

## **FEATURES OF THE POSTOPERATIVE PERIOD FOR MENINGIOMA OF THE SKULL BASE**

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#### **Abstract**

workThere was a study of the clinical and morphological signs of the brain tumor, identification of prognostically significant factors among them, analysis of the results of surgical treatment and the development of rational treatment tactics for these brain tumors.

**Keywords:** Among all intracranial tumors of the meningeal series, meningiomas of the posterior cranial fossa (MPF) account for about 9-10% and are a relatively rare group.

#### **Introduction**

Among all intracranial tumors of the meningeal series, meningiomas of the posterior cranial fossa (MPF) account for about 9-10% and are a relatively rare group. It is still not clear why tumors of the same location, histological type and with the same radicality of removal have different postoperative courses. But it is clear why in some cases, when subtotal removal of the tumor was performed or no operation was performed at all, long-term neurological and radiological monitoring of patients does not reveal the progression of meningiomas with a satisfactory quality of life of the patient. These inexplicable facts force us to reconsider the existing views on the nature of MCNs and the principles of their surgical treatment. Due to the advent of new types of diagnostics, anesthesia methods and improvements in basic surgical techniques, radical removal of these tumors becomes possible, which, however, leads to a higher level of complications after surgery. This is due to the characteristics of tumor growth and its relationship with surrounding structures [1-5]. The importance of clinical factors influencing radicality is constantly in the focus of attention of many neurosurgeons, but their value in determining the tactics of surgical treatment is different, and in some cases, even the opposite. The many other characteristics of meningiomas that influence treatment outcomes still need to be clarified. Their knowledge and correct assessment will make it possible to determine and justify adequate surgical approaches, to develop appropriate methods for removing meningiomas of the specified localization, thereby achieving maximum efficiency of operations [6-10].

#### **Materials and Methods**

The presented study was carried out on the basis of the extensive experience of the neurosurgery clinic of Samarkand State Medical University, accumulated in recent years. During the period

from 2008 to 2013 inclusive, we operated on 202 patients whose tumor, histologically verified meningioma, was located at the base of the PCF. Among the patients there were 37 (18.3%) men and 165 (81.7%) women (ratio - P 4.46). The average age was  $50.5 \pm 1.7$  years (minimum and maximum values - 18 and 75 years). During the analyzed period, 202 patients underwent 212 surgical interventions aimed at tumor removal. Various surgical approaches were used for surgical removal of the MFJ. Total removal was considered in cases where the neurosurgeon's impression of complete removal of the tumor corresponded to CT and/or MRI data obtained in the immediate postoperative period, in which there were no signs of tumor remnants (106 cases - 45.1%). After subtotal removal, the presence of small tumor fragments was implied. According to CT and MRI with contrast, small tumor remnants measuring no more than 10 mm are detected (67 cases - 33.2%). With partial removal, macroscopic areas of the tumor larger than 1 cm remain, detectable on CT and MRI (29 cases - 21.7%)

## Results

Tumors of all groups were united by their average diameter - from 31.14 mm to 33.34 mm (the average value for the entire group was 32.74 mm). Otherwise, each group is characterized by its own characteristics regarding the location of the tumor, the preferential direction of its growth, the impact on the surrounding brain structures, nerves and vessels of the base of the skull. These features had their clinical reflection in the form of characteristic symptom complexes. Each group exhibits its own histological distribution.

The main principle in the surgical treatment of cervical tumors should be their radical removal. Only complete removal of the tumor allows us to hope for a cure and avoid recurrence of the disease. The exception to this rule is cases in which the risk of developing a new neurological deficit is very high. Several intraoperative characteristics of the cervical tumor that we have identified do not allow radical tumor removal without the development of complications in the postoperative period. First of all, this is the involvement of the roots of the cranial nerve, great vessels and structures of the brain stem in the pathological process. The final decision on the extent of tumor resection is made by the surgeon only during surgery.

Postoperative period. Postoperative mortality in our series in patients with MCC was 5.94% (12 observations). It ranged from 4.6% for meningiomas of PPVK to 33.3% for meningiomas of GO. The main cause of death was poor circulation in the hungry brainstem.

Statistical analysis of survival showed that about 91% of patients survive the first two weeks after surgery, regardless of the anatomical and topographic group. About 85% of all patients survive a period of 6 months without becoming disabled. Comparison of the data obtained will give the following results. The assessment graphs for the first day in the group of surviving patients and disabled people are almost the same. Further, however, the curves behave differently; the disability graph passes below the death graph. At the same time, IC on the first day after surgery falls below 20 points and does not increase 7 days after surgery, then these patients die after a different period of time. For patients with IC below 40 points, the temporary results are different. If the patient has an IC score of less than 40 points by the end of 14 days after surgery, he will remain disabled and will require long-term special care. In other words, on

the time scale after surgery, in the first day the question of the patient's life is decided, in the second week - about his disability.

20 patients (9.9%) developed complications after surgery that sharply worsened their condition (up to 30 points or lower on the Karnofsky scale), in some cases requiring unscheduled surgical intervention. 18 of them belonged to PCM, 2 to BZ meningiomas. The severity of the patients' condition is due to several reasons simultaneously: impaired circulation of the brain structures in the area of surgical intervention, changes in intracranial relationships due to developed bleeding, and the formation of intracranial hematomas, cerebral edema and occlusive hydrocephalus, damage to the roots of the caudal group of nerves.

Permanent or temporary complications associated with surgical treatment, defined as at least one new neurological defect or worsening of previously existing symptoms in the immediate postoperative period, were identified in 77 patients, which accounted for 40.5% of all survivors (190 patients). Among all the complications associated with neurological deficits, cranial nerve damage turned out to be the most common.

Thus, in more than half of the patients after surgery, there is no deterioration in their condition, no increase in neurological symptoms or aggravation of an existing neurological deficit. Only in 15.8% of cases there was a significant deterioration in the condition of patients requiring long-term intensive treatment and repeated operations. In 5.94% of patients, treatment had no effect and resulted in death. The most favorable in terms of prognosis is the 3-topographic group of the MGJ - meningiomas of the PPVC.

The main reason for the severe course of the postoperative period was impaired blood circulation in the brain stem - 24 patients (11.9%). Based on the analysis of our own clinical material, we found that there are three visible causes of circulatory disorders in the structures of the brain, which led to a severe course of the postoperative period: 1) Tumor invasion of the pial membrane of the brain stem. In this regard, the mobilization of the cerebral cord is accompanied by injury to brain structures, hemorrhagic impregnation and the development of ischemic disorders. 2) Accumulation of blood at the base of the skull at the site of the removed tumor. The incidence of complications was 2.97% among all patients we operated on. In another 5 patients, the hematoma was located in the cerebellar hemisphere. 3) Trauma to the great vessels of the skull base occurred in 7 cases (3.5%), 4 of which were fatal.

The second place was occupied by complications associated with damage to the cranial nerves in the cisterns of the posterior cranial cavity and the bone canals through which they leave the cranial cavity. In 23.8% of cases, the tumor enveloped the roots of the cranial nerve, in 72.3% it compressed them, leading to varying degrees of deformation and stretching.

Anatomical damage occurred in the following situations: during mobilization of the tumor, when the meningioma tissue roughly stretches and thereby thins the roots of the cranial nerves, turning them into separate fibers, and their separation from the brain is not possible; when removing a tumor in the area of its matrix, where meningioma can spread into the cranial nerve canals. Often, the surgeon leaves tumor fragments on stretched and disintegrated roots, producing additional coagulation, which can also be important in the pathogenesis of the development of complications.

The development of liquorrhea, to which great preventive attention is paid during access procedures, was noted in our series only in two cases and is not a trend that requires separate consideration. Correct execution of surgical approaches, especially the stage of closing the surgical wound, allows us to minimize the occurrence of this complication in the postoperative period, even in patients with unrestored cerebrospinal fluid outflow. Comparing neurological symptoms associated with damage to various nervous structures, it should be noted that symptoms of damage to the oculomotor nerves, MMU nerves in the early postoperative period always increase in frequency of manifestation, while cerebellar disorders, brainstem symptoms, including motor symptoms. In most cases, disorders regress on the first day after surgery. When the caudal group is affected, there is no clear difference among the groups with improvement or deterioration in their functions. Persistent neurological disorders persist in those patients in whom the tumor was intimately fused to the brain stem during surgery. An attempt to mobilize it led to surgical brain injury and, as a consequence, the development of one or another deficit.

In the long-term postoperative period, the tendency towards a quantitative increase in the group of patients with the improvement category remains in all symptoms. However, the restoration of the function of the affected cranial nerves is worse than the regression of cerebellar and brainstem symptoms. In cases of cranial nerve damage, the ratio of improvement/deterioration approaches 1:1 with damage to the trigeminal nerve, while in cerebellar disorders it is at the level of 9.5:1.

The quality of life of patients, assessed using IC, is worse in patients with PCM, better in patients with PCM meningiomas.

After surgery for MCJ, IR decreases, and in the long-term postoperative period (follow-up  $33.3 \pm 2.6$  months) significantly increases in all groups. For this time period after surgery, the quality of life was better in patients with meningiomas of the PPVVK, BZO and GO, and worse in the group of petroclival meningiomas.

Comparing the quality of life of patients after total and incomplete tumor resection, it was found that after subtotal or partial resection of the cervical tumor, the treatment results are worse in the early postoperative period, especially in the group of meningiomas of the cervical tumor. In the long-term period, the value of IC almost levels out and does not depend on radicality. Analysis of the effect of radicality on the quality of life of patients after total or subtotal removal showed that IR does not have a statistically significant difference in these groups. When comparing the three groups of radicality, a pattern is clearly visible, according to which the desire for a highly radical tumor removal is associated with a high risk for the patient to remain disabled. That is, after total tumor removal, complications are more common, the development of which reduces the patient's quality of life by 40 or more points on the Karnofsky scale. Partial or subtotal removal carries a low risk of poor long-term surgical outcome but increases the risk of reoperation. Thus, the significant absence of differences in IC in the group of patients after total or subtotal removal of the cervical tumor, as well as the lower risk of disability of the patient after subtotal removal under certain intraoperative conditions (the nature of tumor growth and its relationship to neurovascular structures in the first place) allows the surgeon to make a bold choice regarding not radical removal.

Assessing the nature of survival in the first day after surgery and the drop in IC by more than 40 points, which corresponds to at least disability group 2, as well as the dynamics of IC after a long period after surgery, we came to the conclusion that in the postoperative period adequate care and proper rehabilitation of the patient. This is especially important for patients with PCM, whose results are significantly worse than in other groups of MCN.

The average follow-up period for patients in whom no recurrence of MGJ was detected was  $31.0 \pm 2.1$  months. The average period of relapse was  $53.0 \pm 3.2$  months. By the end of 1 year after surgery, relapse occurred in 2% of operated patients (two patients from this group had malignant forms of the tumor), by the end of 2 years - 9%; a 5-year relapse-free period was recorded in 83.3% of patients. The median recurrence rate in our series was 20.4%. Tumor progression after subtotal or partial removal was detected in 13.3% of cases. The higher rate of recurrence after total excision in our series is explained by the nature of the tumors, when regrowth occurred in malignant forms of meningiomas (Grade 3) and in cases with high proliferative activity of the tumor.

### Conclusion

The radicality of the removal and the likelihood of developing complications significantly depend on the involvement of the cranial nerve roots, great vessels and tumor invasion of the pial membrane in the pathological process. In this regard, the spread of the tumor into the cavernous sinus, into the canals of the vertebral artery and cranial nerves of the base of the skull, and its invasion of the pial membrane of the brain stem justifies subtotal removal of the tumor. A large tumor detected on MRI, pronounced dislocation and swelling of the brain stem, and the absence of a cerebrospinal fluid gap with a high degree of certainty indicates the invasion of the pial membrane of the brain by meningioma. The quality of life of patients and the likelihood of developing complications in the long term depend on the radicality of the removal. After total removal, the condition of patients is better than after subtotal or partial. However, the risk of complications after total removal is much higher than after subtotal or partial removal of meningioma. There were no significant differences in quality of life after total or subtotal removal. The likelihood of meningioma recurrence is influenced by the patient's age, radicality of removal, and histological variant.

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