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Frequency and peculiarities of localisation of parasagittal meningiomas of the cerebral hemispheres

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***Abstract*---**Background. Meningiomas are benign tumors originating from the cells of the soft and arachnoid membranes of the brain. The study of parasagittal meningiomas is one of the current problems in neurosurgery due to the relatively high prevalence of this type of neoplasm among intracranial tumors. This article provides statistical data on the frequency of meningiomas, localization, size and the presence of perifocal edema. Materials. We conducted a study of 73 patients treated at the neurosurgery department of 1st Clinic of the Samarkand State Medical University. There were 26 (35.6%) male and 47 (64.4%) female patients. Results. Based on our analyses, we have determined that parasagittal meningiomas located in the projection of different areas of the brain, depending on their size, create compression on the relevant centers, causing motor, sensory and mental disorders. The study of the localization and size of parasagittal meningiomas will help to predict the clinical course and choose the appropriate treatment tactics. Conclusions. Thus, perifocal oedema of brain tumors contributes to the patient's survival rate and has a significant impact on the development of neurological symptoms. Two thirds of patients with perifocal oedema needs additional measures in order to reverse the effects of it.

***Keywords*---**brain tumors, parasagittal meningiomas, forms meningiomas.

Introduction

The number of neoplasms is now increasing worldwide. Cancer is a major contributor to mortality of the global population and causes nearly 10 million deaths annually, or approximately one in every six deaths. In spite of an extremely low probability of brain tumors' development and their prevalence,

which, according to different authors, ranges from 0.8 to 1.6%, an aggressive clinic with many complications, the damage of structures of the nervous system, leading to the disability of patients and high mortality rates, have been attracting attention of more and more specialists [1, 2].

Meningiomas are relatively frequently developing benign tumours originating from the cells of the soft and arachnoid membranes of the brain and occurring anywhere where arachnoid cells are found [3, 4]. The development of these tumours from arachnoid endothelial cells became the basis for L.I. Smirnov to call them arachnoid endotheliomas [5]. Meningiomas of the brain occupy a significant place in the structure of intracranial neoplasms and occur in 17-35% of cases among adults. However, the frequency of parasagittal meningiomas among the other types ranges from 20-40.0% [6].

Aim of the study

To analyze data on the distribution and localization features of parasagittal meningiomas of the large cerebral hemispheres in the Samarkand region.

Material and Methods

We conducted a study of 73 patients treated at the neurosurgery department of Clinic 1 of the Samarkand State Medical University. The patients ranged in age from 20 to 72 years, with an average age of 49.86 years. There were 26 (35.6%) male and 47 (64.4%) female patients. All patients with the diagnosis of the parasagittal meningiomas were verified by histological examination. CT, MRI and tractography of the brain pathways was performed to determine the size and localization of the tumor and the existence of perifocal oedema. Evaluation of the neurological status of the patients was one of the most important parts of the study and was carried out on admission to hospital. The patients' general state and health were assessed, motor and sensory disorders, meningeal symptoms and mental disorders were recorded. The data were statistically processed using a statistical analysis software package on a Pentium-4 computer.

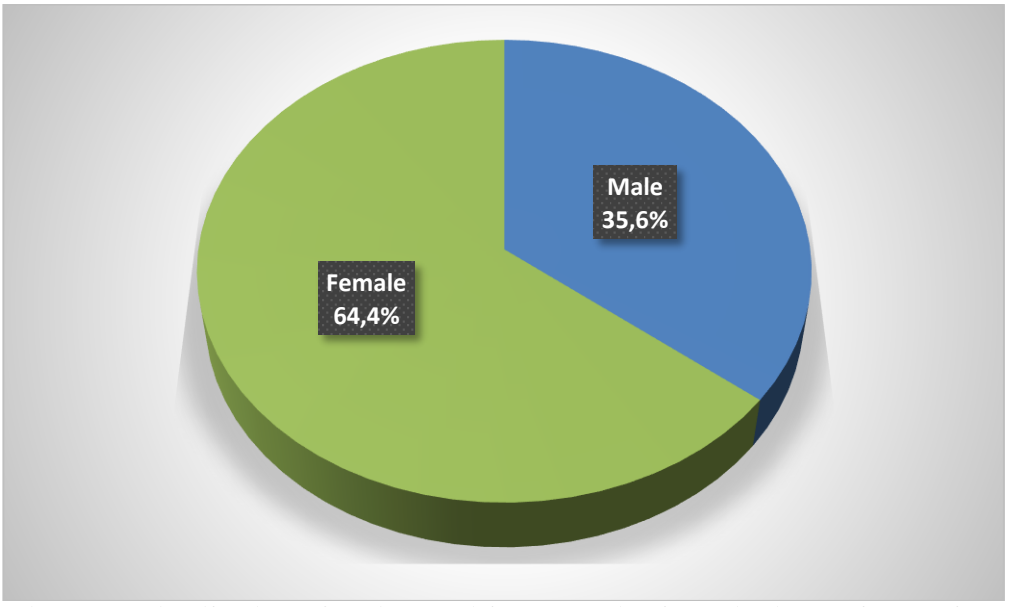


Figure 1. Distribution of patients with parasagittal meningiomas by gender.

Results and Discussions

Histological examination occupies an important place in the diagnosis of brain tumors. According to the histological classification adopted by the WHO in 2007, there are 15 subtypes of meningiomas, divided into 3 grades based on their malignancy. This histological classification clarifies the most probable clinical prognosis of patients with meningiomas, with statistically reliable data on the correlation of clinical features [5].

According to Backer-Grondahl T et al, the majority of meningiomas are represented by typical forms (68.8%), which supports the findings of our study [8]. In our study, 85.2% of patients had this type of neoplasm, while the prevalence of meningioma forms was strikingly different. According to our colleagues, the dominant forms of typical meningiomas were transitional (mixed) (39.8%) and meningothelial subtypes (17.3%). In our study, meanwhile, fibrous (45.9%) and psammomatous (25.7%) subtypes were the most common. Patients with microcystic, secretory, lymphocytic, metaplastic forms of typical meningiomas and clear cell form of atypical meningiomas were not detected.

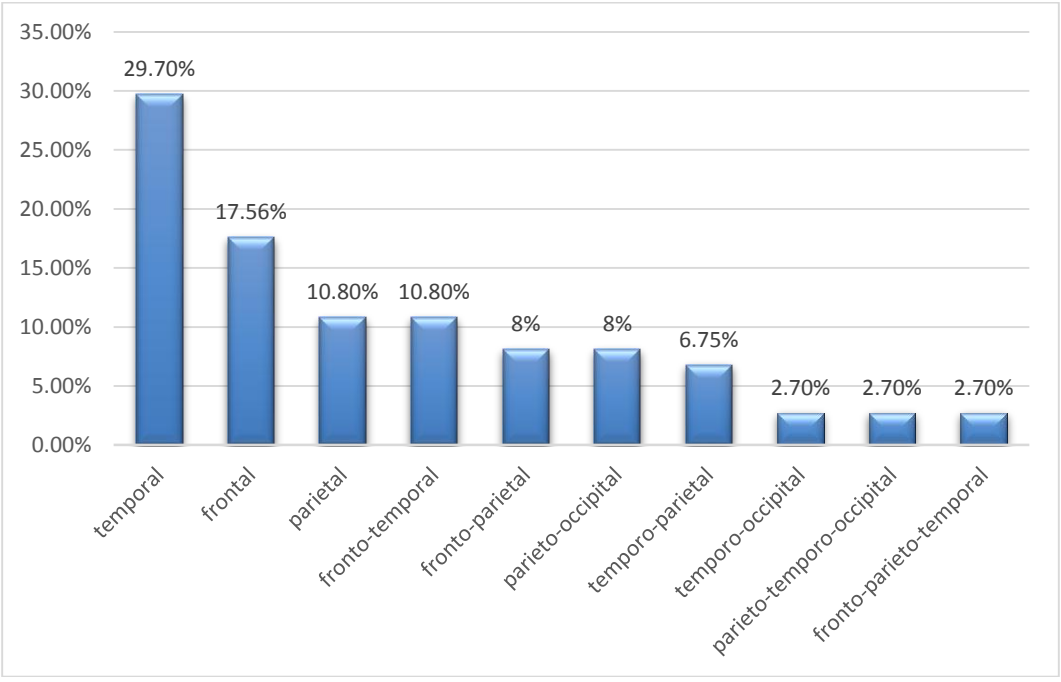
Table 1
Histological subtypes of meningiomas in two different researches

A study by our colleagues (Thomas Backer-Grøndahl and others.)					Our study			
WHO grade	Subtype	Frequency	%		WHO grade	Subtype	Frequency	%
I	Meningothelial	34	17.3		I	Meningothelial	8	10.8

A study by our colleagues (Thomas Backer-Grøndahl and others.)				Our study			
WHO grade	Subtype	Frequency	%	WHO grade	Subtype	Frequency	%
I	Fibrous (fibroblastic)	14	7.1	I	Fibrous (fibroblastic)	34	45.9
I	Transitional (mixed)	78	39.8	I	Transitional (mixed)	1	1.4
I	Psammomatous	1	0.5	I	Psammomatous	19	25.7
I	Angiomatous	3	1.5	I	Angiomatous	1	1.4
I	Microcystic	2	1.0	I	Microcystic	0	0
I	Secretory	1	0.5	I	Secretory	0	0
I	Lympholasmacyterich	1	0.5	I	Lympholasmacyterich	0	0
II	Atypical	57	29.1	II	Atypical	1	1.4
II	Clear Cell	2	1.0	II	Clear Cell	0	0
III	Anaplastic	2	1.0	III	Anaplastic	2	2.7
Total		196	100	Total		66 from 74	100

Note: 4 patients refused histological examination, 4 patients have not yet received results of histological examination.

The next important aspect of research is to investigate the localisation of the neoplasm, its size and the presence of perifocal oedema. A meningioma of the brain is a benign tumour, characterised by slow growth and lack of symptoms. Often the tumour is an incidental finding in an MRI or CT scan of the skull. Its symptoms can be divided into cerebral symptoms caused by an increase of intracranial pressure, and local symptoms that occur when the tumour compresses various anatomical structures of the brain. Parasagittal meningiomas located in the projection of different areas of the brain, depending on their size, create compression on the relevant centers, causing motor, sensory and mental disorders. The study of the localization and size of parasagittal meningiomas will help to predict the clinical course and choose the appropriate treatment tactics.



Note: The total number of patients was 74. Outcome data are based on CT, MRI examinations.

Figure 2. Location of parasagittal meningiomas

This bar chart illustrates the percentage of patients with diverse types of localization of parasagittal meningiomas of our patients. The statistics clearly illustrates that temporal localization is the highest one reaching 27,90%, while three next ones -frontal, parietal and fronto-temporal types as the second and third types of localization, with 17,56% and 10,80%, respectively.

As it is shown, the following localizations like fronto-parietal, parieto-occipital and temporo-parietal being occurred among approximately 10% of patients, we find the other three types of localization-temporo-occipital, parieto-temporo-occipital, fronto-parieto-temporal - to be the lowest one's among the rest types with a percentage of 2,70%.

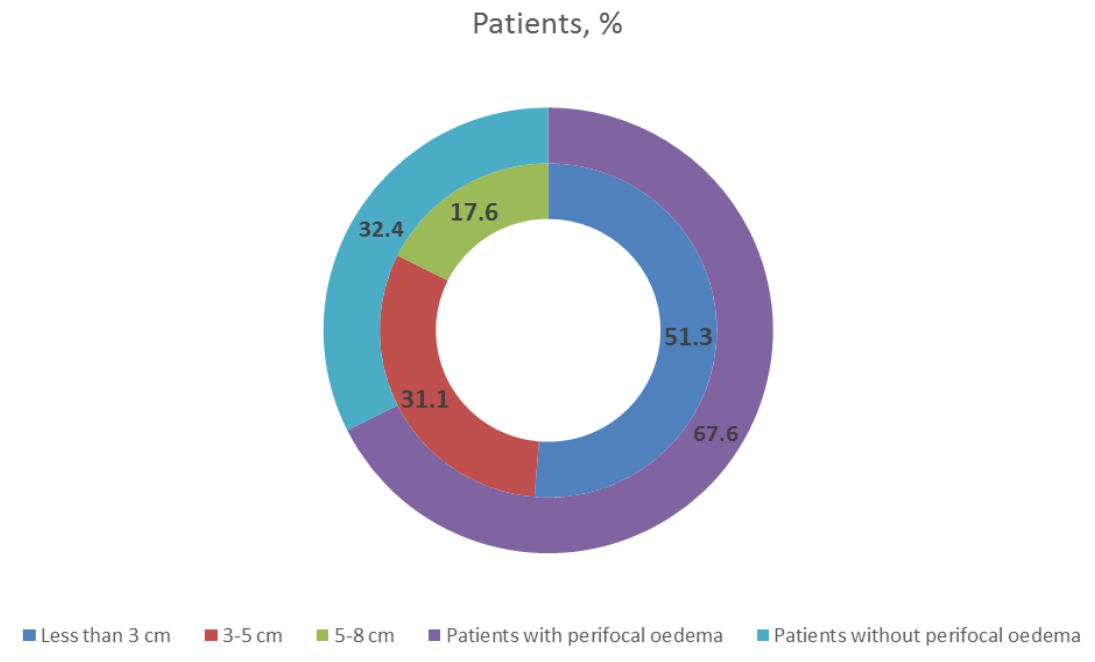


Figure 3. Percentage distribution of patients according to tumor size and presence of perifocal oedema

Perifocal oedema of brain tumors contributes to the patient's survival rate and has a significant impact on the development of neurological symptoms [7]. The figure 3 demonstrates the percentage of patients divided into 2 groups - with perifocal oedema reaching 67.6%, while the rest 32.4 % does not have it. As it is shown, the inner 3 sections of figure are indicators of patients with different sizes of parasagittal meningiomas, among which 51.3 % have the tumor size of less than 3 cm. It is clear from the chart that approximately the rest half consists of the patients with tumor sizes – 3-5 cm and 5-8 cm – reaching 31.3 % and 17.6 % respectively.

Conclusion

1. According to our colleagues, the dominant forms of typical meningiomas were transitional (mixed) (39.8%) and meningothelial subtypes (17.3%). In our study, meanwhile, fibrous (45.9%) and psammomatous (25.7%) subtypes were the most common.
2. Parasagittal meningiomas located in the projection of different areas of the brain, depending on their size, create compression on the relevant centers, causing motor, sensory and mental disorders. The study of the localization and size of parasagittal meningiomas will help to predict the clinical course and choose the appropriate treatment tactics.
3. Perifocal oedema of brain tumors contributes to the patient's survival rate and has a significant impact on the development of neurological symptoms. Two thirds of patients with perifocal oedema needs additional measures in order to reverse the effects of it.

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