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FEATURES OF MAGNETIC RESONANCE IMAGRAPHY OF COMMON TUMORS OF THE POSTERIOR CRANIAL FOSSE IN CHILDREN.

Anvar Mamatmurodovich Zhuraev

Assistant at the Department of Neurosurgery, Samarkand State Medical University.

Introduction

The incidence of brain cancer worldwide is 2.2 per 100,000 in men and 1.4 per 100,000 in women. At the same time, the percentage of brain cancer in male and female children was 18.1% and 17.2%, respectively [1]. Reports from the US Central Brain Tumor Registry indicate that the incidence of brain tumors is 5.47 per 100,000 children under 14 years of age.

Materials and Methods

It is important to note that the most common tumors leading as a cause of cancer mortality were tumors of the posterior fossa (medulloblastomas, ependymomas, and pilocytic astrocytomas) [5],[6], [7], [8]. Although MRI now plays an important role in the evaluation of brain tumors for proper diagnosis, treatment planning and follow-up, by 2009, approximately 80% of Vietnamese cities and central hospitals had only 51 magnetic resonance imaging (MRI) systems [9]. The mean age of medulloblastomas, ependymomas, and pilocytic astrocytomas was 6.2 years; 4.7; and 6.2 respectively. Moreover, the male to female ratio for medulloblastomas, ependymomas, and pilocytic astrocytomas was 1.3/1; 0.67/1; and 1.12/1 [11]. Meanwhile, in our study, the mean age of medulloblastomas, ependymomas, and pilocytic astrocytomas was 7.79 years; 4.50; and 7.60. In addition, the male to female ratio for medulloblastomas, ependymomas, and pilocytic astrocytomas in the present study was 2.37/1; 0.82/1; and 0.36/1. In many literature studies, medulloblastomas, accounting for 40% of posterior fossa tumors, are more prevalent in boys, usually observed before 7 years of age, while ependymomas, accounting for about 20% of posterior fossa tumors in children with a slight increase in incidence in boys, peak incidence occurs in young children from 3 to 5 years old [12, 13]. On the other hand, pilocytic astrocytomas, which account for 30% of posterior fossa tumors and appear between the ages of 5 and 13 years [12] , [13] , [14] , occur with equal frequency among girls and boys. [15]. Although there are slight differences in mean age and sex ratio across studies, the results of our study are consistent with epidemiological information [11] , [12] . Medulloblastomas and ependymomas, usually predominantly solid tumors, are often located in the midline in 75% of cases. Medulloblastomas typically progress in the fourth ventricle of the vermis, whereas ependymomas primarily grow in the fourth ventricle, leading to ventricular obstruction and hydrocephalus [13, 16]. Medulloblastomas have difficulty spreading into the foramina of Magendie or Luschka, whereas ependymomas often show spread through the foramina of Magendie and Luschka [13]. In contrast, pilocytic astrocytomas are always located in the cerebellar hemisphere and have a mixed appearance of a cystic tumor with a parietal part. They evolve slowly and rarely develop into a solid tumor [13]. Due to the typical characteristics of solid tumors, necrosis and hemorrhage are more common in medulloblastomas and ependymomas than in pilocytic astrocytomas [12, 17]. In addition, peritumoral edema is more common in patients with medulloblastomas than with the other two types, since medulloblastomas, the most malignant tumor of the three types, are scored as 4. As shown in Table 1, our results for the baseline characteristics of the three tumor types are completely consistent. with previous studies [12], [13], [15], [16], [17] Typically, medulloblastomas appear as densely packed cells and hyperchromic nuclei, which results in a decrease in intensity to isointensity on the T1W image [18]. Both hyperintensity on DWI and hypointensity on ADC, coexisting with hypointensity or isointensity on T2W, are due to high tumor cellularity [18,.

Among the three types, medulloblastomas are highly malignant and hypervascular; consequently, tumors vigorously absorb contrast agents. Lack of enhancement is rare and occurs in only 7.5% tumors [12], [20]. However, ependymomas
typically presenting with hypointense T1W, hyperintense T2W, and iso- or hyperintense FLAIR. Post-contrast enhancement of T1B images, tumors
usually show vigorous improvement. There are several tumors in which there is little or no post-gadolinium enhancement despite being composed of solid tissue. DWI demonstrates decreased diffusion capacity in most ependymomas, also due to high cellularity. The diffuseness of ependymomas has been reported to generally be intermediate between medulloblastomas and pilocytic astrocytomas [21] , [22] . Pilocytic astrocytoma usually appears as a predominantly cystic tumor with a mural nodule. Pilocytic astrocytoma cysts are usually hypointense on T1W and hyperintense on T2W; and FLAIR. In some cases, tumors show hyperintensity on T1W and FLAIR when the fluid is highly proteinaceous. Unrestricted diffusion is a typical feature of pilocytic astrocytomas [23], [24]. Tumors generally show mixed enhancement due to central cysts that do not absorb contrast agents, whereas mural portions tend to exhibit homogeneous and prominent enhancement [12]. As shown in Table 2, our MRI results are fully consistent with these studies [12], [18], [19], [20], [21], [22], [23], [24]. Some previous studies have shown thatthe two most common symptoms were headache and vomiting. Hydrocephalus was also observed in 78-86.7% of patients [4], [25]. In the present study, headache and vomiting were also the two dominant symptoms, and hydrocephalus occurred in 88.7% of patients. The two most common tumor sites were the fourth ventricle and vermis, and three-dimensional diameters greater than 4.5 cm, causing intracranial hypertension, ventricular obstruction and dilatation of the ventricle, which leads to these clinical symptoms. Thus, our results are consistent with these studies [4], [25].Four treatment-related parameters (operative time, estimated blood loss, ICU stay, and total hospitalization time) were not significantly different overall. Medulloblastomas and ependymomas are predominantly solid, while pilocytic astrocytomas are predominantly cystic. Thus, elimination of medulloblastomas and ependymomas will be more difficult than pilocytic astrocytomas. However, in the present study, the mean three-dimensional diameters of pilocytic astrocytomas were more than 5 cm and higher than those of medulloblastomas. Study Results: Study results showed that brain tumors with a diameter of at least 5 cm are considered giant brain tumors, which poses difficulties during surgery [25]. In summary, in the present study, there are pros and cons of performing surgery to eradicate medulloblastomas, ependymomas, and pilocytic astrocytomas, resulting in generally minor differences between these parameters. However, the Post-Hoc test showed that the total hospitalization time and intensive care unit stay in patients with pilocytic astrocytomas was significantly shorter than in patients with medulloblastomas. This difference is

mainly due to the fact that medulloblastomas, classified as grade 4, are more malignant than pilocytic astrocytomas, considered grade 1, the most benign tumor among the three tumor types [13], [15] (Table 3). In MRI-based practice, each tumor has typical MRI features that help the clinician differentiate them based on baseline and MRI characteristics. Among these tumor types, medulloblastomas are problematic brain tumors, and clinicians should take this into account in cases of larger brain tumors. tumor diameter to ensure the effectiveness and safety of the operation for patients. In the present study, SG diameter was positively correlated with estimated blood loss and surgical time. Tumors were predominantly located in the fourth ventricle and vermis (80.6%). Anatomically, the fourth ventricle is quite free in the center, but very narrow in relation to the overlying aqueduct of Sylvius and below the central canal of the spinal cord. Therefore, killing tumor tissue in the center of the fourth ventricle will be faster and more effective than killing tissue near complex structures such as the aqueduct of Sylvius and the apex of the central canal of the spinal cord. It is clear that the larger the diameter, the larger the tumor, and surgery on larger tumors will take longer than on smaller tumors. We also observed a positive correlation between operative time and estimated blood loss. In addition, when surgical time is increased to eradicate as much tumor tissue as possible, blood loss due to collapse of tumor vascularity increases. In this study, highly enhanced tumors showed that tumor perfusion was significantly effective. Therefore, these results are consistent. Currently there are some restrictions study. First, this is a retrosp ectivedesign with a small population size; therefore we do not have abundant and varied results. Secondly, due to the limitations of the innovative quantitative workstation, it is biased towards qualitative research. Third, we just focused on three common types of posterior fossa tumors in children. Future studies should have a prospective design with a larger sample size. In addition,we also assume that further research will introduce quantitative parameters to obtain more objective results. Conclusions: Future studies should also pay more attention to other types of brain tumors to provide clinicians with extensive knowledge.In MRI-based practice, each tumor has typical MRI features that help the clinician differentiate them based on baseline and MRI characteristics. Among these tumor types, medulloblastomas are problematic brain tumors, and clinicians should take this into account in cases of larger brain tumors. tumor diameter to ensure the effectiveness and safety of the operation for patients.

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