During the period of 2009-2011 in UCH in Belgrade, we treated 22 patients with brain tumors. Treatment included the diagnosis and therapy that included surgery and postoperative neuroradiological follow-up of all patients regardless of whether radiotherapy was conducted with or without chemotherapy.

The most frequent were low grade astrocytomas and medulloblastomas. Patients with supratentorial localization of tumor had significantly smaller neurological sequelae compared with patients with infratentorial as well as patients diagnosed with low grade astrocytomas of any localization. From 10 patients with supratentorial localization, 7 of them had no neurological deficit, while from 11 patients with infratentorial localization, 3 of them were without deficit. Patients with histological diagnosis of low grade astrocytoma of any localization had less neurological deficits compared with other tumors. From 7 low grade astrocytoma in 5 of them there was no neurological deficit, while only in one patient residual tumor was verified.

In 7 patients the rest of the tumor was diagnosed, while in 14 patients no residual tumors was diagnosed during follow-up based on the MRI diagnosis.

Surgery, postoperative radiotherapy and chemotherapy in some cases represent an effective therapeutic approach in the treatment of brain tumors in children.

Key words: brain tumors, children’s age, the results of treatment.

INTRODUCTION

In childhood brain tumors are in second place by frequency after leukemia and make up about 20% of malignant disease. They are dominantly represented in a form of solid tumors and they are rare in children younger than 6 months. Most often they are diagnosed between the ages of 1 to 14 years and the highest incidence is between 2 to 8 years. In the pediatric population they occur more often in the posterior fossa (55%) than among the adult population (40%).

A certain number of tumors in childhood tends to disseminate along the subarachnoid space and meninges. When the tumor reaches a considerable size it puts pressure on surrounding brain tissue that leads to the swelling, disturbed blood flow in the nervous tissue and can lead to bleeding. All this causes symptoms such as morning headache, dizziness, nausea, vomiting, drowsiness, irritability, psychotic behavior, sometimes classical seizures or seizures that are manifested by the loss of attention and more. There may be disorders of vision, speech, hearing, smell, movement of limbs, balance, sense of touch, mental disorders, paralysis of cranial nerves, changes in eating habits, sleeping habits, instability when walking. The variables that affect the development of these neurological manifestations include the type, size, of tumor localization and patient age.

Making a diagnosis is often difficult, because symptoms may resemble to other diseases with physical and psychological causes. Today, if symptoms occur in spite of therapy it should be considered in the direction of the tumor and after performing a neurological and eye examination, where often the signs of increased intracranial pressure can be seen, it is necessary to perform CT or MRI of the brain.

Surgical treatment aims to set histopathological diagnosis (HP) and maximal resection of tumor tissue without serious consequences for the patient. Depending on the HP findings, size of tumor, radicality of surgery and age of the patient consultative decision on further oncologic treatment should be made. Radiotherapy carries a risk of damaging the surrounding healthy tissue, and can not be applied before the age of two years. Craniospinal radiation technique is specific to pediatric radiotherapy be-
cause it is applied to brain tumors that have tendency to disseminate through cerebrospinal fluid9.

This paper presents the results of treatment in the observation period of 3 years and the representation of age, gender, tumor location (supratentorial or infratentorial) and histological type of tumor, neurological status after treatment, associated diseases such as hydrocephalus and epilepsy in patients with brain tumors.

THE AIM

Aims of this research is examining the frequency of CNS tumors in childhood, and their characteristics, a comparison of associated diseases such as epilepsy and hydrocephalus, and to display the postoperative treatment depending on the histopathological type of tumor.

MATERIALS AND METHODS

The study included 22 patients treated at the University Children’s Hospital in Belgrade because of neuroradiological proven primary brain tumor from January 2009 – December 201110. The study is the retrospective character and the criteria for inclusion in the study were histologically confirmed diagnosis of the disease after surgery, age below 18 years and patients with no previous history of malignant disease. During the surgery microsurgical operative technique with the use of microscopes was used. Based on the neuroradiological examination for a certain number of patients there was indication for drainage of cerebrospinal fluid due to obstructive hydrocephalus, while certain number of patients required use of anticonvulsant therapy and continuous monitoring by a neurologist.

After the completion of surgical treatment in all patients was established histopathological diagnosis of the disease as recommended by the World Health Organization (WHO classification of brain tumors). Further decisions of postoperative treatment was consultatory assessed and implemented at the Institute for Oncology and Radiology of Serbia (IORS) depending on the histologic type of tumor.

During the 3 year follow up period, postoperatively 10 patients (45.5%) had no neurologic defects and deficits, in 11 patients (50%) was present a certain degree of neurologic sequelae compared with other tumors. From 7 patients (100%) with infratentorial localization, 3 of them (27.3%) were without neurological deficit, while from 11 patients with supratentorial localization, 7 of them (70%) had significantly smaller neurological sequelae compared with infratentorial patients. By the analysis of representation in relation to age three age groups were separated, 0-3 years, 4-9 years and over 9 years. 5 (22.7%) patients were younger than 3 years, most of the patients (13) were aged 4-9 years (59.1%) and 4 (18.2%) patients were older than 10 years. The youngest patient was aged 1 month (including two patients in the study group) and the was oldest 13 years.

In the tested group of 22 patients in relation to the histopathological type of tumor the mostly present was low-grade astrocytomas in 7 patients (supratentorial localized in 4 patients -18.2% and 3 patients and infratentorial 13.6%). Medulloblastomas of the posterior fossa were diagnosed in 6 patients (27.3%), atypical papillomas choroid plexus in 2 patients (9.1%), craniopharyngeoma in 2 patients (9.1%) and tumors of other histopathology in 5 patients (22.7%) (anaplastic astrocytoma, ependymoma, teratoma maturum, glioma trunci cerebri).

In relation to tentorium in 10 patients (45.5%) tumor was supratentorial and in 12 patients (54.5%) was localized infratentorial of which 4 tumors were in the truncus cerebri.

In the tested group of 22 patients during our regular follow-up without symptoms of disease were 9 patients (40.9%). In those patients was no neurological deficit and residual tumor and this value is maintained during further follow-up.

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Hydrocephalus was present in 15 patients (68.2%) and was surgically treated. In 10 patients it has been treated prior to tumor surgery and in 5 patients after tumor surgery.

Epileptic seizures occurred in 5 patients (22.7%) and in those patients an adequate anticonvulsant therapy was carried out and they were followed-up by neurologists.

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During the 3 year follow up period, postoperatively 10 patients (45.5%) had no neurologic defects and deficits, in 11 patients (50%) was present a certain degree of neurological deficit and one patient (4.5%) was with lethal outcome, which occured 2.5 months after tumor surgery.

Patients with supratentorial localization of the tumor had significantly smaller neurological sequelae compared with patients with infratentorial localization. From 10 patients with supratentorial localization, 7 of them (70%) were without neurological deficit, while from 11 patients with infratentorial localization, 3 of them (27.3%) were without a deficit (one lethal outcome is not taken into consideration).

Patients with histological diagnosis of low grade astrocytoma of any localization had less neurological deficits compared with other tumors. From 7 patients (100%) with low-grade astrocytomas, 5 of them (71.4%) had no neurological deficit, while only in one patient (14.3%) a residual tumor was verified.

Residual tumor was diagnosed in 7 patients or 31.8%, and during follow-up based on the MRI diagnosis there was no residual tumor in 14 of them or 63.6%. One patient died, and therefore is the difference in the number and percentage shown in the following results. In the group of 7 patients with the diagnosed relaps, it was local, supratentorial and infratentorial 3 residual tumor.
Analyzing the occurrence of rest in relation to the histopathological type, in patients with supratentorial localization the most diagnosed was in craniopharyngeoma - 2 patients, and in the group with infratentorial (3) the two medulloblastoma and one brainstem glioma were verified.

In our study group of 22 patients, cranial irradiation was performed in 9 (40.9%) patients. Chemotherapy was applied in a selective group of patients, depending on the histological forms of tumor, age of the child and possible residual tumor. In 6 patients (27.3%) chemotherapy was conducted in combination with radiation therapy, in 2 patients (9%) because of age only chemotherapy was conducted and other patients were followed up and after neuro-radiological control they were presented in IORS Consilium.

**DISCUSSION**

Based on previous results in the postoperative treatment of tumors in children it was believed that a number of children with brain tumors are incurable, and that among the children that have been treated a large number had significantly reduced quality of life. But in the last period there is a progressive improvement in the results of treatment of children with brain tumors. This has been enabled by improving in neuroimaging, improved neurosurgical techniques, better pre-and postoperative care, progress in planning, implementing programs such as radiotherapy and chemotherapy for the specific histological types of tumors.

In the preoperative assessment it is important to conduct adequate diagnostic procedures. Depending on available equipment and technical capabilities, prior radiotherapy, in all patients computerized tomography brain scan and/or magnetic resonance imaging was done. These diagnostic procedures are now commonly used and are necessary to assess the residual disease after surgery, determining the extent of disease and the potential existence of subarachnoid metastases and radiation therapy planning.

As far as equipment and technical capabilities of radiology services and anesthesia at the University Children’s Hospital, it fully meets all requirements for work with children of all ages.

Also in all patients cytological examination of cerebrospinal fluid was done. In patients with brain tumors, which tend to disseminate by CSF-examination of the brain was done and examination of the spinal canal was also required.

One of the largest series that presents the results of treatment and prognosis of children treated for brain tumors is a series of Bloom and colleagues from the Royal Marsden Hospital, UK. They present the results of 610 pediatric patients with 5-year survival 53%, 10-year 46%, 20-year 40% of a 30-year 39%. Improvements of treatment outcomes in patients with brain tumors are confirmed by other authors as well as the International Pediatric Cooperative Group.

In our study group the follow up period was shorter because the conditions for adequate surgical treatment were acquired four years ago. By analyzing the treatment it is clearly seen that the tumor with higher histopathologic grade significantly affect the further course of treatment and continuation of radiotherapy and the occurrence and persistence of neurological sequelae and that patients with a form of low histologic grade have a higher probability of prolonged survival without sequelae.

According to some authors, children’s brain tumors are more common in boys, but girls have a better survival. Most authors agree that there is no statistically significant difference in survival according to sex. In our group girls are much more present and there is no significant differences in the prevalence of certain types of tumors or survival related to gender.

Since the characteristic of childhood is to be far more tumors in the posterior fossa, our results are in agreement with results from the literature. In our study group more patients had infratentorial localization of tumor (12 patients) and 10 patients had supratentorial localization (54.5%: 45.5%).

In many studies brain tumors are rare in patients younger than 6 months which is consistent with our results obtained in the presence of tumors in that period.

Compared with international studies involving a large number of patients (14), the most frequent brain tumors in children were the astrocytomas, which matches the results of our monitoring.

Compared with the results obtained from the literature where medulloblastomas also fall into the category of most frequently represented tumors in childhood, our results are consistent with these results and they make one-third of all cancer patients operated in our country.

Although they represent a therapeutic challenge, intensified and adequate surgical-oncological therapy improves the survival rate so the patients have a high probability of long-term survival.

Time of occurrence of hydrocephalus and its solution coincides with the results reported in other studies. After examining the studies that dealt with the treatment and monitoring of patients with tumors of the choroid plexus that participate in a small percentage of tumors in childhood, our results also indicate a small participation in these tumors and the corresponding results in terms of extent of surgical resection and the occurrence of hydrocephalus.

A modern approach to therapy according to most of studies five-year survival of patients with malignant supratentorial glioma is over 45%.

**CONCLUSION**

Localization of the tumor and histological type are important factors that significantly influence on the prognosis in these patients. Only the adequate approach in the treatment of brain tumors in children which includes surgery, postoperative radiation therapy and in certain cases, chemotherapy can significantly improve treatment results. The results of our study confirm these claims. Long-term survival of patients treated for primary brain tumors has allowed the analysis of possible factors affecting prognosis and ability to improve surgical techniques, the ra-
tronizacija of the oncological approach, maintaining improved treatment results and the expected reduction in late sequelae.

SUMMARY

REZULTATI LEĆENJA PRIMARNIH TUMORA MOZGA U DEĆJEM UZRASTU


Hirurgija, postoperativna radiotherapija i hemoterapija u odredjenim slučajevima predstavljaju efikasan terapeutski pristup u lećenju tumora mozga kod dece.

Ključne reči: tumori mozga, dečiji uzrast, rezultati lećenja

REFERENCES