

STUDYING THE FEATURES OF THE DEVELOPMENT, CLINICAL COURSE AND SURGICAL TREATMENT OF HEMOPHTHALMOS IN TERSON'S SYNDROME

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Local or total hemophthalmos, which develops due to venous hypertension and subsequent advancement of intracranial pressure after hemorrhage in the cerebrum in Terson syndrome (TS). The purpose of our research was to study the features of development, clinical course and surgical treatment of hemophthalmos in Terson's syndrome. 40 patients (80 eyes), 18 women and 22 men, aged 18 to 75 years, with intracranial hemorrhage (ICH) were examined. All patients gave informed voluntary consent to participate in the study. All patients were initially treated with observation and conservative treatment. If the treatment was ineffective for 4-5 weeks, we performed surgical intervention. We performed pars plana vitrectomy (PPV) 23/27ga with removal of the ILM and endotamponade with a gas-air mixture. The frequency of Terson's syndrome was analyzed taking into account gender, age, cause of ICH, presence of coma in the anamnesis, and the fact of neurosurgery. The localization and type of hemorrhage in Terson's syndrome and visual results, the frequency of complications and recurrences during the entire period of observation were also determined. ST was diagnosed in 25% of cases. The frequency of development of ST was statistically significantly higher in women than in men, in patients aged 30 to 60 years, as well as among cases of non-traumatic IHD. It was found that coma and the presence of neurosurgical intervention in the anamnesis are also factors associated with a statistically significantly higher frequency of ST. In CT, cases of subhyaloid and subILM hemorrhage were more often observed in CT. Surgical treatment (PPV) was required in 60% of cases. A statistically significant improvement of visual functions was established after the operation. A single case of recurrence of hemophthalmos was recorded, which was associated with late postoperative complications. The results of our study complement the data published in the literature on the peculiarities of the occurrence, clinical course and treatment of Terson's syndrome, and confirm that surgical intervention for hemophthalmos in this case is necessary in more than half of the cases, and statistically significantly improves the visual functions of patients. The risk of surgery, taking into account the frequency of complications and recurrences, was low in our study.

Key words: Terson's syndrome, intracranial hemorrhage, hemophthalmos, neurosurgical intervention, intracranial hemorrhage, vitrectomy.

Connection of the publication with planned research works.

The work was carried out within the framework of the National Research Council of the Department of Ophthalmology of the Shupyk National Healthcare University of Ukraine: "Clinical and experimental substantiation of diagnosis, treatment and prevention of refractive, dystrophic, traumatic and inflammatory diseases of the organ of vision" (state registration number 0116U002821) and "Development of new methods of diagnosis, treatment and prevention of refractive, inflammatory, dystrophic and traumatic diseases of the organ of vision and their clinical and experimental justification" (state registration number 0120U105324) and the department of ophthalmology and optometry of postgraduate education of the Institute of Postgraduate Education of Bogomolets National Medical University "Theoretical and practical aspects of improving clinical and experimental methods of diagnosis, treatment and prevention of diseases and injuries of the organ of vision and their complications" (state registration number 0123U104207).

Introduction.

Terson's syndrome is a well-known complication of intracranial hemorrhage that can lead to vision loss. Terson's syndrome (TS) is believed to be associated with impaired retinal microcirculation as a result of increased intracranial pressure (ICP) after cerebral hemorrhage, ultimately leading to venous hypertension and hemophthalmus [1].

It is most often observed after rupture of an aneurysm of the anterior segment of blood circulation, especially of the anterior connecting artery or the internal carotid artery [2]. Causes also include subdural hematoma, traumatic subarachnoid hemorrhage (SAH), severe traumatic brain injury (TBI), rupture of a posterior circulation or vertebral artery aneurysm, spinal SAH, epidural saline injection, and endoscopic third ventricular ventriculostomy [3-7]. Intracranial hemorrhage (ICH) is one of the manifestations of TBI. As you know, TBI is an important global health problem [8]. It is the main cause of disability and mortality in many countries, especially in younger age groups. Mortality associated with TBI is observed even more frequently than with cancer or AIDS [8]. In active combat zones, TBI is one of the main causes of mortality [9, 10]. Unfortunately, this is an extremely urgent problem in Ukraine now. The full-scale war unleashed by Russia provoked an extraordinary increase in traumatic injuries, including TBI. Therefore, it is important to assess the risks of ST development in traumatic intracranial hemorrhages, including, especially considering such challenges today.

Hemophthalmos in CT is very important not only for visual functions, but also for prognosis from the general condition [11, 12]. A meta-analysis review of three prospective and six retrospective studies found that SAH patients with Terson syndrome had higher Hunt and Hess scores than patients without hemophthalmos. They also had a higher risk of mortality (43% vs. 9%) with an odds ratio of 4.8 [13]. A recent prospective study presenting

a case series of 47 patients with SAH also showed similar results with a 50% mortality rate in Terson syndrome compared to 9% without this complication [14]. One of the reasons why Terson's syndrome is a marker of poor prognosis is probably an increase in ICP above a certain threshold due to massive intracranial hemorrhage. This is consistent with the connection of Terson's syndrome with indicators that testify to the severity of the general condition in ICH – the Glasgow coma scale is less than 8, the World Federation of Neurology scale is more than 3, and the Fisher scale is more than 3 points [3]. A second reason is likely that Terson's syndrome is often associated with recurrent subarachnoid hemorrhage, which is another life-threatening prognostic marker [15].

Taking into account such statistical data, it seems to us important and relevant to study all potentially important factors that can play a role in the occurrence of such an ophthalmic complication of intracranial hemorrhage as ST, influence its clinical course, treatment effectiveness, risks of complications and recurrences. Given the severity of the general condition, it is necessary to evaluate all prognostic markers that may be important in this case to determine the prognosis for the recovery of visual functions, choose the safest and most effective treatment tactics, assess the risks of relapses and complications after treatment. The question of the pathogenesis of this pathology is still open, but further research in this direction is impossible without an assessment of all external influencing factors and risk groups in the population.

The aim of the study.

To study the features of development, clinical course and surgical treatment of hemophthalmus in Terson's syndrome.

Object and research methods.

The study was a prospective interventional observational clinical case-control study. The research was conducted in compliance with the basic bioethical norms and requirements of the Declaration of Helsinki, adopted by the General Assembly of the World Medical Association, the Council of Europe Convention on Human Rights and Biomedicine (1977) and the Order of the Ministry of Health of Ukraine No. 690 dated 23.09.2009 and with the permission of the Commission on Bioethics of the Shupyk National University of Health Care of Ukraine.

All patients gave informed voluntary consent to participate in the study. All patients underwent examination and treatment at the clinical bases of the Department of Ophthalmology of the P. L. Shupyk National Medical University of Ukraine and the Department of Ophthalmology and Optometry of Postgraduate Education of the IPO of the National Medical University named after O. O. Bogomolets. 40 patients (80 eyes), including 18 women and 22 men, aged 18 to 75 years, with ICH were under observation.

For patients according to the Order of the Ministry of Health of Ukraine dated 15.03.2007 No. 117, the protocol for providing medical care to patients with hemorrhage in the vitreous body, opacification and degenerative changes of the vitreous body, code MKX-10 H43.1; H44.8; H43.8 observation and conservative treatment was used, which included: bed rest, general and local therapy, autohemotherapy and physiotherapeutic treatment.

If the treatment was ineffective for 4-5 weeks, we performed surgical intervention. The surgical intervention was carried out in the scope of a closed subtotal vitrectomy (SVT) 23/27ga with removal of the ILM and endotamponade with a gas-air mixture.

We analyzed the frequency of CT depending on gender, age, cause of ICH, presence of coma in the anamnesis, and the fact of neurosurgery. The localization of hemorrhage during CT and visual results, the frequency of complications and recurrences during the entire period of observation were also determined. Visual acuity was assessed at baseline, 2 weeks and 1 month after the start of conservative treatment for ST. Control after vitreoretinal surgery was performed after 2 weeks, after 1 and 6 months, comparing with preoperative data.

Statistical analysis of the results was performed using the SPSS 61 11.0, MedStat and MedCalc v.15.1 software package (MedCalc Software bvba). In all cases, the differences were considered statistically significant at $p < 0.05$.

Research results and their discussion.

The obtained results are presented in **tables 1-10**.

It should be noted that among the patients under our observation, ST was diagnosed in 25% of cases.

To begin with, within the framework of our study, we studied the relationship between ST and gender. **Table 1** shows the dependence of ST development in patients with ICH on gender.

Table 1 – Dependence of the development of Terson's syndrome in patients with intracranial hemorrhage on gender (in %, P+m)

Gender	Frequency of hemophthalmos
Female (n=36)	17,5%
Male(n=44)	7,5%
Statistical indicators $\chi^2=5.455$; $p=0.02$	

Notes: the significance level of differences between groups of observations was calculated using the χ^2 test (Pearson) with Yates correction.

According to the results presented in the **table 1**, it can be seen that there is a statistically significant advantage in the incidence of ST among women.

A potentially important risk factor for the development of ST can be the age of patients. The age distribution of patients with Terson's syndrome has not yet been sufficiently studied. **Table 2** shows the dependence of ST development in patients with ICH on age.

Table 2 – Dependence of the development of Terson's syndrome in patients with intracranial hemorrhage on age (in %, P+m)

	18-30y (n=18)	31-45y (n=23)	46-60 (n=17)	61-70y (n=15)	70 > (n=7)
Frequency of hemophthalmos	1,25%	10%	11,25%	1,25%	1,25%
Statistical indicators $\chi^2=11.069$; $p=0.026$					

Notes: the significance level of differences between groups of observations was calculated using the χ^2 test (Pearson) with Yates correction.

As can be seen from **table 2**, there is a statistically significant difference between the frequency of CT in different age groups of patients with ICH.

In this study, a statistically significantly higher frequency of CT was observed in patients aged 30 to 60 years compared to other age groups.

In our opinion, it is also important to evaluate the influence of the cause of ICH on the development of ST. In our study, 55% of cases of ICH of traumatic genesis were found. **Table 3** presents the frequency of ST development in patients with traumatic ICP and non-traumatic ICP.

It was established (**table 3**) that the frequency of ST in non-traumatic ICH is statistically significantly higher.

Taking into account the literature data, it is advisable to evaluate the relationship between the severity of the neurological condition and the occurrence of this pathology. For this purpose, in our study, we studied the relationship between coma in the anamnesis and the development of ST in ICH.

Table 3 – Frequency of development of Terson’s syndrome in patients with traumatic and non-traumatic intracranial hemorrhage (in %, P+m)

Sex	Frequency of hemophthalmos
TBI with the ICH (n=44)	7,5%
Nontraumatic ICH (n=36)	17,5%
Statistical indicators $\chi^2=4.279$; $p=0.039$	

Notes: the significance level of differences between groups of observations was calculated using the χ^2 test (Pearson) with Yates correction.

Table 4 – Dependence of the development of Terson syndrome in patients with intracranial hemorrhage from coma in the anamnesis (in %, P+m)

History of coma	Frequency of hemophthalmos
Fixed(n=32)	18,75%
Non fixed (n=48)	6,25%
Statistical indicators $\chi^2=11.736$; $p<0.001$	

Notes: the significance level of differences between groups of observations was calculated using the χ^2 test (Pearson) with Yates correction.

Table 5 – Dependence of the frequency of development of Terson’s syndrome on neurosurgical intervention with intracranial hemorrhage in the anamnesis (in %, P+m)

Neurosurgical intervention	Frequency of hemophthalmos
Intracranial hemorrhage is present(n=30)	16,25%
No intracranial hemorrhage(n=50)	8,75%
Statistical indicators $\chi^2=7,111$; $p=0,008$	

Notes: the significance level of differences between groups of observations was calculated using the χ^2 test (Pearson) with Yates correction.

Table 6 – Analysis of hemorrhage localization in patients with hemophthalmos in Terson’s syndrome (in %, P+m)

	Intravitreal (n=2)	Subhyaloid (n=8)	SubILM (n=8)	Intraretinal (n=1)	Double ring (subhyaloid+ subILM)
Frequency	10%	40%	40%	5%	5%
Statistical indicators $\chi^2=16.875$; $p=0.003$					

Notes: the significance level of differences between groups of observations was calculated using the χ^2 test (Pearson) with Yates correction.

Table 4 presents the dependence of ST development in patients with ICH on a history of coma.

The analysis of the results shows (**table 4**) that a statistically significantly higher frequency of ST was observed in the presence of coma in the anamnesis. Thus, the results obtained by us are consistent with the data of modern literature.

Features of the treatment of ICH can potentially be associated with the frequency of CT. Therefore, at this stage, we investigated whether the fact of neurosurgical intervention affects the frequency of ST development.

Table 5 presents the frequency of development of ST, provided there is or is no neurosurgical intervention for the treatment of ICH in the anamnesis.

The results indicated a statistically significantly higher frequency of development of ST in the condition of the transferred neurosurgical intervention (**table 5**). This is probably related to the severity of the pathology, including. A more thorough study is possible with the involvement of related specialists and under the conditions of a neurosurgical hospital. That is, the data we received create the basis for further research in this direction.

With ST, hemophthalmos can be in the form of intravitreal, subhyaloid, sub-ILM and intraretinal hemorrhage [1]. In our study, we also evaluated the frequency of different localization of hemorrhage in CT. **Table 6** presents the distribution by location of hemorrhage in patients with hemophthalmos during ST.

From the results presented in **table 6**, it can be noted that subhyaloid and subILM hemorrhages were recorded statistically significantly more often.

However, it should be noted that there was a case of a combination of subILM and subhyaloid hemorrhage.

In general, the prognosis for visual improvement is favorable and most hemorrhages disappear spontaneously within a few weeks [16].

During the study, according to order No. 117, all patients were initially treated with conservative treatment and observation. All patients from the beginning of treatment and during the month of observation underwent a complex ophthalmological examination, which included an assessment of visual acuity according to Snellen. **Table 7** presents the dynamics of visual acuity indicators with conservative treatment.

The analysis of the results established a statistically significant improvement in functional results after conservative treatment of hemophthalmos (t before drugs-2 weeks = 6.93; $p=0.000000$, t before drugs-1 month = 8.06; $p=0.000000$) (**table 7**).

Among all cases in our study, it was noted that 60% of patients required surgical treatment in the amount of PPV 23/27ga with removal of ILM and endotamponade with a gas-air mixture.

After surgical treatment, all patients with hemophthalmos in Terson’s syndrome were assessed for visual function, recurrence of hemophthalmos, and postoperative complications. Visual functions after surgical treatment are presented in **table 8**.

As can be seen from **table 8**, there is a statistically significant improvement in visual acuity after surgical treatment in patients with hemophthalmos (t before medication-2 weeks = 4.44;

p=0.000228, t before medication-1 month = 6.43; p=0.000002, t before medication-6 month = 5.58; p=0.000015).

In our study, we also determined the frequency of postoperative complications. Complications included retinal detachment, postoperative uveitis, endophthalmitis, cataract development, and glaucoma. The frequency of complications after surgical treatment is shown in **table 9**.

As can be seen from **table 9**, surgical treatment is associated with the presence of postoperative complications. A slightly higher rate of complications at long-term follow-up is noted, but there is no statistically significant difference between this indicator at different follow-up periods.

Also, an important indicator that we analyzed during our study was the recurrence of hemophthalmos. The frequency of recurrences of hemophthalmos after surgical treatment in patients with hemophthalmos with Terson's syndrome are shown in **table 10**.

As can be seen from **table 10**, isolated cases of recurrence of hemophthalmos after surgery were recorded during the study among patients with ICH in the late period of postoperative follow-up. These cases were associated with late postoperative complications. This indicates the need for long-term dynamic ophthalmological observation in these patients.

In this study, we investigated the factors associated with the occurrence of CT in patients of both sexes, of different age groups, and with different causes of CAD. Previous studies have shown that both Terson syndrome and SAH are more common in women than in men [17]. However, it should be noted that according to the literature, TBI is more often observed among the male population [4].

Analysis of the results of our study shows that the incidence of ST in patients was higher in women than in men. Several previous studies have reported the mean age in cases of SAH and Terson syndrome.

In a study by Seif et al. the mean age of patients with SAH and Terson syndrome was approximately 60 years, whereas in a study by Sung et al. the average indicator was about 49 years [11, 12]. Lee et al. reported that the mean age of patients with SAH and Terson syndrome was 54.3 years, while the mean age of patients with SAH and without Terson syndrome was 56.0 years [18].

The frequency of ST in our study was statistically significantly higher in patients aged 30 to 60 years, compared to other age groups. It is possible that these minor differences with the literature data are related to the causes of CT studied in the studies.

In our study, we analyzed the frequency of CT of different genesis – as a result of traumatic and non-traumatic intracranial hemorrhage. In our study, we found that non-traumatic ICH was more often associated with the development of ST.

Such results coincide with the data of modern literature. ST occurs in 8-14.5% of SAH, in 9.1% of intracerebral hemorrhage, in 3.1% of

Table 7 – Visual functions in patients with hemophthalmos in Terson's syndrome after conservative treatment (visual acuity according to Snellen)

	Before the treatment	In 2 weeks	In 1 month
VA (n=20)	0,05+-0,01	0,54+-0,07	0,62+-0,07
Statistical indicators t before medication-2 weeks = 6.93; p=0.000000 t before medication-1 month = 8.06; p=0.000000			

Notes: the level of significance of differences between groups compared to data before cardiac surgery was calculated using the Student's t-test.

Table 8 – Visual functions in patients with hemophthalmos with Terson's syndrome after surgical treatment (visual acuity according to Snellen)

	Before the treatment	In 2 weeks	In 1 month	In 6 months
	0,2+-0,09	0,68+-0,06	0,86+-0,03	0,75+-0,04
Statistical indicators t before medication-2 weeks = 4.44; p=0.000228 t before medication-1 month = 6.43; p=0.000002 t before medication-6 months = 5.58; p=0.000015				

Notes: the level of significance of differences between groups compared to data before cardiac surgery was calculated using the Student's t-test.

TBI [19, 20]. Factors potentially associated with the occurrence of ST are known to include a severe neurological condition, a history of transient or prolonged coma before hospitalization [21, 22]. In our study, a history of coma was also associated with a statistically significantly higher frequency of ST.

The literature describes clinical studies that determined the impact of specific neurosurgical interventions on the development of ST. It is known that in the case of SAH due to the rupture of an aneurysm of the cerebral vessels, surgical intervention is most often used in the volume – clipping of the aneurysm of the cerebral vessels or endovascular coiling (endovascular spiral embolization) of the aneurysm of the cerebral vessels [23, 24].

Lee et al. reported that Terson's syndrome was diagnosed statistically significantly more often during endovascular spiral embolization [18]. But in another study, no statistically significant difference was noted between different methods of neurosurgical interventions in SAH [25].

In the course of our research, we analyzed cases associated with SAH of various genesis, not only as a result of aneurysm rupture, as in the literature data cited above. This significantly supplemented the previously

Table 9 – Frequency of complications in patients with hemophthalmos with Terson's syndrome after surgical treatment (in %, P+m)

	In 2 weeks	In 1 month	In 6 months
Complications (n=12)	16,6%	8,3%	25%
Statistical indicators $\chi^2=1.2$; p=0.549			

Notes: the significance level of differences between groups of observations was calculated using the χ^2 test (Pearson) with Yates correction.

Table 10 – Frequency of recurrence of hemophthalmos after surgical treatment in patients with hemophthalmos with Terson's syndrome (in %, P+m)

	In 2 weeks	In 1 month	In 6 months
The presence of recurrences of hemophthalmos (n=12)	0%	0%	8%
Statistical indicators $\chi^2=2.057$; p=0.358			

Notes: the significance level of differences between groups of observations was calculated using the χ^2 test (Pearson) with Yates correction.

highlighted data of clinical studies on this matter. We established that neurosurgical interventions in ICH in the anamnesis were also a factor associated with a statistically significantly higher frequency of ST.

According to published studies, histopathological specimens from patients with CT show erythrocytes and leukocytes in the vitreous, subhyaloid and sub-ILM spaces, as well as in the retina [26]. Other studies [27] have documented sub-ILM and subhyaloid hemorrhage occurring simultaneously in CT, creating a “double ring” sign.

However, today there are some contradictions regarding the exact anatomical localization of dome-shaped hemorrhages in CT. Kuhn et al. reported a 39% incidence of macular hemorrhages in TS and reported that blood accumulates under the ILM [28].

Morris et al. documented histologically the presence of a hemorrhage located between the “nerve fiber layer and the ILM,” but mistakenly called it a “preretinal hemorrhage” [29].

In their study, Friedman et al. provided histological evidence that the hemorrhage can be located under the ILM in CT [30].

During our study, we most often observed cases of subhyaloid and subILM hemorrhage, less often intravitreal and intraretinal, and we also recorded one case with the sign of “double ring”, which is a rather rare clinical manifestation of ST.

Early diagnosis of Terson’s syndrome is especially important for patients with ICH to choose treatment tactics, assess recovery prognosis, and even to determine risks associated with the general condition. Previous studies of the methods of treatment of Terson’s syndrome showed that the frequency of cases in which surgical intervention was used ranged from 50 to 36.2% [31].

The analysis of the results of our study established that the percentage of cases with Terson’s syndrome, in which the ZSV was performed according to the indications, was within 60%, which is generally consistent with the literature data. This indicates that nearly half of patients with CT can recover without surgery, but surgery is essential and necessary in some cases to restore visual function and avoid complications associated with massive hemorrhages. In addition, the duration and completeness of spontaneous resorption of hemophthalmos have not yet been sufficiently studied. It may take several years to obtain reliable data on this disease. One observational study found that hemophthalmos did not resolve over 19 months in nearly half of patients [26, 31].

Although there is no consensus on the best timing for vitrectomy, the arguments in favor of early vitrectomy may be to accelerate visual recovery and reduce the risk of hemophthalmic complications, such as proliferative vitreoretinopathy, secondary ghost cell glaucoma, and epiretinal membrane formation [26, 32, 33].

However, the frequency of surgical complications varies from study to study, and cannot be a reliable indicator, which is an argument in favor of delaying vitrectomy [16, 34]. Some authors even suggest performing vitrectomy only after failure of spontaneous resorption of hemophthalmos during long-term observation [35]. Given the peculiarities of blood catabolism in the vitreous body, this can happen rather slowly and lead to specific complications [36].

Glatt and Machemer demonstrated that blood has a toxic effect on retinal photoreceptors, even in the first 7 days after the onset of hemorrhage [37].

Iron from hemoglobin catalyzes the transformation of hydrogen peroxide into a hydroxyl radical, which is the most destructive type of active oxygen. The damage caused by this radical consists of lipid peroxidation, DNA strand breaks, and biomolecular degradation. Since the main function of the retinal pigment epithelium (PE) is to phagocytize the lipid-rich outer segments of photoreceptors, the retina and PE are prone to oxidative damage [26, 38].

During our research, we used the treatment protocol stipulated by the Order of the Ministry of Health of Ukraine dated 03.15.2007 No. 117, which involves observation and conservative treatment for a month, which in our opinion is optimal, taking into account all the above-mentioned risks. No such complications were recorded in the patients who were under our observation.

Thus, the results of our research complement the data published in the literature on the peculiarities of the occurrence, clinical course and treatment of ST, and confirm that surgical intervention for hemophthalmia in this case is necessary in more than half of the cases, and statistically significantly improves the visual functions of patients.

In addition, it was established that the risk of surgical complications, taking into account the frequency of complications and recurrences, was low. In rare cases, complications occurred in the late period of postoperative observation, therefore, in our opinion, there is a need for mandatory long-term dynamic ophthalmological observation.

Conclusions.

As a result of our research, Terson’s syndrome was diagnosed in 25% of cases.

The results showed that the incidence of Terson’s syndrome was statistically significantly higher in women than in men, in patients aged 30 to 60 years, compared to other age groups, and among cases of non-traumatic IHD.

It was revealed that coma and the presence of neurosurgical intervention in the anamnesis are factors associated with a statistically significantly higher frequency of Terson’s syndrome.

Statistically significantly more frequent cases of subhyaloid and subILM hemorrhage were found in Terson’s syndrome.

Surgical treatment was required in 60% of patients. A statistically significant improvement of visual functions after the operation was revealed. The complication rate was 16.6% 2 weeks after surgery, 8.3% – 1 month, and 25% – 6 months. During our study, only one case of recurrence of hemophthalmus was recorded, which was associated with late postoperative complications.

Prospects for further research.

The analysis of the literature shows that the diagnosis and treatment of Terson’s syndrome is an urgent task of modern ophthalmology, and this explains the desire of ophthalmologists to improve the known and develop new methods of surgical treatment of this disease. Therefore, it seems relevant and timely to study the possibilities of early surgical treatment of hemophthalmos in Terson’s syndrome.

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ДОСЛІДЖЕННЯ ОСОБЛИВОСТЕЙ РОЗВИТКУ, КЛІНІЧНОГО ПЕРЕБІГУ І ХІРУРГІЧНОГО ЛІКУВАННЯ ГЕМОФТАЛЬМУ ПРИ СИНДРОМІ ТЕРСОНА

Ілюк О. Ю., Шаргородська І. В.

Резюме. Вступ. Синдром Терсона (СТ) пов'язаний з порушенням мікроциркуляції сітківки в результаті підвищення внутрішньочерепного тиску після церебрального крововиливу, що в кінцевому підсумку призводить до венозної гіпертензії та гемофтальму.

Метою наших досліджень було визначення особливостей розвитку, клінічного перебігу і хірургічного лікування гемофтальму при синдромі Терсона.

Об'єкт і методи дослідження. Всі пацієнти дали інформовану добровільну згоду на участь в дослідженні та проходили обстеження і лікування на клінічних базах кафедри офтальмології НУОЗ України імені П. Л. Шупика та кафедри офтальмології та оптометрії післядипломної освіти ІПО Національного медичного університету імені О. О. Богомольця. Під спостереженням знаходилось 40 пацієнтів (80 очей), серед яких 18 жінок і 22 чоловіка, віком від 18 до 75 років, з ВЧК. Пацієнтам згідно з Наказом МОЗ України від 15.03.2007 № 117 спочатку застосовувалось спостереження та консервативне лікування. При неефективності лікування на протязі 4-5 тижнів нами було виконане хірургічне втручання. Хірургічне втручання проводилось в обсязі закриття субтотальна вітректомія (ЗСВ) 23/27га з видаленням ILM та ендотампонадою газо-повітряною сумішшю. Була проаналізована частота виникнення СТ з урахуванням статі, віку, причини ВЧК, наявності коми в анамнезі, факту проведення нейрохірургічного втручання. Також визначалось локалізація крововиливу при СТ та візуальні результати, частота виникнення ускладнень і рецидивів протягом всього терміну спостереження.

Результати. СТ був діагностований у 25% випадків. Частота розвитку СТ була статистично значуще вищою у жінок, ніж у чоловіків, у пацієнтів вікових груп від 30 до 60 років, а також серед випадків нетравматичних ВЧК. Ми виявили, що кома та наявність нейрохірургічного втручання в анамнезі – це також фактори, пов'язані зі статистично значимо вищою частотою СТ. При СТ частіше спостерігались випадки субгіалоїдного і субILM крововиливу при СТ. Хірургічне лікування знадобилось в 60% випадків в нашому дослідженні. Ми виявили статистично значиме покращення зорових функцій після операції. Частота ускладнень була на рівні 16,6% через 2 тижні після операції, 8,3% – через місяць і 25% – через 6 місяців. Нами було зафіксовано єдиний випадок рецидиву гемофтальму, що був пов'язаний з пізніми післяопераційними ускладненнями.

Висновки. Результати нашого дослідження доповнюють опубліковані в літературі дані про особливості виникнення, клінічного перебігу та лікування СТ, і підтверджують, що проведення хірургічного втручання при гемофтальмі в даному випадку необхідно у більше, ніж в половині випадків, і статистично значимо покращує зорові функції пацієнтів. Ризик хірургічного втручання з урахуванням частоти виникнення ускладнень і рецидивів був низький у нашому дослідженні.

Ключові слова: синдром Терсона, внутрішньочерепний крововилив, гемофтальм, нейрохірургічне втручання, інтракраніальний крововилив вітректомія.

STUDY OF THE FEATURES OF THE DEVELOPMENT, CLINICAL COURSE AND SURGICAL TREATMENT OF HAEMOPHTHALMS IN TERSON'S SYNDROME

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Abstract. Introduction. Terson syndrome (TS) is associated with impaired retinal microcirculation as a result of increased intracranial pressure after cerebral hemorrhage, ultimately leading to venous hypertension and hemophthalmos.

The purpose of our research was to determine the features of the development, clinical course and surgical treatment of hemophthalmos in Terson's syndrome.

Object and research methods. All patients gave informed voluntary consent to participate in the study and underwent examination and treatment at the clinical bases of the Department of Ophthalmology of the Shupyk National Medical University of Ukraine and the Department of Ophthalmology and Optometry of Postgraduate Education of the IPO of the Bogomolets National Medical University. 40 patients (80 eyes), including 18 women and 22 men, aged 18 to 75 years, with ICH were under observation. According to the Order of the Ministry of Health of Ukraine dated 15.03.2007 No. 117, the patients were initially observed and treated conservatively. If the treatment was ineffective for 4-5 weeks, we performed surgical intervention. The surgical intervention was carried out in the scope of a closed subtotal vitrectomy (SVT) 23/27ga with removal of the ILM and endotamponade with a gas-air mixture. The frequency of CT was analyzed taking into account gender, age, cause of HF, presence of coma in the anamnesis, and the fact of neurosurgery. The localization of hemorrhage during CT and visual results, the frequency of complications and recurrences during the entire period of observation were also determined.

The results. ST was diagnosed in 25% of cases. The frequency of development of ST was statistically significantly higher in women than in men, in patients aged 30 to 60 years, as well as among cases of non-traumatic IHD. We found that coma and a history of neurosurgery are also factors associated with a statistically significantly higher frequency of ST. In CT, cases of subhyaloid and subILM hemorrhage were more often observed in CT. Surgical treatment was required in 60% of cases in our study. We found a statistically significant improvement in visual function after surgery. The complication rate was 16.6% 2 weeks after surgery, 8.3% – 1 month, and 25% – 6 months. We recorded a single case of recurrence of hemophthalmus, which was associated with late postoperative complications.

Conclusions. The results of our study complement the data published in the literature about the peculiarities of the occurrence, clinical course and treatment of ST, and confirm that surgical intervention for hemophthalmia in this case is necessary in more than half of the cases, and statistically significantly improves the visual functions of patients. The risk of surgery, taking into account the frequency of complications and recurrences, was low in our study.

Key words: Terson's syndrome, intracranial hemorrhage, hemophthalmos, neurosurgical intervention, intracranial hemorrhage, vitrectomy.

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The Authors declare no conflict of interest.

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THE EFFECT OF BLOOD PRESSURE WITHIN THE RANGE OF «130/80 – 139/89 MM HG» ON THE MAGNITUDE OF CARDIOVASCULAR RISK IN PATIENTS WITH TYPE 2 DIABETES MELLITUS

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The outpatient records of 596 patients in the archives of the Azerbaijan Association of Endocrinology, Diabetology and Therapeutic Training were analyzed. A group with DM2 (n=450) was identified. To determine the effect of the blood pressure level on the value of CVR, the group participants were divided into 3 subgroups: 1) a subgroup of "Ideal Normotension" (n=71), which included people with blood pressure within the normal range according to both ESC/ESH (2018) and ACC/AHA (2017) criteria; 2) a subgroup of "Ideal Hypertension" (n=125), which included people with hypertension according to both ESC/ESH (2018) and ACC/AHA (2017) criteria; 3) a subgroup of "Intermediate BP" (n=254), which included people with hypertension according to ACC/AHA criteria (2017) and "high norm" according to ESC/ESH criteria (2018).

To determine the CVR, the following methods were used: PROCAM risk score; Framingham risk score based on lipid profile; Framingham risk score based on body mass index; QRISK 2 risk score; Pooled Cohort Equations risk score; ASCVD risk score.

The average values of the CVR level in the "Ideal Normotension" subgroup of the DM2 group were 8.5% (95% CI. 7.80; 9.28). In the "Intermediate BP" subgroup, this indicator corresponded to 12.9% (95% CI.12.32; 13.51), and in the subgroup of "Ideal hypertension" the value of cardiovascular risk was 18.0% (95% CI 17.43; 18.55). The differences between all subgroups were statistically highly significant $p < 0.001$.

The use of CVR calculators both individually and in combination in patients in the DM2 group indicate that an increase in SBP to 130-139 mmHg and/or DBP to 80-89 mmHg contributed to an increase in cardiovascular risk. It can be assumed that a further increase in blood pressure further increases this risk.

Key words: arterial hypertension, type 2 diabetes mellitus, ESC/ESH criteria (2018), ACC/AHA criteria (2017).

Connection of the publication with planned research works.

This work is a fragment of a dissertation for the degree of Doctor of Philosophy in medicine.

Introduction.

Arterial hypertension (AH) is a powerful risk factor for the development of cardiovascular diseases (CVD) and also diabetes mellitus (DM) [1, 2]. 80% of diabetic patients die from CVD, in particular, from myocardial infarction and stroke. The coexistence of hypertension with diabetes leads to an increase in the risk of death and cardiovascular events (CVE) by 44% and 41%, respectively, compared with 7% and 9% risks in people suffering only from diabetes and not suffering from hy-

pertension [1, 2]. There is evidence that AH treatment and blood pressure (BP) control significantly reduce the risk of CVE and cerebrovascular events, as well as morbidity and mortality in patients with diabetes [3, 4, 5]. It is also assumed that antihypertensive treatment improves endothelial function, reduces sympathetic activity, demonstrating significant anti-atherosclerotic and antifibrotic effects [6, 7, 8, 9, 10].

To solve this issue, we can apply the value of cardiovascular risk (CVR), which can prove whether the CVR changes in patients with type 2 diabetes mellitus (DM2) with an increase in BP in the range of 130/80 – 139/89 mmHg.

The aim of the study.