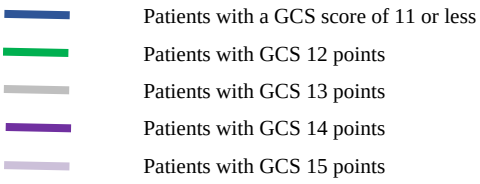

Figure 2

A comparative assessment of 30-day survival rates after conservative and surgical treatment, depending on the level of consciousness according to the GCS, showed that in patients, as the level of consciousness narrowed, the survival rate increased. The reason for this phenomenon is the fact that out of 9 patients with a GCS level of consciousness of 15 points, 2 had hemorrhage localized in the projection of the pons of the brainstem, which led to low survival rates. In 5 patients of this subgroup, hemorrhage was complicated by a breakthrough of blood into the ventricular system and a high degree on the mGS scale.

When analyzing the world literature on the basis of numerous large-scale studies, it can be concluded that one of the main predictors of an unfavorable outcome is IVH due to a breakthrough of the HIH into the ventricular system of the brain [4,9,14]. In the STICH study, intraventricular hemorrhage due to rupture of the SVCH was shown to reduce the rate of favorable outcomes from 31% to 15% [6]. Trifan G et al. in his studies proved that the mGS score is the most important predictor of the outcome of treatment in patients with HIH complicated by a breakthrough of blood into the ventricular system. Thus, in this study, it was noted that in patients with mGS >5 points, the probability of an unfavorable outcome is high, and in patients with mGS <5 points, the probability of a favorable outcome is high [17]. Tuhrim et al. showed in his studies that IVH volume is associated with lower 30-day survival rates [18]. Also Young et al. in their studies determined that IVH volume >20 ml is a prognostically unfavorable factor [22]. Analysis of the results of 30-day survival with conservative and surgical treatment, depending on the degree of gradation on the mGS scale, showed that in the subgroup of patients with conservative treatment with a zero gradation on the mGS scale, 24.3% (n=34) of cases were observed, in which the score was 30 -day survival rate was 0.92, with the first gradation on the mGS scale it was 3.6% (n=5), while the 30-day survival rate was 0.75, with the second gradation on the mGS scale (4.3% (n= 6)) - 0.66, at the third gradation on the mGS scale (1.4% (n=2)) - 0.5, at the fourth gradation on the mGS scale (5% (n=7)) - 0.85, at the fifth gradation on the mGS scale (3.6% (n=2)) - 0 days, at the sixth gradation on the mGS scale (2.1% (n=3)) - 0.33, patients with the seventh gradation on the mGS scale in this subgroup was not observed, with the eighth gradation on the mGS scale, 1 patient (0.7%) was observed, who did not survive during the observation period (30-day survival). In the subgroup of patients with surgical treatment with zero gradation on the mGS scale, 12.8% (n=18) of cases were observed in which the 30-day survival rate was 0.94, with the first gradation on the mGS scale was 1.4% (n= 2) while 30-day survival - 1.0, with the second gradation on the mGS scale (7.1% (n=10)) - 0.9, with the third gradation on the mGS scale (5% (n=7)) - 0.57, with the fourth gradation on the mGS scale (5.7% (n=8)) - 0.37, with the fifth gradation on the mGS scale (2.8% (n=4)) - 0.5, with at the sixth gradation on the mGS scale (6.4% (n=9)) - 0.44, at the seventh gradation on the mGS scale (7.1% (n=10)) - 0.3, at the eighth gradation on the mGS scale 8.6% (n=12) of cases with a 30-day survival of 0.29 (Table 3 and Figure 3 A and B).

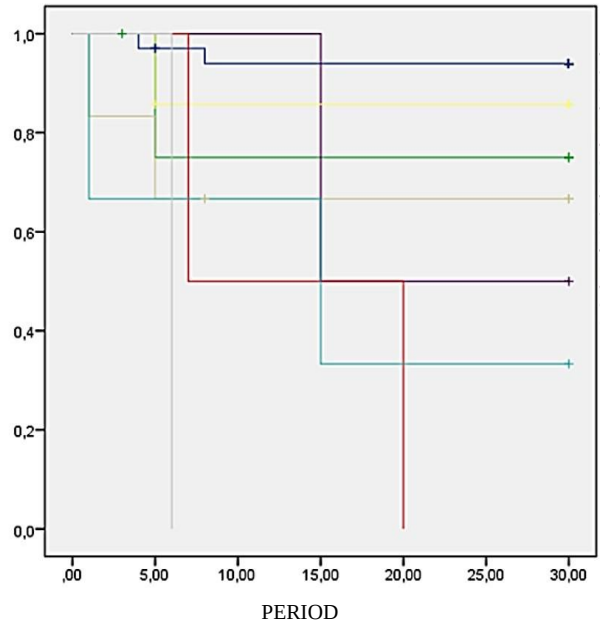

Figure 3 (A). 30-day survival in patients with conservative treatment, depending on the gradation on the mGS scale

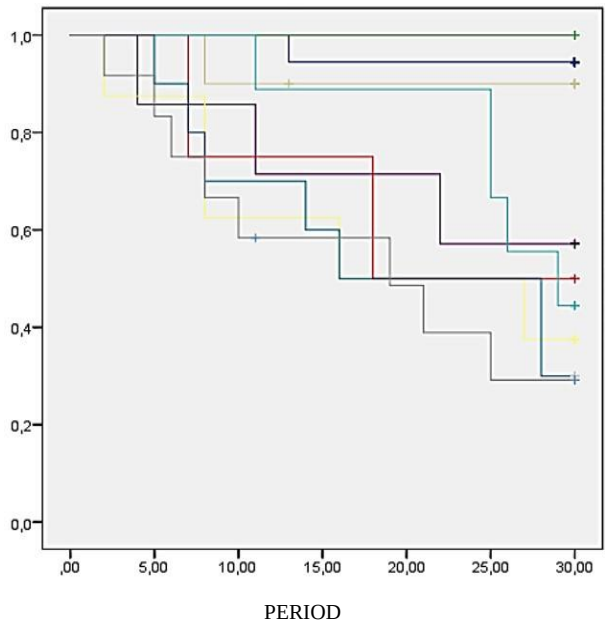

Figure 3 (B). 30-day survival in patients with surgical treatment, depending on the gradation on the mGS scale

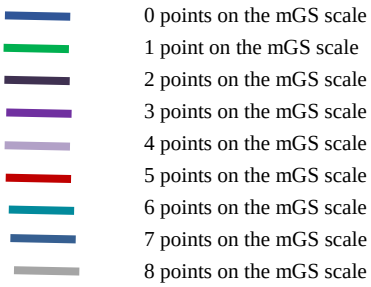

Figure 3

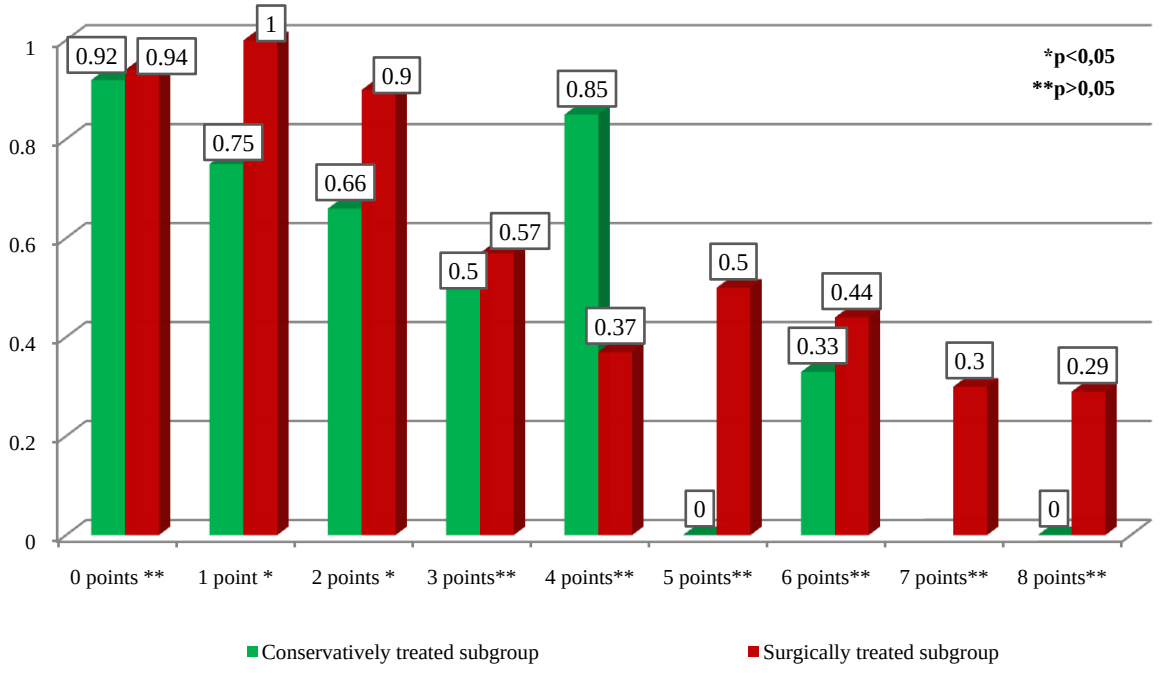

Figure 4. Comparative assessment of 30-day survival of patients depending on the degree of gradation according to the mGS scale

A comparative analysis of the results of treatment of 30-day survival of patients with HIH, depending on the gradation on the mGS scale, showed that there is a tendency for a decrease in 30-day survival as the severity of intraventricular hemorrhage increases, regardless of the method of treatment. Thus, the comparative coefficient of 30-day survival of conservative and surgical methods of treatment in patients with the first gradation on the mGS scale was 0.75 and 1.0, respectively ($p<0.05$), with the second gradation on the mGS scale, this coefficient was 0, 5 and 1, respectively ($p<0.05$), with the third gradation on the mGS scale - 0.5 and 0.57, respectively ($p>0.05$), with the fourth gradation on the mGS scale - 0.85 and 0.37, respectively ($p>0.05$), at the fifth gradation on the mGS scale - 0 and 0.5, respectively ($p>0.05$), at the sixth gradation on the mGS scale - 0.33 and 0.44, respectively ($p>0.05$), with the eighth gradation on the mGS scale - 0 and 0.29, respectively ($p>0.05$) (Table 3 and Figure 4).

4. Conclusions

Thus, based on the study, we can conclude that the 30-day survival rates in patients with HIH depend on many factors, such as the initial level of consciousness according to GCS, neurological deficit according to the NIHSS scale, as well as CT- morphometric indicators, namely, the localization of the HIH, the volume of hemorrhage and the degree of gradation of intraventricular hemorrhage according to the mGS scale.

The authors declare no conflict of interest.

This study does not include the involvement of any budgetary, grant or other funds.

The article is published for the first time and is part of a scientific work.

REFERENCES

[1] Galkina T.N. Organization of medical care and multivariate analysis of the outcomes of non-traumatic intracranial hemorrhages: Abstract of the thesis. dis. cand. med. Sciences: 14.00.13, 14.00.33 // Russian Research Neurosurgical Institute. A.L. Polenov. St. Petersburg, 2000. p 25.

[2] Gusev E.N., Vilensky B.S., Skoromets A.A. et al., "Main factors influencing outcomes of strokes," J. nevrol. and psychiatrist. 1995. V.95, No. 1. pp. 4-7.

[3] Martynov Yu.S., Kevdina O.N., Shuvakhina N.A. Pneumonia in stroke // Nevrol. magazine 1998. Vol. 3, No. 3. pp. 18-21.

[4] Al Shardan, M.M. Factors that predict hydrocephalus following intraventricular hemorrhage // Brit j neurosurg. - 2015. -Vol. 29, No. 2. - P. 225-228.

[5] Auer LM, Deinsberger W, Niederkorn K, et al. Endoscopic surgery versus medical treatment for spontaneous intracerebral hematoma: a randomized study. // J Neurosurg 1989; 70: 530–35.

[6] Bhattathiri, P.S. Intraventricular hemorrhage and hydrocephalus after spontaneous intracerebral hemorrhage: results from the STICH trial // Acta neurochirurg.- 2006. - Vol. 96 suppl. - P. 65-68.

[7] Bhattathiri PS, Gregson B, Prasad KS, Mendelow AD, STICH Investigators. Intraventricular hemorrhage and hydrocephalus after spontaneous intracerebral hemorrhage: results from the STICH trial. // Acta Neurochir Suppl 2006; 96:65–68.

[8] Feigin VL, Lawes CMM, Bennett DA, Anderson CS. Stroke epidemiology: a review of population-based studies of incidence, prevalence, and case-fatality in the late 20th century. // Lancet Neurol 2003; 2:43–53.

[9] Herrick, D.B. Determinants of external ventricular drain placement and associated outcomes in patients with spontaneous intraventricular hemorrhage / D.B. Herrick, N. Ullman, S. Nekoovaght-Tak et al. // Neurocrit care. - 2014. - Vol. 21, No. 3. - P. 426-434.

[10] Keep RF, Xi G, Hua Y, Hoff JT. The deleterious or beneficial effects of different agents in intracerebral hemorrhage: think big, think small, or is hematoma size important? // Stroke 2005; 36:1594–96.

[11] Mendelow AD. Mechanisms of ischemic brain damage with intracerebral hemorrhage. // Stroke 1993; 24 (suppl I): I115–I7.

[12] Mendelow AD, Bullock R, Teasdale GM, Graham DI, McCulloch J. Intracranial haemorrhage induced at arterial pressure in the rat: part 2. Short term changes in local cerebral blood flow measured by autoradiography. // Neurol Res 1984; 6:189–93.

[13] Mendelow DA, Gregson BA, Rowan EN, Murray GD, Gholkar A, Mitchell PM // Early surgery versus initial conservative treatment in patients with spontaneous supratentorial lobar intracerebral haematomas (STICH II): a randomised trial // Lancet 2013; 382: 397–408.

[14] Moradiya, Y. Intraventricular thrombolysis in intracerebral hemorrhage requiring ventriculostomy: a decade-long real-world experience // Stroke. - 2014. - Vol. 45, No. 9. - P. 2629-2635.

[15] Nehls DG, Mendelow DA, Graham DI, Teasdale GM. Experimental intracerebral hemorrhage: early removal of a spontaneous mass lesion improves late outcome. // Neurosurgery 1990; 27:674–82.

[16] Siddique MS, Fernandes HM, Arene NU, Wooldridge TD, Fenwick JD, Mendelow AD. Changes in cerebral blood fl ow as measured by HMPAO SPECT in patients following spontaneous intracerebral haemorrhage. // Acta Neurochir Suppl 2000; 76: 517–20.

[17] Trifan G., Arshi B., Testai F.D. Intraventricular Hemorrhage Severity as a Predictor of Outcome in Intracerebral Hemorrhage // Frontiers in Neurology 2019 10: 217. doi:10.3389/fneur.2019.00217.

[18] Tuhrim S., Horowitz D.R., Sacher M., Godbold J.H. Volume of ventricular blood is an important determinant of outcome in supratentorial intracerebral hemorrhage. // Crit Care Med. 1999 27: 617–21. doi: 10.1097/00003246-199903000-00045.

[19] van Asch CJJ, Luitse MJA, Rinkel GJE, van der Tweel I, Algra A, Klijn CJM. Incidence, case fatality, and functional outcome of intracerebral haemorrhage over time, according to

age, sex, and ethnic origin: a systematic review and meta-analysis. // Lancet Neurol 2010; 9:167–76.

[20] Xi G, Keep RF, Hoff JT. Mechanisms of brain injury after intracerebral haemorrhage. // Lancet Neurol 2006; 5:53–63.

[21] Xi G, Wagner KR, Keep RF, et al. Role of blood clot formation on early edema development after experimental intracerebral hemorrhage. // Stroke 1998; 29:2580–86.

[22] Young W.B., Lee K.P., Pessin M.S., Kwan E.S., Rand W.M., Caplan L.R. Prognostic significance of ventricular blood in supratentorial hemorrhage: a volumetric study. // Neurology. 1990 40:616–9. doi: 10.1212/WNL.40. 4.616.