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CLINICAL AND EPIDEMIOLOGICAL FEATURES OF THE PREVALENCE OF CONVEXITAL MENINGIOMAS IN THE PREDICTION AND PREVENTION OF THEIR RECURRENT DEVELOPMENT

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КЛИНИКО-ЭПИДЕМИОЛОГИЧЕСКИЕ ОСОБЕННОСТИ РАСПРОСТРАНЕННОСТИ КОНВЕКСИТАЛЬНЫХ МЕНИНГИОМ В ПРОГНОЗИРОВАНИИ И ПРОФИЛАКТИКЕ РАЗВИТИЯ ИХ РЕЦИДИВОВ

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The study assessed the clinical and epidemiological features of the prevalence and dynamics of the incidence of convexital meningiomas in the Rostov region. The incidence of meningiomas among the adult population ranged from 1.12 to 11.51 per 100 000 people. The progressive growth of neurooncological pathology was in areas with high-rise system buildings and highways. In addition, there was a high prevalence of meningiomas among residents of rural areas located within the industrial complex of the Rostov region or in its immediate vicinity. The developed map of an individual system for predicting the detection of meningiomas allows for secondary and tertiary prevention of meningiomas, aimed at their timely prediction, detection and prevention of relapses.

Keywords: meningioma, morbidity, frequency of occurrence, relapses, prognosis, prevention

В исследовании проводилась оценка клинико-эпидемиологических особенностей распространенности и динамики заболеваемости конвекситальными менингиомами в Ростовской области. Заболеваемость менингиомами среди взрослого населения составила от 1,12 до 11,51 на 100 тыс. Прогрессирующим рост нейроонкологической патологии был на территориях с высокоэтажной системной застройкой и транспортными магистралями. Кроме того, отмечалась высокая распространенность менингиом среди жителей сельских районов, находящихся в пределах промышленного комплекса Ростовской области или в непосредственной близости от него. Разработанная карта индивидуальной системы прогноза выявления менингиом позволяет осуществить вторичную и третичную профилактики менингиом, направленные на их своевременное прогнозирование, выявление и предупреждение рецидивов после выбора адекватных методов хирургического лечения.

Ключевые слова: менингиома, заболеваемость, частота встречаемости, рецидивы, прогнозирование, профилактика

F – Fisher's exact criterion
RostSMU – Rostov State Medical University

χ^2 – Pearson's criterion

In recent decades, in a number of countries, the observed increase in the number of primary brain tumors in general, and meningiomas in particular, may be the result of population aging, improved access to health care and diagnostic procedures; Changes in the classification of tumor coding. Demographic epidemiological studies of primary brain tumor risk factors have already established the causal relationship of ionizing radiation, and the hypothesis about the role of electromagnetic fields, nutrition, hormonal and reproductive factors has been proposed. Most geographical regions, including Russia, mortality rates are similar to morbidity levels [1–3]. Annual standardized rates of meningioma morbidity range from 3.4 to 5.7 per 100 000 population. And the increase in the standardized mortality rate in Russia (7 %) over the last decade was not as significant as the increase in morbidity (33.1 %) during the same period [4, 5].

A differentiated clinical approach to the surgical treatment of meningiomas should be developed to prevent relapses in the long term, including secondary and tertiary prevention of meningiomas, with a view to their timely prediction, detection and prevention of relapses [2].

The aim of the study was to determine the clinical and epidemiological features of the prevalence and dynamics of the distribution of the incidence of meningiomas with tertiary prevention in the Rostov region.

Material and Methods. The work was carried out at the Department of Nervous Diseases and Neurosurgery of the RostSMU. The analytical epidemiological study included patients of the main group (n=100) with convexital meningiomas, average age of 65±1.23 years, men – 38 (38 %), women – 62 (62 %), operated in the period from 2017 to 2021. The control group consisted of healthy people (n=120) with an average age of 63±1.15 years, men 49 (40.8 %), women 71 (59.2 %). In 100 % of cases, the diagnosis of meningioma was histologically verified. The representativeness of the main and control groups was assessed to level the influence of age as the leading risk factor on the results obtained (Fig. 1). For an in-depth study of the role of the above factors in the occurrence of meningiomas among residents of Rostov-on-Don and the Rostov region to exclude the variability and subjectivity in assessment of individual risk factors of meningiomas in both groups of respondents. The retrospective analysis was carried out using a specially designed questionnaire of 103 characters.

The selected topics reflect not only their importance in the development of meningiomas but also the conditions and lifestyle of the region's population. Further analysis using the «case-control» method of the obtained questionnaire data, representative by the age of the main and control groups, allowed us to identify the most significant factors in the development of meningiomas in the Rostov region.

The presented algorithm for calculating the risk of a complex of adverse factors can be used for individual assessment and prediction of the risk of meningioma in a general medical network to implement this method in the work of practical healthcare in the Rostov region. Based on the conducted studies, a «Map of an individual system for predicting the detection of meningiomas based on clinical data» has been developed. A method to predict meningioma recurrence and a technique to prevent meningioma recurrence were developed as well.
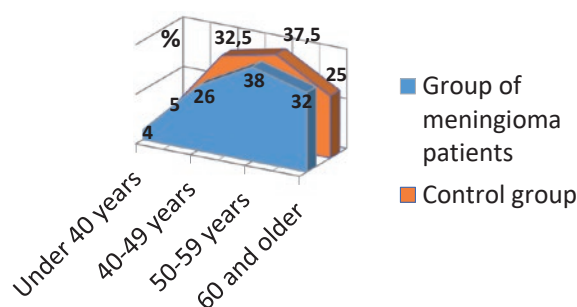

Fig. 1. The representativeness of the main group and the control group of age

To predict the detection of meningitis in the general population, we tested this questionnaire and added weighting coefficients based on all the above topics. If the sum of coefficients is greater than 0, the probability of detection of meningioma will be 100.0 %. If the sum of coefficients is less than 0, the likelihood of not getting sick is also 100.0 %. The characterization of the quantitative traits was based on the Shapiro – Wilk criterion. For qualitative comparison of independent groups, the Pearson criterion χ^2 or the exact Fisher criterion (F) was chosen. The obtained results of the study were processed using the Statistica version 10.1 (StatSoft Inc., USA), programs MedCalk version 20.0 (MedCalc Software Ltd, Ostend, Belgium) and the biomedical statistics program the ASTA (N. N. Blokhin National Research Center, Russia). The p<0.05 was taken as the level of statistical significance.

Results and Discussion. Average annual prevalence of meningitis in the Rostov region for the studied five-year period was 3.65 cases per 100 000 inhabitants of the region (among urban residents – 4.14 per 100 000 urban population and 3.42 per 100 000 rural population – among rural residents of the region), in Rostov-on-Don – 7.37 cases per 100 000 city residents. To systematize the data obtained in urban areas, all cities were conventionally divided into three groups according to the predominant location of enterprises (coal, machinery and light industry), transport modes (road, rail, water), and their historical development, which determines the sanitary and hygienic characteristics in each of them.

The gradation was carried out following the official data of the Rostov Regional Committee of State Statistics for the period under study. The prevalence of meningitis

among the population of six major industrial cities in the south-west of the Rostov region (with an unfavorable environmental situation during the reporting period) and of the developed diversified industry was significantly higher (p<0.05) than in cities with the coal industry. In a study of the prevalence of meningitis on the territory of the largest industrial city of the Rostov region – Rostov-on-Don – its heterogeneity was revealed. The prevalence of meningitis among residents of Rostov ranges from 3.49 to 11.51 per 100 000 inhabitants (Fig. 2, 3). Kirovsky district of the city, with multi-storey buildings of the system and transport highways, is characterized by gradual growth of neurooncological pathology, peripheral, and Oktyabrsky district with more private construction of houses with landscaping – stability of meningioma morbidity. In the region's rural areas, the incidence of meningitis varies considerably (from 1.12 to 7.75 per 100 000 population). In areas located within or near the territorial and industrial complex of the Rostov region, the prevalence of meningiomas among the region's rural population is much higher than in areas remote from the industrial complex of the region (p<0.05). The highest prevalence of meningiomas in the region is found in rural areas along the river bed and on the banks of open reservoirs, especially with high pollution levels. Given the population's use of water from these reservoirs for food and drinking with little or no chemical treatment [5–7], this overlap can hardly be considered accidental.

Absolute number of brain tumors

Fig. 2. The absolute number of meningiomas among residents of the administrative districts of Rostov-on-Don (per 100 thousand population)

Intensive indicator of the incidence of brain tumors

Fig. 3. Intensive indicator of the incidence of OGM in the districts of the city of Rostov-on-Don for the period 2016–2020 (per 100 thousand population)

In this regard, we compared rural areas of 4 conditional zones of the Rostov region that differ in geographical location (relation to the territorial-industrial complex) and the predominant development of individual branches of agriculture [8]. The result is a very realistic picture: the prevalence of meningiomas is higher among residents of rural areas located within the industrial complex of the Rostov region or near it. In groups of districts located a considerable distance from the territorial-industrial complex of the region, whose economy is based only on agriculture (cattle breeding, plant growing and vegetable growing), the prevalence of meningiomas is noticeably lower (2.6 per 100 000 population). A high prevalence of meningiomas is noted in areas of natural anomalies (in particular, radon) and industrial accidents (the territory adjacent to Volgodonsk) [9].

According to the level of economic development, the Rostov region is a productive and agricultural territory. The anthropogenic landscapes of the region are as follows: agricultural – 85 %, industrial – 4 %, water – 4 %, forest – 3 %, residential – 2 %. The economy's dominant sector is a mechanical engineering. Lead, chromium, zinc, copper and vanadium are increasing in the soils of these settlements. Agricultural land with such a degree of pollution is located around Rostov-on-Don, east of Novocherkassk, in the GRES area and south of Krasny Sulin. Here, the content is higher than the transfer coefficient: the lead concentration in the soil reaches 300–600 mg/kg, zinc – 900–1000, copper – 200–500 mg/kg. The soil and land resources of the southern parts of the Rostov region are negatively affected by the use of pesticides, fertilizers, and chemical and biological agents in agriculture. Taking into account the epidemiological picture of the prevalence of meningitis in the Rostov region, it can be assumed that this is due to the ecological heterogeneity of the habitat since it is 3–5 times higher in urban and rural areas of the south-west of the Rostov region, Three to six times more in areas near water bodies due to pollution of water bodies, as well as in their territorial-industrial complex than in the rest of the territory [10–12]. Current methods for improving the diagnosis of neoplasms, taking into account their pathogenetic factors, make it possible to identify patients with a meningioma based on pre-existing clinical symptoms of tumors when the size of the tumor itself is large enough. However, to improve the early detection of brain tumors in each entity of the Russian Federation, it is necessary to consider the risk factors specific to a particular area [13].

A further continuation of this work was the development of therapeutic and preventive measures, including secondary and tertiary prevention of meningiomas, aimed at their timely detection, prediction of relapses and prevention of relapses using a method for predicting relapses of meningiomas (Patent No. 2689795 RF «Method for predicting relapses of meningiomas in the postoperative period») [14].

Conclusions. Thus, the study's results revealed a different prevalence of meningioma both territorially and in the structure of overall morbidity in the Rostov region. The incidence of meningioma among adults ranged from 1.12 to 11.51 per 100 000. It should be noted that the prevalence of meningitis was higher among the inhabitants of rural areas located within the industrial complex of the Rostov region or in its immediate vicinity.

During clinical trials, our approach is essential for identifying high-risk meningioma groups, especially in high-risk areas, for in-depth examination by highly qualified specialists. The acquired forecasting capabilities are the basis for tertiary prevention by preventing the recurrence of neoplasms.

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DYNAMICS OF INDICATORS OF THE PROOXIDANT AND ANTIOXIDANT BLOOD SYSTEM IN PATIENTS WITH PEMPHIGUS VULGARIS

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ДИНАМИКА ПОКАЗАТЕЛЕЙ ПРО- И АНТИОКСИДАНТНОЙ СИСТЕМЫ КРОВИ У БОЛЬНЫХ С ВУЛЬГАРНОЙ ПУЗЫРЧАТКОЙ

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The article presents the results of research on the dynamics of indicators of pro- (the level of malondialdehyde in erythrocytes and the level of average mass molecules in the blood serum) and the antioxidant system of the blood (the level of reduced glutathione in erythrocytes and the activity of ceruloplasmin in the blood serum) in patients with Pemphigus