

## Early Diagnostics of Meningioma of the Sella Turcica Region

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### Abstract

Currently, the number of oncological diseases among the population is significantly increasing. It is worth noting that among neoplasms, brain tumors occupy a fairly impressive position, and 10% of them are tumors of the arachnoid space of the meninges - meningiomas of the sella turcica region [1]. The main problem associated with the diagnosis and therapy of meningiomas is their fairly deep localization and, most often, late detection. It is worth noting the age characteristics of the most frequent detection of meningiomas and tracking the correlation of this indicator with possible patient complaints, which will allow detecting a neoplasm at the earliest stage and significantly increasing the prognosis of treatment and further rehabilitation of the patient. In this scientific work, a clinical case of meningioma in a 57-year-old patient was considered, the treatment she received was analyzed and a diagnostic technique for this pathology was proposed.

**Keywords:** Meningioma; Mental Disorders; Surgical Treatment; Tumor of the Sella Turcica; Transnasal Access

### Introduction

The issue of oncological diseases and their treatment is one of the most pressing at the present time. Approaches to the diagnosis and treatment of pathological neoplasms are constantly improved. But one of the most inaccessible and difficult to treat with various variations of therapy are rightfully brain tumors [2]. This article discusses a clinical case of sella turcica meningioma (hereinafter referred to as STM). These tumors can have varying degrees of malignancy. In this paper, we examined a case of Rhabdoid meningioma, which is classified as Grade 3 in terms of malignancy. In turn, the further development of the tumor is quite ambiguous and both right-sided and left-sided variants are distinguished [3]. They are united by a common feature that often determines the most frequent and early manifestation of this type of meningiomas - damage to the chiasmatal tract (most often with the development of bitemporal hemianopsia). It is worth touching on the issue of general cerebral manifestations of the tumor process of the brain: this type of neoplasm will be characterized by an increase in ICP, as well as "causeless" headaches.

In the vast majority of cases, meningioma is a benign neoplasm, but malignant variants are also possible. According to the existing WHO classification, depending on the histological picture, there are three types of meningiomas:

1. Grade-1 (1<sup>st</sup> degree of malignancy): Benign, slowly growing formations, without atypia, not infiltrating surrounding tissues. Characterized by a favorable prognosis and a low recurrence rate. Includes 9 subtypes. Accounts for 94.5% of all meningiomas.
2. Grade-2 (2<sup>nd</sup> degree of malignancy): Atypical, characterized by more aggressive, rapid growth, a higher recurrence rate and a less favorable prognosis. Includes 3 subtypes. Accounts for 4.7% of all meningiomas.
3. Grade-3 (3<sup>rd</sup> degree of malignancy): Malignant neoplasms with an unfavorable prognosis, a high recurrence rate, aggressively growing and involving surrounding tissues in the process. Includes 3 subtypes. On average 1% of all meningiomas. More common in men.

The practical significance of this research lies in the proposal of criteria for the early diagnosis of STM, which significantly facilitate further therapy and improve the prognosis for the patient's life.

### Materials and Methods of the Study

The study was conducted at the Republican Clinical Psychiatric Hospital in accordance with Article 11 of the Law of the Russian Federation of 02.07.1992 N 3185-1 (as amended on 30.12.2021) "On Psychiatric Care and Guarantees of Citizens' Rights in Its Provision", informed written voluntary consent was obtained for medical intervention and the use of examination and treatment materials for medical purposes and their publication. Type of study: clinical observation. The study also received Conclusion of the LEC of the Mordovian State University No. 18 dated 10.09.2022.

### Clinical Case

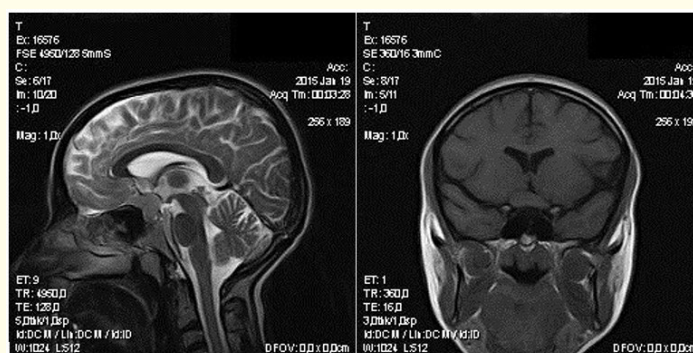
Patient, 57 years old. Height 162 cm, weight 78 kg. Body mass index (BMI) 29.72. Normostenic body type. Disharmonic physical development. (overweight). No history of cancer in the family. Since January 2022, has been on the "D" register with meningiomatosis. Meningioma, G 3 tubercle of the sella turcica. Histologically, rhabdoid meningioma, GIII (WHO CHS 2016) was determined. Subsequently, the patient underwent a course of radiotherapy in hypofractionation mode to the area of residual meningioma tissue from 14.03.22 to 21.03.22, after the 2<sup>nd</sup> stage of combined radiation therapy - proton beam therapy in hypofractionation mode to the meningioma area (14.04.2022). Disability group 2 was established for a period of 1 year. At the time of examination by a neurologist, the patient complained of dizziness, slight unsteadiness when walking, poor sleep and shooting headaches. When assessing the objective status, the patient's condition is satisfactory, consciousness is clear. The patient is able to answer questions, memory is reduced, but preserved. Speech is not changed. The state of the pupils D = S, the palpebral slits D = S. Photoreaction of the pupils is preserved. Eye movements are full, nystagmus is not detected. Face: symmetrical, trigeminal nerve exit points are painless. Facial sensitivity is not changed. Swallowing and phonation are not impaired. Tongue: along the midline. Oral automatism reflexes are absent. Muscle tone is normotonic. Muscle strength: in full. Pathological wrist and foot signs are absent. Spinal dynamics are not impaired. Severe ataxia is observed in the Romberg position. Palpation and percussion in the projection of the spinous processes and paravertebral points are painless.

Oncologist's examination: Complaints of headache, dizziness, facial swelling, general weakness, insomnia. On objective examination: the patient's general condition is relatively satisfactory. Consciousness is clear, the patient is asthenic. The skin and visible mucous membranes are pale in color, clean. Speech is not changed. The face is symmetrical upon examination, puffy. The thyroid gland is not enlarged, soft and elastic. Regional lymph nodes are not palpable.

Examination by an ophthalmologist: The patient complains of decreased distance vision. Objectively: OD VIS = 0.7\_\_SPH\_ + 1.0 \_\_CYL\_\_AX = 1.0. IOP 18. Visual fields are normal. The position and movement of the eyeballs in the orbit are correct. The cornea the lens is phacosclerotic. Objectively OS VIS = 0.7\_\_SPH + 1.0 \_\_CYL\_\_AX = 1.0. IOP 18. The arteries and veins are narrowed, the veins are dilated and tortuous.

Examination by a therapist: The condition is satisfactory, periodic complaints of instability of blood pressure, objectively unstable blood pressure, temperature 36.6, saturation 98%. Consciousness is clear. The skin is of normal color, peripheral nodes are not enlarged. Blood pressure 130/80 mm Hg. Pulse 72 beats/min, respiratory rate 18/min. Heart sounds are rhythmic. Vesicular breathing, no wheezing. The abdomen participates in breathing symmetrically, is soft, painless in all areas. The liver is not enlarged. The stool is formed. Urination is free, there is no edema, the percussion symptom in the lumbar region is negative on both sides.

04/15/2023 magnetic resonance imaging of the brain with contrast was performed. Compared with the results of preoperative MRI, incomplete resorption of the hydroma in the left frontal region, a decrease in the size of the zone of gliotic-atrophic changes in the lateral parts of the left frontal lobe are determined. The size and signal characteristics of the meningioma of the cavernous sinus and tentorium cerebelli on the right remained the same.



Figure

### Discussion of the Study Results

The most accurate method for diagnosing brain tumors, including MOTS, is MRI, which will reveal a formation of varying sizes in the corresponding area. In the clinical case studied above, it was possible to diagnose the tumor at a relatively early stage and the patient's postoperative complications developed to a relatively weak degree. Early diagnosis of any formations is necessary due to the lack of data on the stage of tumor progression at the time of examination. Accurate data can be obtained after histological examination; in our clinical case, the patient had Grade-3 stage, which confirms the fact of successful early diagnosis of the neoplasm.

It is necessary to consider surgical intervention options for this type of meningioma. On the one hand, partial removal of the neoplasm is a prognostically unfavorable sign since it does not exclude the possibility of further growth of the meningioma, but at the same time, total resection is not the best option, since due to its fairly deep location, the meningioma is often in close proximity to the optic nerves, blood vessels and other important parts of the brain, and the age characteristics of the patient do not have diagnostic significance in determining the possible localization. Choice of surgical approach directly depends on the location of the tumor and its size. For small tumors (less than 6 cm), one of the most modern methods can be used - transnasal tumor removal, which is the most gentle and convenient method of surgical intervention for the surgeon. However, for larger sizes, classical resection through the trepanation hole is most often used. Returning again to our clinical case, it is worth paying attention to the complications that arose in the patient after partial resection of the tumor. Among them, we will highlight minor gait disturbances, a minor symptom complex of visual impairments and headaches. The

patient had these symptoms before surgery, but it is worth noting that the severity of these disorders after partial resection of the tumor became significantly less. The prognosis for complete restoration of lost functions in the patient is questionable due to:

1. Age-related features.
2. Irreversible partial damage to the brain structures responsible for the above functionality.

Consequently, after the course of treatment, the main attention should be paid to the possible progression of the remaining part of the neoplasm. The choice in this case is the method of dynamic observation, consisting of periodic monitoring of the tumor size using CT and MRI methods and monitoring the patient's symptoms.

Having analyzed the clinical case, it is necessary to note the main role that determines the course of the operation and further prognosis - early diagnosis and put forward 3 main provisions for the successful determination of the presence of a neoplasm in the early stages:

1. Introduction of mandatory periodic examination of the structures and vessels of the brain for the presence of neoplasms in individuals predisposed to this pathology, taking into account specific symptoms for the most accurate differentiation of the diagnosis.
2. For some individuals predisposed to the appearance of this type of neoplasm (individuals over 50 years old), it is necessary to pay more attention to the symptoms that occur with meningiomas. (In the early stages, these can be both general cerebral symptoms such as shooting headaches and increased intracranial pressure), and more specific symptoms such as impaired visual acuity and decreased vision.
3. Identification of individuals with a hereditary history of neuro-oncological diseases. (In the early stages, these may be general cerebral symptoms such as shooting headaches and increased intracranial pressure), as well as more specific symptoms such as impaired visual acuity and decreased vision.

In the treatment of meningiomas, there are 3 main methods of the safest surgical intervention for this type of neoplasm:

1. In accordance with the size and location of the tumor, preference should be given to the least invasive methods of intervention. The gold standard among them are endonasal intervention methods without radical craniotomy. This method allows for the least harm to the structures of the brain, but requires sufficient skill from the neurosurgeon if the tumor is larger than 6 cm and has fused with nearby brain structures.
2. Among radiosurgical methods, the main and "gold" standard is the use of a "gamma knife". This method can be used for tumors of various sizes and its main advantage, of course, is the accuracy of up to 0.5 mm. This virtually eliminates the possibility of damage to the structures of the brain adjacent to the tumor and reduces the risk of complications due to the absence of radical intervention in the cranial cavity, which eliminates the risk of possible infection and significantly reduces surgical risks.
3. In the late stages of tumor growth and with its size over 8 cm, a choice should be made between classical transcranial access and dynamic observation. Since the risk group for MOTS disease is mainly elderly people, often with concomitant chronic diseases, it is necessary to rely on the risk that the intervention can bring to the patient. In case of vital indications for intervention, invasive access primarily has the advantage of a good overview of the tumor localization area for the surgeon, but this point is questionable in case of deep tumor localizations.

Currently, contrast-enhanced MRI is the leading diagnostic method for meningiomas of virtually any localization. MRI allows visualization of tumor vascularization, the degree of damage to arteries and venous sinuses, and the relationship between the tumor and

surrounding structures. On native T1-weighted MRI, most meningiomas do not differ in intensity from the cerebral cortex. Fibromatous meningiomas may be lower in intensity than the cortex. On T2-weighted MRI, meningiomas are usually of increased intensity, and edema is also clearly visible on T2-weighted MRI. Intense contrast enhancement is detected in 85% of meningiomas. Meningiomas often have a so-called “dural tail”, a section of adjacent dura mater that intensively accumulates CM. This dura mater may be either tumor- or reactively altered. The “dural tail” is found in 65% of meningiomas and only in 15% of other tumors. Therefore, although it is not specific for meningioma, it allows one to speak more accurately in its favor. Among the disadvantages of this method, it is necessary to note the high frequency of false-negative results in relation to the diagnosis of the presence of calcifications and hemorrhage foci.

### Conclusion

Meningiomas of the sella turcica region may not show any specific signs for a long time that allow one to suspect their presence. Neurosurgical techniques are currently constantly developing rapidly, which allows for interventions that were unavailable several decades ago. The prognosis after a course of treatment for meningioma depends directly on the patient’s symptoms. Therefore, with early intervention and a responsible attitude of the patient to his or her health, the risk of complications becomes significantly lower, and the prognosis for life improves.

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