

## THE ROLE AND CORRECTION OF SEXUAL DYSFUNCTION AS A COMPONENT OF THE QUALITY OF LIFE IN PATIENTS OPERATED ON FOR CEREBRAL ANEURYSM RUPTURE

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### Summary

**Introduction.** Hemorrhagic stroke due to the rupture of the intracranial aneurysm (IA) is a typical clinical manifestation of the disease and one of the main causes of disability, affecting the quality of life in operated patients.

**The aim.** To determine the feasibility and safety of implementing protocols for diabetes mellitus (DM) treatment as part of rehabilitation interventions in patients who have undergone surgery for the rupture of intracranial aneurysm (IA) in the brain.

**Materials and methods.** To determine the effectiveness and safety of implementing diabetes mellitus (DM) treatment protocols in individually developed rehabilitation interventions following surgery for the rupture of intracranial aneurysm (IA) in the brain, a retrospective cohort study was conducted in parallel groups.

**Results.** Sexual dysfunctions (SD) resulting from the rupture of IA are multifactorial. The causes of SD can be categorized as primary, secondary, and tertiary. Primary causes include damage to brain structures by hemorrhagic stroke or vascular ischemic events affecting sexual functioning, pre-existing medical conditions, and side effects related to medication therapy during treatment. Secondary causes encompass persistent sensorimotor disturbances due to a prior stroke. Issues related to cognitive, behavioral, and psychosocial adaptation constitute tertiary causes of SD. The effective and prompt correction of sexual dysfunction in patients following the rupture of cerebral blood vessel aneurysms largely depended on the proper administration of anesthesia during surgical interventions and intensive therapy in the perioperative period. This includes preoperative preparation and patient analgesia, the administration of anesthesia, and adequate postoperative care.

**Conclusions.** The application of SD correction in men as part of rehabilitation measures from the 6th to the 24th month after surgical treatment of intracranial aneurysm (IA) has a positive impact, reducing SD regression from 88.9 % (n=56/63) to 34.9 % (n=22/63).

**Keywords:** rehabilitation measures, correction of sexual dysfunction, hemorrhagic stroke, reproductive health, effectiveness of medical care, diagnosis, treatment

### INTRODUCTION

Hemorrhagic stroke resulting from the rupture of intracranial aneurysms (IA) in the brain is a typical clinical manifestation of the disease and a leading cause of disability that impacts the quality of life of operated patients.

Sexual health is an integral part of overall health, well-being, and quality of life [1]. Additionally, sexual health is part of reproductive health and human reproductive rights [2]. Sexual dysfunction (SD) is a common impairment after a stroke [3], classified under b640 'Sexual functions' in the International Classification

of Functioning, Disability and Health (ICF), and as F52 'Sexual dysfunction not caused by organic disorder or disease' in ICD-10. Considering the age and gender composition of the sample, determining the reproductive age for the female population from 15 to 49 years (WHO recommendation) and the results of reproductive potential studies in men, which found that the reproductive age of a man does not play a decisive role if it does not exceed 60 years [4] – among patients with the rupture of IA in the brain, 62 % (n=339/547) were in reproductive age (men – 68.7 % (n=233/339) and women – 31.3 % (n=106/339)).

Therefore, studying the feasibility and safety of implementing current SD treatment protocols as part of rehabilitation measures in patients operated on for the rupture of IA in the brain is of medical and social relevance.

### THE AIM

To determine the feasibility and safety of implementing protocols for diabetes mellitus (DM) treatment as part of rehabilitation interventions in patients who have undergone surgery for the rupture of intracranial aneurysm (IA) in the brain.

### MATERIALS AND METHODS

To determine the effectiveness and safety of implementing diabetes mellitus (DM) treatment protocols [5, 6] in individually developed rehabilitation interventions [7, 8] following surgery for the rupture of intracranial aneurysm (IA) in the brain, a retrospective cohort study was conducted in parallel groups.

A comparative analysis of the results of rehabilitation treatment was conducted in 311 (100 %) patients with hemorrhagic manifestations of intracranial aneurysm rupture (IA) who underwent urgent and elective surgery at 6-, 12-, and 18-months post-operation. At all observation stages to determine the specifics and assessment of sexual dysfunction (SD) in individuals with hemorrhagic manifestations of IA after surgical treatment, the following questionnaires and scales were used: International Erectile Function Index (IIEF); Derogatis Interview on Sexual Functioning (DISF); Changes in Short Form of Sexual Functioning (CSFQ-14); Sexual Function Questionnaire (SFQ); Arizona Sexual Experience Scale (ASEX); The Sexual Satisfaction Scale for Women (SSS-W); the Sexual Perception and Adaptation Questionnaire (SSPAQ) [9, 10].

The first (control) observation group (Group 1) consisted of patients who, by their own choice, abstained from SD correction – 49.8 % (n=155/311).

SD correction in the second group (Group 2) of observations – 50.2 % (n=156/311) was carried out by a multidisciplinary team of related specialists (gynecologist, andrologist, urologist, clinical psychologist, psychiatrist, and sexologist) as part of rehabilitation

measures and included: pharmacological support therapy (hormonal and non-hormonal drugs); non-pharmacological methods (physiotherapy, sexual implants, penile prostheses, and lubricating gels); psychotherapy, and educational interventions [5, 6, 7].

### RESULTS AND DISCUSSION

Sexual dysfunction (SD) resulting from the rupture of intracranial aneurysms (IA) is multifactorial [5, 6, 7, 9]. The causes of SD can be categorized as primary, secondary, and tertiary. Primary causes include damage to brain structures by hemorrhagic stroke or vascular ischemic events affecting sexual functioning, pre-existing medical conditions, and side effects related to medication therapy during treatment. Secondary causes encompass persistent sensorimotor disturbances due to a prior stroke. Issues related to cognitive, behavioral, and psychosocial adaptation constitute tertiary causes of SD [9]. Tertiary causes of SD were the exclusion criteria from this study (in accordance with the Council of Europe Convention on Human Rights and Biomedicine, also known as the Convention on Human Rights and Biomedicine (ETS No. 164) dated April 4, 1997, and the Helsinki Declaration of the World Medical Association (2008).

Two observation groups included patients with heterosexual behavior and a form of psychosocial orientation in reproductive age: Group No. 1 women (up to 50 years) – 28.4 % (n=44/155) and men (up to 60 years) – 40.6 % (n=63/155); Group No. 2: women – 34.6 % (n=54/156); men – 32.7 % (n=51/156) (figure 1). Patients with heterosexual orientation outside reproductive age who considered sexual activity as a relevant component of their quality of life were: Group 1 – women 29.7 % (n=46/155), men – 0.6 % (n=2/155), and Group 2 – women 25 % (n=39/156), men – 23.1 % (n=36/156). Thus, the distribution of patients by age is presented in figure 1, and by age and gender in groups, it is presented in table 1.

Most patients in the two observation groups are of reproductive age: Group 1 – 69 % (n=107/155); Group 2 – 67.3 % (n=105/156).

Sexual function and activity tend to decrease with age [11]. In addition to physiological involuntional changes in the reproductive system, this is often associated with comorbidities and factors such as the need for continuous medication, changes in lifestyle, and relationship dynamics. To clarify the initial status (before the occurrence of IA BGA disease) of sexual function and activity, and to assess the impact of the experienced illness and surgical intervention on sexual life and satisfaction, patients were surveyed according to the recommended protocols for SD treatment in men and women using the A guide to taking a sexual history [12]. The anamnestic data on the presence of SD in the history of women (sexual status before the surgical intervention for IA BGA rupture) are presented in figures 2-4.

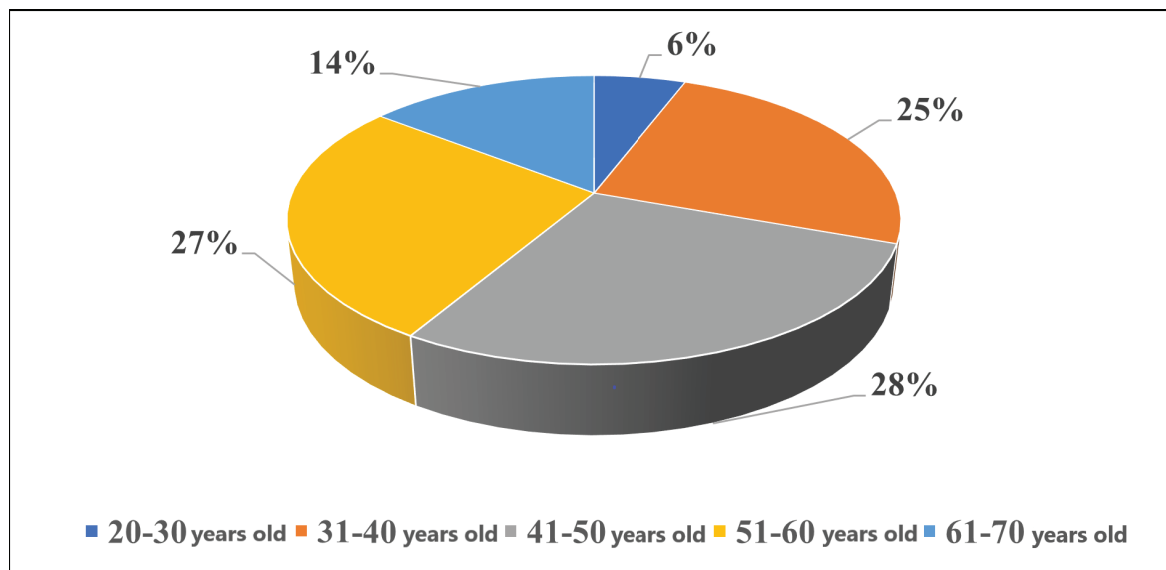


Figure 1. Distribution of patients in observation groups with IA (intracranial aneurysm) in the brain by age

Table 1

Distribution of patients with IA (Intracranial Aneurysm) in the brain by age and gender in comparison groups

N		20-30 years		31-40 years		41-50 years		51-60 years		61-70 years		Total	
		P,%	N	P,%	N	P,%	N	P,%	N	P,%	N	P,%	N
Group 1	Ж	4	1,3	18	5,8	22	7,1	28	9	18	5,8	90	28,9
	Ч	10	3,2	29	9,3	18	5,8	6	1,9	2	0,6	65	20,9
Group 2	Ж	2	0,6	27	8,7	25	8	26	8,4	13	4,2	93	29,9
	Ч	2	0,6	3	1	22	7,1	24	7,7	12	3,9	63	20,3
Total		18	5,8	77	24,8	87	28	84	27	45	14,5	311	100

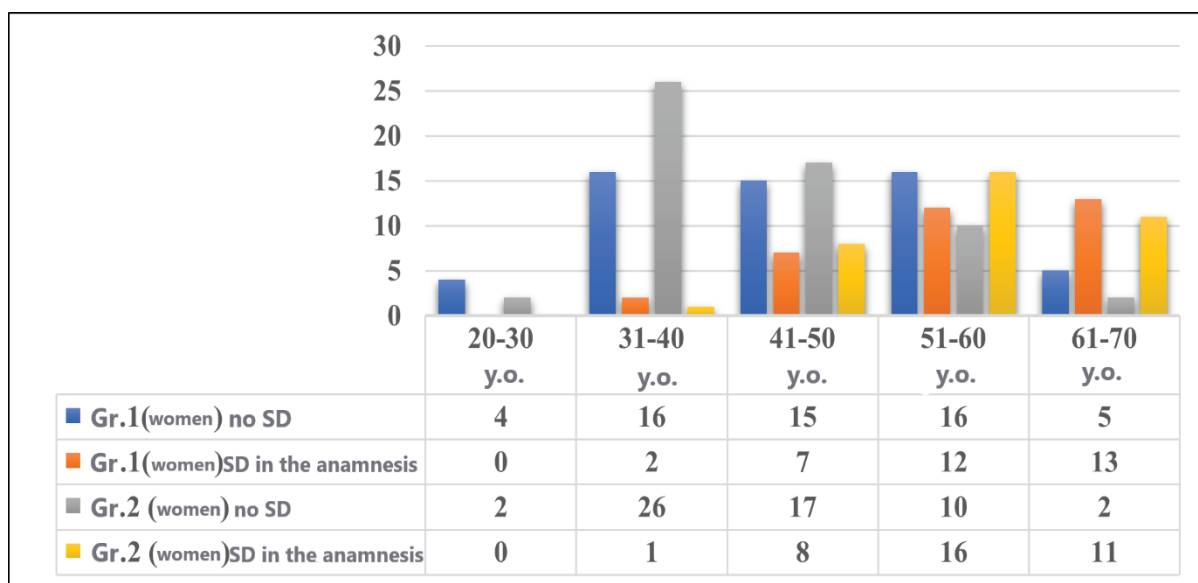


Figure 2. Presence of Sexual Dysfunction (SD) in women's medical history before surgical treatment for IA (Intracranial Aneurysm) in the brain

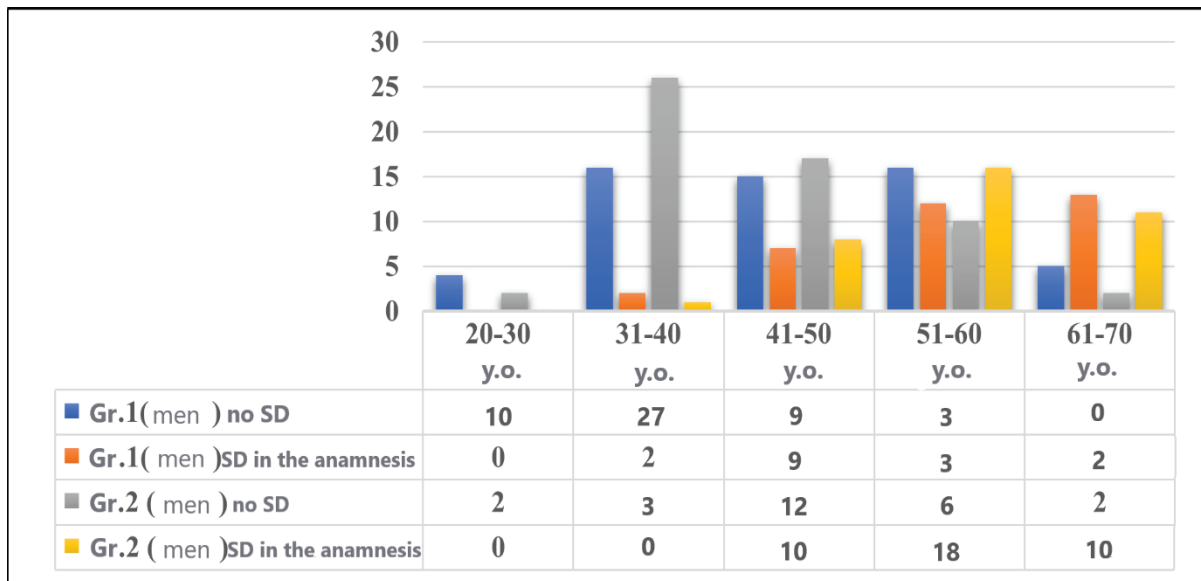


Figure 3. Sexual Dysfunction (SD) in men’s medical history before surgical treatment for IA (Intracranial Aneurysm) in the brain

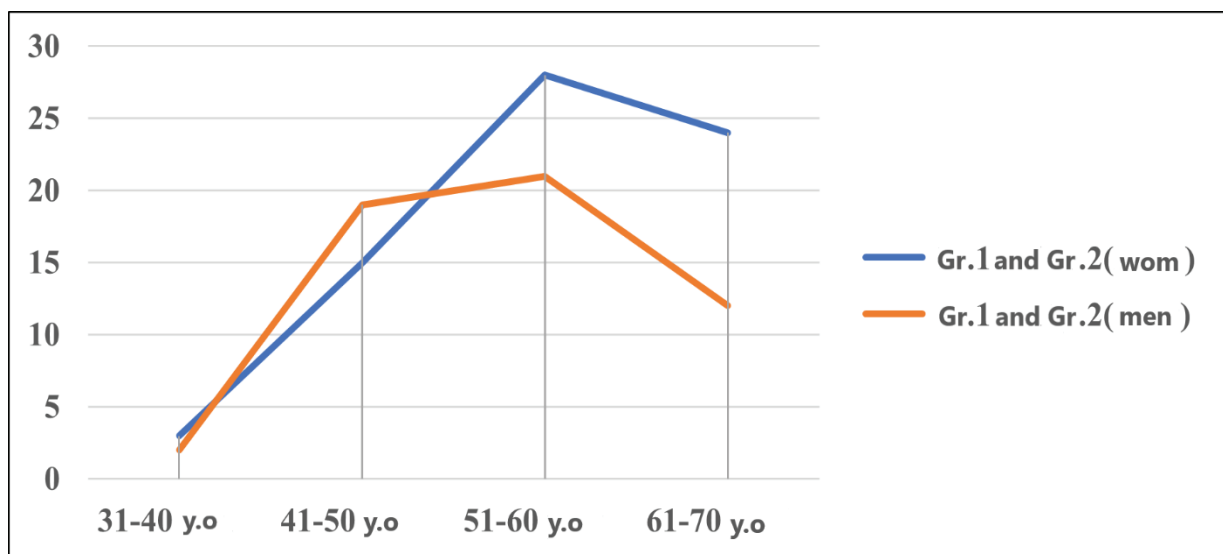


Figure 4. Distribution of patients with IA (Intracranial Aneurysm) BGA and Sexual Dysfunction (SD) in the medical history by age and gender in comparison groups

The presence of sexual dysfunction (SD) in the medical history was recorded in 38.3 % (n=70/183): Group 1 – 37.8 % (n=34/90); in Group 2 – 38.7 % (n=36/93).

When analyzing the anamnestic data, an age-dependent tendency towards the presence of initial SD was identified. In the two observation groups, among women aged 20-30, no cases of any manifestations of SD were recorded before the occurrence of IA BGA disease.

In the age group of 31-40 years, complaints about the presence of sexual dysfunction (SD) in the medical history (before the occurrence of IA BGA disease) were found in 6.7 % (n=3/45) of observations: in Group 1 – 11.1 % (n=2/18); in Group 2 – 3.7 % (n=1/27).

For women aged 41-50, initial Sexual Dysfunction (SD) is recorded in almost 1/3 of cases – 31.9 % (n=15/47): in Group 1 – 31.8 % (n=7/22); in Group 2 – 32 % (n=8/25). More than half of women have been identified with SD in the medical history at the age of 51-60-51.9 % (n=28/54): Group 1 – 42.9 % (n=12/28); Group 2 – 61.5 % (n=16/26). In the majority of women operated for IA (Intracranial Aneurysm) BGA in the age group of 61-70, SD is recorded in the medical history – 77.4 % (n=24/31): Group No. 1 – 72.2 % (n=13/18); Group No. 2 – 84.6 % (n=11/13).

In men from both observation groups, a dependence on the presence of Sexual Dysfunction (SD) based on age was also identified when analyzing the anamnestic

data. Thus, among men aged 20-30, no cases of any manifestations of SD were recorded at the stage of aneurysm formation (before the onset of IA BGA). In the age group of 31-40 years, the presence of episodes of SD in the medical history of men was recorded in 6.3 % (n=2/32) of observations and found in observations in Group 1 – 7.4 % (n=2/27); in Group 2 – there were none.

Men aged 41-50 with SD constituted almost half of the observations – 47.5 % (n=19/40): in Group 1 – 50 % (n=9/18); in Group 2 – 45.6 % (n=10/22).

The majority of men aged 51-60 from this sample had complaints of SD in the medical history – 70 % (n=21/30): Group 1 – 50 % (n=3/6); Group 2 – 75 % (n=18/24).

Almost all male patients aged 61-70 had SD in the medical history – 85.7 % (n=12/14): Group 1 – in all observations (100 % (n=2/2)); Group 2 – 83.3 % (n=10/12).

Comparing the anamnestic data on the presence of Sexual Dysfunction (SD) before the manifestation of IA (Intracranial Aneurysm) BGA, it can be concluded that the frequency of SD increases with age in the cohort of women and men, reaching its maximum frequency in the age group of 51-60 years. The decrease in complaints of SD in patients aged 61-70 of both genders is associated with the patients' own assessment of the desexualization status of their lives and its activity, considering it as something that 'does not create physiological and/or psychological discomfort, does not disturb the quality of life.'

In all patients (n=311/100 %) included in the comparative analysis of rehabilitation results after surgery for IA BGA, there was a hemorrhagic type of clinical manifestations of the disease. The severity of the condition at admission was assessed using the WFNS scale (table 2).

Table 2

**Severity of condition at admission in groups according to the WFNS SAH scale**

	Group 1		Group 2		Total	
	N	P,%	N	P,%	N	P,%
Grade II	18	5,8	20	6,4	38	12,2
Grade III	66	21,2	68	21,9	134	43,1
Grade IV	64	20,6	62	19,9	126	40,5
Grade V	7	2,3	6	1,9	13	4,2
Total	155	49,8	156	50,2	311	100

Most patients – 55.3 % (n=172/311) at the time of hospitalization corresponded to grade II and III severity according to the WFNS scale. In a severe condition (grade IV) – sopor with varying degrees of hemiparesis in 40.5 % (n=126/311) of observations. Early signs of decerebrate rigidity or comatose state (grade V) were recorded in 4.2 % (n=13/311) of cases. There were no significant differences in the initial neurological status

at the time of hospitalization between patients in the comparison groups and the overall sample of patients with intracranial aneurysm rupture (n=547/100).

The distribution of patients by the anatomical form of subarachnoid hemorrhage due to the rupture of intracranial aneurysm in the comparison groups is presented in table 3.

Table 3

**Anatomical Form of Intracranial Aneurysm Rupture in Comparative Groups**

Anatomical Variants of Intracranial Aneurysms	Group 1		Group 2		Total	
	N	P,%	N	P,%	N	P,%
SAH	63	20,3	65	20,9	128	41,2
SAH+IVH	64	20,6	59	19	123	39,5
SAH+ IVH + IPH	23	7,4	26	8,4	49	15,8
SAH+ IVH + IPH + hydrocephalus	5	1,6	6	1,9	11	3,5
Total	155	49,8	156	50,2	311	100

In the onset of the disease, subarachnoid hemorrhage (SAH) was present in 41.2 % (n=128/311) of cases: Group 1 – 40.6 % (n=63/155), Group 2 – 41.7 % (n=65/156). Complicated forms of subarachnoid hemorrhage due to the rupture of intracranial aneurysm were

observed in the majority of patients, accounting for 58.8 % (n=183/311): Group 1-59.4 % (n=92/155), Group 2 – 58.3 % (n=91/156). The combination of subarachnoid hemorrhage with intraventricular hemorrhage occurred in 39.5 % (n=123/311) of cases: Group 1 – 41.3 %

(n=64/155), Group 2-37.8 % (n=59/156). Rupture of blood into the subarachnoid space, intraventricular system, and brain parenchyma (SAH+IVH+IPH) was observed in 15.8 % (n=49/311) of cases: Group 1 – 14.8 % (n=23/155), Group 2 – 16.7 % (n=26/156). Subarachnoid-paranchymal-ventricular hemorrhage complicated by occlusive

hydrocephalus was recorded in 3.5 % (n=11/311) of patients: Group 1 – 3.2 % (n=5/155), Group 2 – 3.8 % (n=6/156).

Analysis was conducted in groups according to the localization of intracranial aneurysm (ICA) that manifested itself with rupture (table 4).

Table 4

**Distribution of patients in groups by the localization of intracranial aneurysm (IA)**

	Group 1		Group 2		Total	
	N	P, %	N	P, %	N	P, %
ACA – Anterior Part	74	23,8	71	22,8	145	46,6
SSA	38	12,2	41	13,2	79	25,4
MCA	35	11,3	30	9,6	65	20,9
IA	8	2,6	14	4,5	22	7,1
Total	155	49,8	156	50,2	311	100

The majority of observations, 46.6 % (n=145/311), in both groups consisted of patients with the rupture of the Anterior Cerebral Artery – Anterior Part (ACA-APA) at the onset of the disease: Group –1 – 47.7 % (n=74/155), Group 2 – 45.5 % (n=71/156). The long-term results of surgical treatment for ruptures of ACA-APA complex comprised 71.4 % (n=145/203) of the total sample of patients with ACA-APA and 80.6 % (n=145/180) of ACA-APA with hemorrhagic manifestations of the disease analyzed in this study.

The rupture of the Superior Sagittal Artery (SSA) occurred in 25.4 % (n=79/311) of cases: Group 1 – 24.5 % (n=38/155), Group 2 – 26.3 % (n=41/156), constituting 54.9 % (n=79/144) of the total cases of SSA with hemorrhagic manifestations of the disease.

Patients with the rupture of the Middle Cerebral Artery (MCA) (from the sample of MCA with hemorrhagic manifestations of the disease, 67 % (n=65/97) and 55.1 % (n=65/118) of the total MCA cases) accounted for 20.9 % (n=65/311) of observations:

Group 1 – 22.6 % (n=35/155), Group 2 – 19.2 % (n=30/156).

The smallest group of observations consisted of patients with the rupture of the Intracranial Arteries – 7.1 % (n=22/311): Group 1 – 5.1 % (n=8/155), Group 2 – 8.9 % (n=14/156). Patients with IA rupture constituted 59.5 % (n=22/37) of the IA sample and 68.8 % (n=22/32) of the total IA cases with hemorrhagic manifestations of the disease.

Patients operated on due to the rupture of the Superior Sagittal Artery (SSA) – 4 % (n=22/457) are not included in this section of the study due to the specific clinical-neurological manifestations of a combination of persistent psycho-organic syndrome with other focal neurological manifestations (see section 3.3.). The presence of a psychiatric disorder was a criterion for exclusion from this study fragment.

In all observations, surgical treatment for Intracranial Aneurysm was performed. The distribution of patients based on the chosen method of devascularization is presented in table 5.

Table 5

**The method of surgical treatment for Intracranial Aneurysm**

	Group 1		Group 2		Total	
	N	P, %	N	P, %	N	P, %
Clipping of Intracranial Aneurysm	79	25,4	89	28,6	168	54,1
Embolization of Intracranial Aneurysm	76	24,4	67	21,5	143	45,9
Total	155	49,8	156	50,2	311	100

Exclusion of Intracranial Aneurysm by the Microsurgical (MS) method was performed in 54.1 % (n=168/311): Group 1 – 51 % (n=79/155); Group 2 – 57 % (n=89/156), constituting 71.5 % (n=168/235) of the total number of Microsurgical (MS) operations performed for urgent and elective indications.

Endovascular (EV) operations were performed in 45.9 % (n=143/311): Group 1 – 49 % (n=76/155);

Group 2 – 42.9 % (n=67/156), constituting 65.3 % (n=143/219) of the total number of Endovascular (EV) operations performed for urgent and elective indications.

Successful results were achieved through the collaboration of a multidisciplinary team of specialists, including neurosurgeons, gynecologists-endocrinologists, neurologists, and anesthesiologists. In particular, the effective and prompt correction of sexual dysfunction in

patients with intracranial aneurysm rupture significantly depended on the correct provision of anesthesia during surgery and intensive care in the perioperative period: preparation for surgery and patient anesthesia, the actual anesthesia, and adequate treatment in the postoperative period.

According to our observations and relying on numerous data from the literature based on the results of conducted studies, extended intraoperative and postoperative monitoring is crucial for this patient group: continuous invasive (artery cannulation) monitoring of arterial pressure (AP), ECG, blood oxygen saturation, and carbon dioxide levels (SpO<sub>2</sub> and EtCO<sub>2</sub>), depth of anesthesia assessed by electroencephalography (BIS or ENTROPY), hourly diuresis, and the installation of an intracranial pressure (ICP) sensor when indicated and feasible. Such monitoring allows for the assessment and rapid correction of changes in hemodynamics and respiration, central nervous and excretory systems.

Additionally, a sufficiently deep anesthesia without significant fluctuations in arterial pressure, especially during induction and tracheal intubation, helps reduce the risk of re-bleeding from the ruptured aneurysm and fluctuations in intracranial pressure (ICP). For induction and maintenance of anesthesia, we primarily used propofol. For induction, 100 mcg of fentanyl and propofol at a dose of 2.5-3 mg/kg were administered, and for anesthesia maintenance, a dose of 3.6 ± 0.3 mg/kg/h was used. The total dose of propofol was 452 ± 27 mg. Dosages exceeding 4 mg/kg/h (or 67 mcg/kg/min) were not used due to the risk of propofol infusion syndrome (PRIS).

The changes in average blood pressure and heart rate during the induction of anesthesia were not significant, and during anesthesia maintenance, hemodynamic parameters remained relatively stable. Propofol also has some neuroprotective effects, reduces intracranial pressure (ICP), and lowers cerebral metabolism. When used, awakening occurs rapidly with clear consciousness or without its depression, and the incidence of postoperative headache, nausea, and vomiting is low. All of this contributes to accelerated rehabilitation and the restoration of neurological deficits in all their manifestations.

Preventing and treating vasospasm of the cerebral vessels according to the «Triple-H» therapy principle (hypervolemia, hypertension, hemodilution) is also crucial, with adequate infusion through a catheterized Central Venous Pressure (CVP) and the use of calcium channel antagonists that dilate cerebral vessels (nimodipine, nicardipine). The infusion therapy rate (balanced crystalloids) during surgery was 2-3 ml/kg/hour of surgical intervention.

All the mentioned measures in the comprehensive treatment of the consequences of ruptured cerebral aneurysms contribute to the rapid restoration of the central nervous system function, elimination of neurological deficits, and quick neurological rehabilitation, along with a gradual improvement in punctuation according to the GCS and AVPU scales and a progressive reduction in sexual dysfunction.

The patient's condition according to the Glasgow Outcome Scale at the time of discharge from the hospital in the table 6.

Table 6

**Clinical and neurological treatment outcomes according to the Glasgow Outcome Scale**

Results	Group 1		Group 2		Total	
	N	P,%	N	P,%	N	P,%
Good	52	16,7	51	16,4	103	33,1
Moderate disability	74	23,8	72	23,2	146	47
Severe disability	29	9,3	33	10,6	62	19,9
Total	155	49,8	156	50,2	311	100

On the discharge from the hospital, most patients had satisfactory results: good recovery – 33.1 % (n=103/311): Group 1-33.5 % (n=52/155), Group 2 – 32.7 % (n=51/156), or moderate disability – 47 % (n=146/311): Group 1 – 47.7 % (n=74/155), Group 2 – 46.2 % (n=72/156). Severe disability was recorded in 19.8 % (n=62/311) of patients: Group 1 – 18.7 % (n=29/155), Group 2 – 21.1 % (n=33/156). A reassessment of the functional status of patients after a stroke and surgical treatment of IA, with the determination of the presence

and type of sexual dysfunction, was conducted at 6, 12, and 18 months from the onset of the disease (rupture of IA) according to the DSM-5 diagnostic criteria for sexual dysfunction [12] (figures 5-7).

Complaints of sexual dysfunction (SD) at 6 months after the rupture and surgical treatment of BGA GM occurred in the majority of observations – 81.4 % (n=149/183) in both groups – 80 % (n=72/90), Group 2 – 82.8 % (n=77/93), regardless of the presence or absence

of SD in the medical history. A typical manifestation of SD in women was a combination of emotional lability, libido disorders, and changes in the menstrual cycle in

both observation groups. The impact of SD correction in women from Group 2 compared to natural restoration of sexual functioning is shown in figure 6.

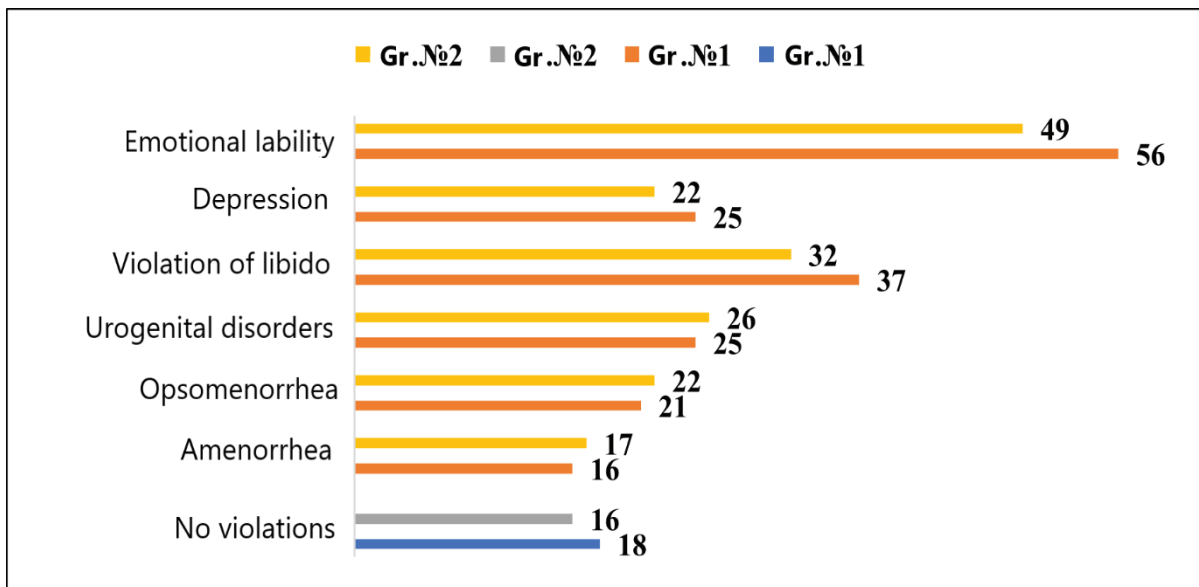


Figure 5. Specifics of Sexual Dysfunction (SD) and Psychoemotional Changes in Women

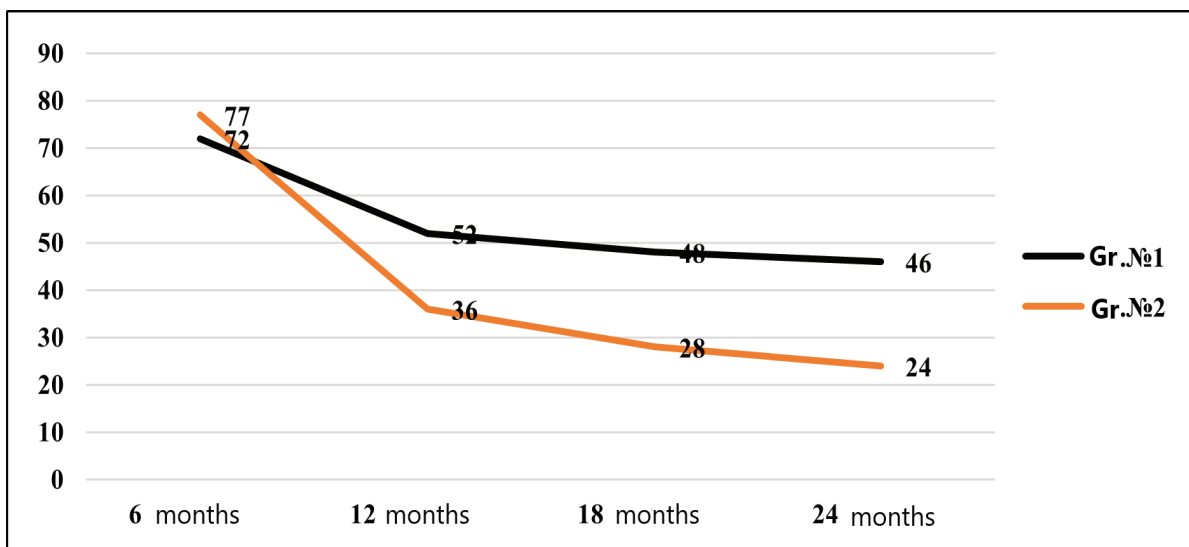


Figure 6. Dynamics of Sexual Dysfunction (SD) and Psychoemotional Changes in Women in Comparison Groups

The application of rehabilitation measures combined with the correction of Sexual Dysfunction (SD) (according to the individualized use of SD treatment protocols in women) demonstrates positive dynamics in terms of SD already after 6 months from the beginning of treatment (see fig. 7.3.6). Thus, in Group 1, complaints about the presence of SD at the 12-month follow-up after craniotomy and clipping (CRA) for ruptured intracranial aneurysms (RICA) were still present in 57.7 % (n=52/90), while in Group 2, a more intensive positive dynamics of SD regression was noted – 38.7 % (n=36/93).

A reduction in SD manifestations at the 18- and 24-month follow-ups was recorded in both observation

groups, but there was no statistically significant difference in dynamics. The presence of SD at the 24-month follow-up after CRA for RICA in Group 1 reached 51.1 % (n=46/90) compared to the number of SD in the history in this group – 37.8 % (n=34/90). This may indicate a negative impact of the experienced hemorrhagic stroke and operative treatment of RICA on the sexual functioning of patients in the form of an increase in the number of SD compared to the initial indicators (presence of SD in the history – see table 7.13) in this observation group.

At the 24-month follow-up after the rupture of intracranial aneurysms and surgical treatment in women from Group 2, the frequency of Sexual Dysfunction



(SD) decreased below the level of initial complaints (historical SD in Group 2 – 38.7 % (n=36/93)) to 25.8 % (n=24/93). This suggests that medical interventions aimed at correcting SD in women after the rupture and surgical treatment of IA have a positive impact on the quality of life of operated patients, preserving and restoring reproductive potential.

A similar study was conducted in men at 6, 12, and 18 months after the rupture and surgical treatment of IA (fig. 7).

Sexual Dysfunction (SD) occurred in the majority of men 6 months after the rupture and surgical treatment of Intracranial Aneurysm (IA) GM – 88.3 % (n=113/128) in both groups – 87.7 % (n=57/65), Group 2 – 88.9 % (n=56/63), regardless of the presence or absence of SD in the medical history. The typical manifestation of SD

in men was a combination of depressive disorder with libido and erectile dysfunction. Significant differences in the manifestations of SD were found between Group 1 and Group 2 regarding the frequency of urogenital disorders (Group 1 – 41.5 % (n=27/65); Group 2 – 12.7 % (n=8/63)) and sexual life deactivation (Group 1 – 41.3 % (n=26/65); Group 2 – 12.7 % (n=8/63)), which may be explained by a significantly lower number of cases of SD in the medical history of men in Group 1 – 24.6 % (n=16/65) compared to Group 2 – 60.3 % (n=38/63).

When combining rehabilitation measures with the correction of Sexual Dysfunction (SD) (according to the individualized application of SD treatment protocols in men), positive dynamics of SD are demonstrated at all stages of dynamic observation compared to the control group (figure 7, 8).

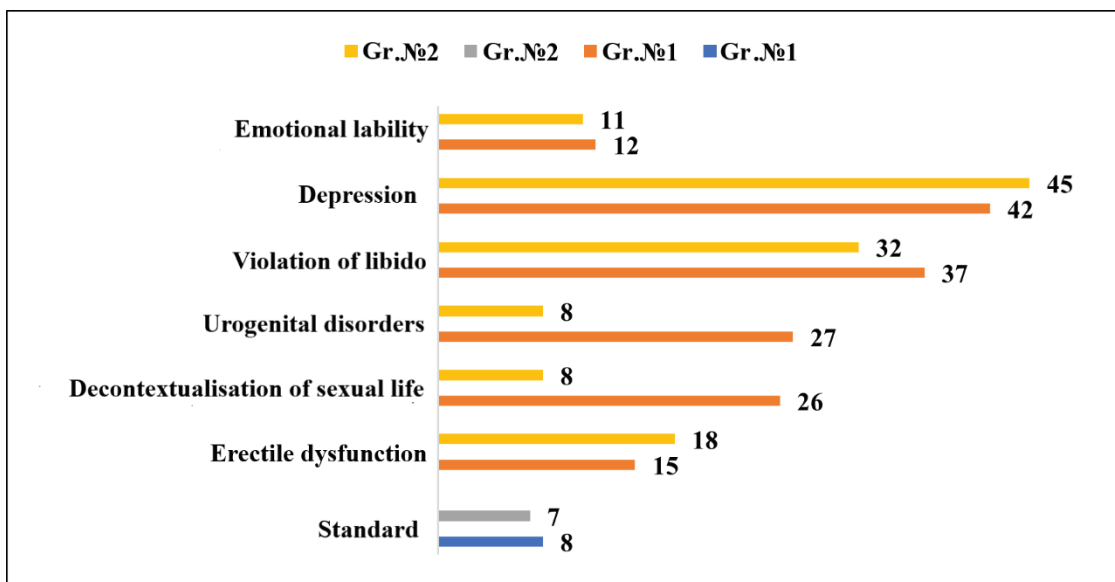


Figure 7. Specifics of Sexual Dysfunction (SD) and psychomotional changes in men

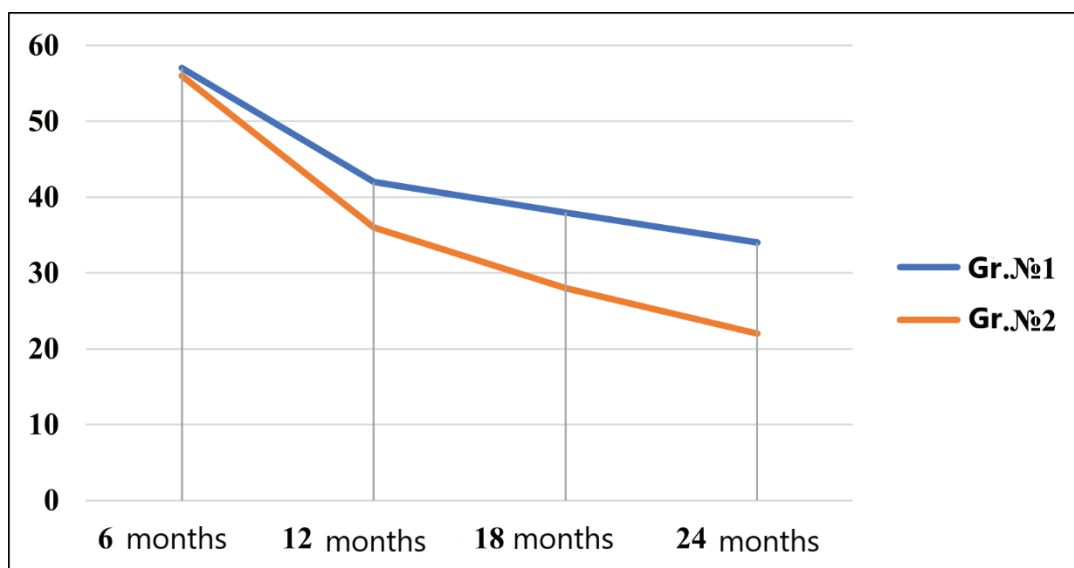


Figure 8. Dynamics of Sexual Dysfunction (SD) and psychomotional changes in men in comparison groups

The complaints about the presence of Sexual Dysfunction (SD) in men during the 12-month follow-up persisted in 69 % (n=78/113): Group 1-64.6 % (n=42/65); Group 2-57.1 % (n=36/63). Group 2 showed a greater intensity of SD regression compared to natural recovery of the sexual sphere. The reduction in SD manifestations at the 18- and 24-month follow-ups was observed in both observation groups, but there was no statistically significant difference in dynamics.

The presence of SD in men at the 24-month mark in Group 1 reached 52.3 % (n=34/65), which is twice the initially detected SD in this group – 24.6 % (n=16/65). This could suggest a possible negative impact of depression and urogenital disorders resulting from hemorrhagic stroke and the complex treatment (surgical, medical) of IA on the process of natural recovery of the sexual sphere in men.

After 24 months, in men from Group 2, the frequency of Sexual Dysfunction (SD) was significantly lower than the initial level – 34.9 % (n=22/63), compared to the anamnestic SD in Group 2-60.3 % (n=38/63). This demonstrates the positive impact of SD correction as part of rehabilitation measures after surgical treatment of IA on the quality of life of operated patients and contributes to the restoration of the reproductive potential of operated patients.

## CONCLUSIONS

1. Patients with IA initially suffer from Sexual Dysfunction (SD) in 39.9 % (n=124/311): women – 38.3 % (n=70/183), men – 42.2 % (n=54/128). The frequency of SD detection increases with the patient's age regardless of gender.

2. Hemorrhagic stroke due to the rupture of an aneurysm and surgical treatment of IA has a negative impact on the sexual sphere, increasing the frequency of SD after 6 months to 88.3 % (n=113/128) in men and 81.4 % (n=149/183) in women. SD has different specific manifestations in men and women 6 months after hemorrhagic stroke due to IA rupture.

3. The rapid correction of sexual dysfunction in patients arising from the rupture of cerebral blood vessel aneurysms largely depends on properly conducted anesthesia, adequate treatment in the postoperative period, and rapid neurological rehabilitation.

4. The application of SD correction in women as part of rehabilitation measures from 6 to 24 months after surgical treatment of IA has a positive impact on SD regression, reducing it from 82.8 % (n=77/93) to 25.8 % (n=24/93).

5. The application of SD correction in men as part of rehabilitation measures from 6 to 24 months after surgical treatment of IA has a positive impact on SD regression, reducing it from 88.9 % (n=56/63) to 34.9 % (n=22/63).

**Prospects for further research.** Further research can help refine our understanding of the relationship between hemorrhagic stroke, surgical treatment of IA, and sexual dysfunction. Additionally, it can guide further efforts in developing effective treatment and rehabilitation strategies for this patient group. Exploring the possibilities of integrating physiotherapy, psychotherapy, and other approaches into comprehensive rehabilitation programs may contribute to reducing sexual dysfunction.

## FUNDING AND CONFLICT OF INTEREST

This research was carried out using budgetary funds as part of the comprehensive research topic for the years 2022-2024. The study was conducted under the State Institution of Science «Research and Practical Centre of Preventive and Clinical Medicine,» State Administrative Department. The specific research topic is «Optimization of surgical treatment for patients through a multimodal fast-track recovery program based on improving minimally invasive surgical interventions, including the application of nano biosensor technologies and anesthesia support» with registration number 0122U000233. The authors declare no conflict of interest.

## COMPLIANCE WITH ETHICAL REQUIREMENTS

The research was conducted in accordance with the fundamental principles outlined in the «Rules of Ethical Principles for Conducting Medical Research Involving Human Subjects», as stated in the Helsinki Declaration (1964-2013), ICH GCP (1996), Directive EEC No. 609 (dated November 24, 1986), and Orders of the Ministry of Health of Ukraine No. 690 dated September 23, 2009, No. 944 dated December 14, 2009, and No. 616 dated August 3, 2012. Informed consent was obtained from each patient participating in the study.

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## Резюме

### РОЛЬ ТА КОРЕКЦІЯ СЕКСУАЛЬНОЇ ДИСФУНКЦІЇ, ЯК СКЛАДОВОЇ ЯКОСТІ ЖИТТЯ ХВОРИХ ОПЕРОВАНИХ З ПРИВОДУ РОЗРИВУ ЦЕРЕБРАЛЬНОЇ АНЕВРИЗМИ

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**Вступ.** Геморагічний інсульт внаслідок розриву ІА (аневризма мозкової артерії) головного мозку (ГМ) є типовим клінічним проявом захворювання та однією з основних причин інвалідності, яка впливає на якість життя оперованих пацієнтів.

**Мета.** Визначити можливості та безпечність застосування протоколів лікування СД у комплексі реабілітаційних заходів у хворих, оперованих з приводу розриву церебральної аневризми ГМ.

**Матеріали та методи.** Для визначення ефективності та безпечності застосування протоколів лікування СД в індивідуально розроблених реабілітаційних заходах після операцій з приводу розриву церебральної аневризми проведено ретроспективне когортне дослідження в паралельних групах.

**Результати дослідження.** Статеві дисфункції (СД) внаслідок розриву аневризми мозкової артерії ГМ – багатофакторні. Причини СД мають: первинний, вторинний і третинний характер. До первинних причин відносять: ураження інсульт-гематомою чи ВІУ ГМ структур, які впливають на статеве функціонування; преморбідні захворювання; побічні ефекти пов'язані з медикаментозною терапією під час лікування. До вторинних причин належать стійкі розлади у сенсомоторній сфері внаслідок перенесеного інсульту. Проблеми когнітивної, поведінкової та психосоціальної адаптації формують третинні причини СД. Ефективна і швидка корекція сексуальної дисфункції у пацієнтів внаслідок розриву аневризми судин головного мозку значною мірою залежала також від правильного проведення анестезіологічного забезпечення хірургічного втручання та інтенсивної терапії в периопераційному періоді: підготовки до операції та знеболення пацієнта, власне анестезії, адекватного лікування в післяопераційному періоді.

**Висновки.** Застосування корекції СД у чоловіків в комплексі реабілітаційних заходів з 6-го по 24 міс після хірургічного лікування ВГА ГМ має позитивний вплив на регрес СД з 88,9 % (n=56/63) до 34,9 % (n= 22/63).

**Ключові слова:** реабілітаційні заходи, корекція сексуальної дисфункції, геморагічний інсульт, репродуктивне здоров'я, ефективність медичної допомоги