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The article was received
2019.11.25

UDC 616.12-008.331.1-06:617.75-036-07-08 https://doi.org/10.26641/2307-0404.2020.1.200404

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CLINICAL CHARACTERISTICS OF TRANSIENT VISION DISORDERS AND ARTERIAL HYPERTENSION

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Цитування: Медичні перспективи. 2020. Т. 25, № 1. С. 73-79
Cited: Medicni perspektivi. 2020;25(1):73-79

Key words: *transient visual disorders, blindness, arterial hypertension, hypoxic-ischemic encephalopathy, transient ischemic attacks*
Ключові слова: *транзиторні порушення зору, сліпота, артеріальна гіпертензія, гіпоксично-ішемічна енцефалопатія, транзиторні ішемічні атаки*
Ключевые слова: *преходящие нарушения зрения, слепота, артериальная гипертензия, гипоксически-ишемическая энцефалопатия, транзиторные ишемические атаки*

Abstract. Clinical characteristics of transient vision disorders and arterial hypertension. Wang Zi Wei, Pohorielov O.V. *A study of 104 patients with a transient ischemic attacks (TIA) in the form of visual disorders was conducted to assess the factors that affect the development and probable localization of TIA. Neurological and ophthalmological status, structural characteristics of the brain and major arteries of the head (MAH) with the use of magnetic resonance therapy (MRT) and ultrasonic dopplerography were assessed. The age of patients ranged from 33 to 79 years (65.4 years in average). The control group consisted of 46 patients with an average age of 67.8 years without cerebral ischemic events and visual disorders. During the MRI, the presence of microstructural pathology of the brain was assessed; "leukoaraiosis" was considered; foci up to 2-3 mm that are vascular by genesis. Significant differences in the frequency of TIA occurrence in terms of gender were not detected in all age subgroups. In young*

patients with TIA, arterial hypertension was associated with signs of microstructural pathology (MSP) of the brain in 85.58% cases. TIA localization did not correlate with the grade of structural disorders of the MAH and the nature of retinopathy in all age groups. Frequency of TIA tended to increase (in the a. ophthalmica pool) with an increase in the grade of stenosis of the MAH and retinopathy. The control group had retinopathy of the 1st stage in 12 or 26.09%, showing a qualitative difference with the group of study. The study did not reveal any differences in the frequency of TIA (according to presentations to a medical institution) in patients of different age groups, which indicates the influence of others factors that are not related to aging, such as TIA factors. The state of the MAH and microcirculation of vessels are their markers and probable causative factors. Determination of markers for the prognosis of the development of cortical TIA or TIA in a. ophthalmica pools are still an open issue, as well as the chances of the TIA development in other areas of cerebral blood supply. Thus, according to clinical and anamnestic data, transient ischemia in the patients, who have applied to medical institutions with complaints of transient vision disorder (impairment) and who have been diagnosed with TIA is detected mainly in the a. ophthalmica blood supply pool (89 or 85.58%), more rarely (in 15 or 14.42%) in the cortical areas of visual analyzer without gender and age differences. All age groups had TIA associated with MAH structure impairment, retinopathy, MSP of the brain (in 82% of men and 67% of women), this leads to the interpretation of such TIA as non-random events preceded by systemic disorders, which are the basis for the prediction and prevention of such conditions.

Реферат. Клінічна характеристика транзиторних порушень зору та артеріальна гіпертензія. Ван Цзи Вей, Погорєлов О.В. *Проведено дослідження 104 пацієнтів з транзиторними ішемічними атаками (ТІА) у вигляді зорових порушень з метою оцінки факторів, що впливають на розвиток та вірогідно локалізацію ТІА. Оцінено неврологічний та офтальмологічний статус, структурні характеристики головного мозку та магістральних артерій голови (МАГ) методами магнітно-резонансної томографії (МРТ) та ультразвукової допплерографії. Вік пацієнтів коливався від 33 до 79 років (середній – 65,4 року). Контрольна група – 46 пацієнтів середнім віком 67,8 р. без транзиторних ішемічних подій і порушень зору. При МРТ оцінено наявність мікроструктурної патології (МСП) головного мозку, враховано «лейкоареоз», васкулярні за генезом вогнища до 2-3 мм. Достовірних відмінностей частоти ТІА за статтю не виявлено у всіх вікових підгрупах. У пацієнтів молодого віку з ТІА АГ, поєднану з ознаками МСП головного мозку, виявлено у 85,58%,. Залежностей локалізації ТІА від рівня структурних порушень МАГ та характеру ретинопатії не виявлено у всіх вікових групах. Окреслена тенденція до збільшення частоти ТІА (у басейні a. ophthalmica) при зростанні ступеня стенозу МАГ і ретинопатії. У групі контролю ретинопатії 1 ст. визначались у 12 або 26,09%, що становило якісну різницю з групою дослідження. У проведеному дослідженні не виявлено відмінностей частоти ТІА (за зверненнями до медичної установи) пацієнтів різних вікових груп, що означає вплив інших, ніж вікові, факторів таких ТІА, маркерами яких і вірогідними чинниками є стан МАГ та мікросудин. Установлення маркерів прогнозу розвитку кіркових ТІА або ТІА в басейнах a. ophthalmica залишаються неповністю вирішеною проблемою, як і шанси розвитку ТІА і в інших регіонах церебрального кровопостачання. Таким чином, у пацієнтів, що звернулись до медичних закладів зі скаргами на минущі порушення зору і в яких діагностовано ТІА, клінічно та анамнестично виявляється транзиторна ішемія переважно в басейні кровопостачання a. ophthalmica у 89 (85,58 %), значно рідше (у 15 або 14,42%) у кіркових зонах зорового аналізатору без відмінностей за статтю і віком. У всіх вікових групах ТІА виявлялись на фоні порушень структури МАГ, ретинопатії, МСП головного мозку (у 82% чоловіків та 67% жінок), що призводить до трактовки таких ТІА як невипадкових подій, яким передують системні порушення, що становить основу побудування прогнозу та профілактики таких станів.*

According to representative studies, transient ischemic attacks (TIA) with visual impairments among all TIA are observed in 34-35%, among them 17% of patients have only an isolated visual impairment syndrome (a study of 2,398 patients with TIA) [3]. The etiology of such TIA undergoes further study. Microembolia and cardiogenesis are considered to be the most likely factors [3, 5]. The problem lies in the assessment of the risk of complete and incomplete transient cerebral ischemia (TCI), including visual impairment, probable pool of development, preventive and therapeutic actions in patients with cerebral ischemia. Thus, cerebral ischemia has the description of the heading for hypoxic-ischemic encephalopathy and the consequences [1] in the 11th revision of the International Classification of Diseases [1]. Additionally, it provides a definition for such terms as “silent cerebral infarcts”, “lacunar syndromes”, “late effects of cerebrovascular disease” [1]. New terms have consensus and likely better describe the pathophysiology, the combination of complete and incomplete TCI, anoxia and hypoxia [1]. At the same time, the influence of AH, linked disorders of vascular structures that take part in blood supply of the eyes, optic nerves, occipital cortex or other factors of hypoxia on the development of TIA, and the pattern of TCI localization are not fully defined. The study herein is aimed at practical issues of prognosis and prevention of such conditions.

Purpose of the study: assessment of the characteristics of clinical and neurological, as well as ophthalmological status, structural changes in the brain and its vessels as factors affecting

development of transient visual impairment and possible localization of transient ischemia.

MATERIALS AND METHODS OF RESEARCH

We examined 104 patients aged from 33 to 79 years (average age – 65.4 years, 48 women and 56 men) with transient visual impairments not caused by any proven factors other than cerebral transient ischemia. Some patients (71; 68.3%) had arterial hypertension (AH assessment according to clinical recommendations of Hypertension Guidelines ACC/AHA) [6]. The control group consisted of 26 men and 20 women of comparable age (n=46; average age – 67.8) without cerebral ischemic episodes and visual impairment. Exclusion criteria: diabetes of 1-2 type, glaucoma, secondary types of AH and AH of the 3rd stage, hemorrhages and hereditary cerebrovascular syndromes [1]. This work is a fragment of the dissertation research, a reported part of the research results, namely: neurological and ophthalmological status, MRI of the brain (or CT, if prescribed) and ultrasonic dopplerography (USDG) of the major arteries of the head and neck (MAH). During the MRI we have determined the patients with the following conditional representation: microstructural pathology (MSP) of the brain with leukoaraiosis, foci, vascular by the description, up to 2-3 mm. The condition of the fundus oculi was studied with a method of direct ophthalmoscopy, the field of vision (perimetry) — on an automated Zeiss Humphrey 720 spheroperimeter. The classification of the retinopathy grade was carried out according to Keith-Wagner [2]. Primary processing of the obtained data was performed using descriptive statistics methods using Microsoft Office Excel-2003® (№ 74017-641-9475201-57075) (Microsoft Corporation, USA) та Statistica v6.1 (StatSoft Inc., USA) (№ AJAR909E415822FA) with presentation of results for quantitative features in the form of: number of observations (n), arithmetic mean (M), standard error of mean (m), and for qualitative features in the form of intensive and extensive relative indicators, expressed in %±m (standard error), indicators of visualisation. The assessment of the difference reliability in the mean for all unrelated samples was conducted according to the Student criteria respective to sample group (t).

RESULTS AND DISCUSSION

The main clinical characteristics of symptoms of transient visual impairment were one-sided visual impairment in 94 patients (90.38%). Concentric narrowing of the visual fields was revealed in 21 (20.19%), diplopia without significant impairment of the oculomotor nerves – in 28 (26.9%). The feeling of “blurring”, “fuzziness”, “points”, “flies” without reliable scotoma on the worst eye - in 85 (81.7%). Paresis of the cight undefined by place (cortex, stem) was in 5 (4.8%). Descriptive statistics of the group, distribution by age, gender, MRI data, and presence of hypertension are given in Table. 1.

Table 1

Distribution of patients in the study groups by age, presence of arterial hypertension, nature of morphological changes in the brain, n=104

Patients age	Male, n=56	With MSP of the brain	With AH	Female, n=48	With MSP of the brain	With AH	Total n=104
25-44	5	5	5	4	3	4	9
%	8.93	100	100	8.33	75	100	8.65
±m	3.81	0	0	3.99	21.65		2.76
45-59	21	12	16	21	9	11	42
%	37.50	57.14	76.19	43.75	42.86	52.38	40.38
±m	6.47	10.8	9.29	7.16	10.8	10.9	4.81
60-74	30	29	22	23	20	17	53
%	37.5	96.67	73.33	47.91	86.96	73.91	50.1
±m	6.47	3.28	8.07	7.21	7.02	9.16	4.9
Total (n=104)	56	46	43	48	32	28	104
	53.85	82.14	76.79	46.15	66.67	58.33	
	4.89	5.12	5.64	4.89	6.80	7.12	

Note: MSP is a microstructural pathology of the brain. Distribution in terms of age was made according to the WHO classification.

There were 9 patients aged of 25-44 (8.65%±42.76): 5 men and 4 women. There were 42 patients aged 45-59 years (40.38%±4.81), 21 men and 21 women, and 53 patients aged 60-75 years (50.1%±4.9), 30 men and 23 women. Thus, the study group had a uniform distribution without significant differences by gender; the number of patients aged 25-44 years was less ($p<0.05$). 75-100% of patients of this age had AH, and everyone with AH also had signs of MSP of the brain. MSP of the brain was observed in patients aged 45-59 years, where 57.14% were men and 42.86% – women, 52.38-76.19% of them also had AH. The frequency of AH and MSP detection in this age group did not show any significant differences by gender. 86.96-96.67% of patients aged 60-75 years had signs of MSP of the brain, and 73.9% of them had AH. There was no statistically significant difference in the distribution of MSP and AH by gender between young and middle-aged groups ($p>0.05$). MSP of the brain was detected in 13 patients (28.26%±6.64) of the control group, but it was diagnosed only in elderly patients, showing a statistically significant difference relatively to the main study group. Attention is drawn to the fact that young patients with TIA had AH and MSP of the brain in 75-100% cases, and it groundly raises the question of the probable connection of these factors and the TIA development.

The assessment of the effect of MAH structural disorders on TIA with visual impairment was carried out by analyzing the frequency of such TIA in cortical localizations or a. ophthalmica blood supply pool.

Table 2

Distribution of patients depending on age, probable localization of TIA and MAH structure disorders, n=104

Age	Pool (localization) of TIA	Thickening of KIM MAH > 0.9 mm	MAH stenosis to 30%	MAH stenosis > 30%	Total
25-44 N=9 n; % ±m	Cortical	2; 22.22% 13.86	1; 11.11% 10.48		3; 33.33%; 15.71
	Branches of a. ophthal-mica	4; 44.44%; 16.56	2; 22.22% 13.862		6; 66.67% 15.71
45-59 N=42 n; % ±m	Cortical TIA	2; 4.76% 3.29	3; 7.14% 3.97		5; 11.90%; 5.0
	Branches of a. ophthal-mica	8; 4.76% 3.29	7; 16.67% 5.75	22; 52.38% 7.71	37; 88.10%; 5.0
60-74 N=53 n; % ±m	Cortical TIA	1; 1.89% 1.87	4; 7.55% 3.63	2; 3.8%; 2.62	7; 13.21%; 4.65
	Branches of a. ophthal-mica	2; 3.77% 2.62	13; 24.5% 5.91	31; 58.49%; 6.77	46; 86.79%; 4.65
	Total	19; 18.3% 3.79	30; 28.8% 4.44	55; 52.88%; 4.89	104

Note. Localization of TIA (cortical, a. ophthalmica pool) is considered to be the most probable localization assessment.

In the group of patients aged 25-44 years, 3 of 9 patients suffered from probable cortical TIA, 6 — in the a. ophthalmica pool. At the age of 45-59 years, 5 patients (11.9%±5.0) had cortical TIA and 37 (88.1%±5.0) had TIA localized in the a. ophthalmica pool. At the age of 60-74 years, 7 patients (13.21%±4.65) – cortical TIA, and 46 patients (86.79%±4.65) – in the a. ophthalmica pool. According to this distribution, there is a significant difference in the frequency of TIA localization in different pools. There were no dependencies of structural disorders of MAH by age and localization of TIA, the grade of MAH stenosis did not influence the frequency of TIA in cortical localization in all age groups (diagnosed in 13-33% of patients in general, but without statistical reliability, $p>0.05$). Signs of intimal thickening were determined in 32 patients (69.57%±6.78) and changes in MAH up to 30% – in 8 patients (17.39%±5.59) of the control group. These data show significant differences in the degree of impairment in the control and study group. Patients aged 45-58 years and 60-74 years had a

significantly higher number of incidences of TIA localization in a. ophthalmica pool with the more acute structural pathology of MAH (3.77-4.76% of patients with TIA and intima thickening of vessels, 16-24% with stenosis up to 30% and 52-58% with stenosis of MAH more than 30%; but the reliability criteria were close to significant criteria (in the group of 60-74 years, p was 0.051).

Indicators for the assessment of the possible dependence of TIA localization from age and grade of retinopathy are in Table 3.

Table 3

Distribution of patients according to age, grade of retinopathy and probable localization of TIA

Age	Probable localization (pool)	Retinopathy 1 (n;%±m;)	Retinopathy 2 (n;%±m;)	Retinopathy 3 (n;%±m;)	Total (n;%±m;)
25-33	Cortical (3)	1	2		3
N=9		11.11	22.22		33.33
		10.48	13.86		15.71
	a. ophthal-mica (6)	2	1	3	6
		22.22	11.11	33.33	66.67
		13.86	10.48	15.71	15.71
45-59	Cortical (5)	2	1	2	5
N=42		4.76	2.38	4.76	11.9
		3.29	2.35	3.29	5.0
	a. ophthal-mica (37)	7	12	18	37
		16.67	28.57	42.86	88.1
		5.75	6.97	7.64	5.0
60-74	Cortical TIA (7)	2	3	2	7
N=53		3.77	5.66	3.77	13.21
		2.62	3.17	2.62	4.65
	a. ophthal-mica (46)	8	14	24	46
		15.09	26.42	45.28	86.79
		4.92	6.06	6.84	4.65
	Total 104	22	33	49	104

Note. Classification of retinopathy of 1-4 grade, IV stage according to Keith-Wagner was not included in the study.

According to the obtained data, it is impossible to make convincing conclusions about the dependence of the TIA localization on the age and grade of retinopathy in the age group of 25-44 years. All age groups had a comparable level of cortical TIA without statistical differences. Concerning TIA in the *a. ophthalmica* pool, 18 patients or 42.86% had retinopathy of the 3rd grade, 12 patients (28.57%) had retinopathy of the 2nd grade, and 7 patients (16.67%) did not show any statistical difference in the group of patients aged 45-59. Retinopathy of the 1st grade was found in 8% of patients; the 2nd grade - in 14% of patients; the 3rd grade - in 24% of patients at the age of 60-74 years, but this difference was not statistically provable. Retinopathy of the 1st grade was observed in 12 patients (26.09% ±6.47) without TIA (control) showing a qualitative difference with the study group. Today, retinopathy of the 3rd grade is considered to be a relatively rare condition due to the system of preventive treatment of arterial hypertension and complications, so the presence of such patients in the study also directs preventive actions.

Analysis and discussion

The distribution of patients with visual impairment and probable TIA localization in the cortical areas of the visual analyzer (in 15 or 14.42%) and 89 (85.58%) in the *a. ophthalmica* blood supply pool may indicate both the features of the vascular bed in the two pools, which predetermine an uneven distribution, and rare addressing of patients with cortical TIA and visual impairment to medical institutions, meaning that a significant part of such TIA remains undiagnosed. The study did not reveal any marked difference in the frequency of visits of patients of different age groups to medical institution, which leads to the need to consider the

influence of other TIA development factors, which are not age-related, and the condition of MAH and microcirculation of vessels can be their markers.

Microstructural brain disorders of non-acute nature were revealed in 78 (82.1% of men and 66.7% of women) patients, which indicates a gradual accumulation of ischemic disorders in the group, and leads to the conclusion of the non-random development of TIA with visual impairment, but caused by previous chronic adverse conditions. The presence of arterial hypertension is detected in most of the studied patients (up to 85.58% in the age of 25-45), the negative impact of AH on the development of angiopathy, MSP of the brain and MAH structure impairment in this context does not raise objections.

Probably, signs of retinopathy, structural disorders of a. ophthalmica branches may determine a greater risk of TIA development in this pool, but the presence of systemic vascular disorders in this group of patients also determines the chances of TIA development in other areas of the cerebral blood supply. Controversial issues relevant for an additional study in the interpretation of the obtained results may be the criteria for predicting the localization of TIA development depending on the type of disorders associated with atherosclerotic changes, arterial hypertension, pathology of small vessels, mixed forms as well as measures of prevention of the adverse development of such conditions.

CONCLUSIONS

1. Transient visual impairment due to brain and eye ischemia occurs mainly in the a. ophthalmica blood supply pool in 89 (85.58%), its occurrence in cortical areas of the visual analyzer was observed more rarely (in 15 or 14.42%) and was not dependent on age and gender differences.

2. MAH pathology and retinopathy of varying grades were revealed in young patients in all cases; AH was found in 88.9% that makes it possible to discover risks factor without discovered correlations with TIA localization in a particular pool.

3. There were no incidences of TIA without disorders in MCR, MAH or AH in all age subgroups. This justifies that TIA with vision disorder is not a random episode, and it is preceded by impairments of the brain structure, MAH of the head, microcirculation, which forms the basis for the prediction and prevention of such conditions.

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DOI: https://doi.org/10.1161/HYP.0000000000000075

The article was received
2019.11.11