HISTOPATHOLOGICAL FEATURE OF THE TUMOR OF CENTRAL NERVOUS SYSTEM AT AIRLANGGA UNIVERSITY SCHOOL OF MEDICINE, DR SOETOMO HOSPITAL, SURABAYA, IN 2001-2003

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ABSTRACT

The tumors of central nervous system are rare but so variety. To establish reasonable histopathological diagnosis of tumor of central nervous system (CNS), a pathologist needs data base as a guideline. There is sex predilection in some CNS tumors. The aim of these study was to create data base about frequency and distribution of tumors of central nervous system which will be beneficial as guideline and to analyze correlation between sex predilection and histopathological diagnosis of CNS tumor. A number of 79 cases of CNS tumor have been collected and were stained with Hematoxylin Eosin. We found that the histopathological diagnosis consistent with the WHO classification 1999. The three most frequent tumors were meningioma, astrocytic tumor and schwannoma. There were 32 cases of meningioma with the ratio of men and women 1 : 7, 18 cases of astrocytic tumor with the ratio of men and women 1.25 : 1 and 13 cases of schwannoma with the ratio of men and women 2.25 : 1. In this study, we found one difficult case. From this study, it was concluded that meningioma is the most frequent tumor of central nervous system at Airlangga University School of Medicine, Dr Soetomo Hospital, between 2001 and 2003. There was different frequency of astrocytic tumor, meningioma and schwannoma between men and women. Progesterone perhaps involved in the regulation of growth and development of some tumors of central nervous system. To obtain an appropriate histopathological diagnosis of a difficult case, we need additional examination, such as immunohistochemistry.

Keywords*: tumor of the central nervous system, distribution, frequency*

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INTRODUCTION

Tumors of central nervous system (CNST) is one of a group of tumors with various histopathological picture. Each type of the tumor has different characteristics of distribution and frequency. At the Department of Anatomic Pathology, Airlangga University School of Medicine, Dr Soetomo Hospital, the data on the distribution and frequency of CNST have not been available, while various centers have already had such data. In those centers, the data are used for guidelines in establishing the histopathological diagnosis, for example, data on age group, sex, and organ location. The data are also useful for determining supportive examination standard needed, such as special staining, immunohistochemical examination, etc.

In establishing the histopathological diagnosis of CNST, there are several problems, such as limited size of submitted tissue, the sparse number of CNST cases, and highly varied histopathological pictures, so that the establishment of CNST histopathological diagnosis needs carefulness, experience, clinical information and other supporting factors. However, the subjective factor also has remarkable role. Even several difficult cases may become a debate, so that discussion with clinicians is needed as it has a high effect on the patient's management. Some CNSTs have different frequency between men and women. For example, Astrocytic tumor is more commonly found in men than in women, with a ratio of 1.18 : 1 to 1.87 : 1 (Kleihues 1999). However, meningioma more frequently occurs in women than in men, with a ratio of 2 : 3 to 1 : 2 (Louis 1999). An observation showed the advancement of meningioma growth in pregnancy. This indicates that hormonal factor plays a role in the growth of the tumor (Rosenblum 2004).

Rapid development of science has become a basis for the Department of Anatomic Pathology, Airlangga University School of Medicine, Dr Soetomo Hospital, as an outstanding center of anatomic pathology, to conduct research to find the distribution and frequency of CNST. This study also had objective to analyze correlation between sex and CNST histopathological types, and to find difficult cases. In providing its

service, the Department of Anatomic Pathology used WHO classification 1999.

MATERIALS AND METHODS

Based on secondary data from the archives of histopathological examination, we collected all paraffin blocs of CNST cases, either intracranial or spinal, at the Department of Anatomic Pathology, Airlangga University School of Medicine, Dr Soetomo Hospital, from the years 2001 - 2003. Histopathological preparations were made from all those blocs using hematoxylin eosin staining. CNST histopathological reading was conducted according to WHO Classification 1999 by two researchers. The results of histopathological reading were classified based on histopathological diagnosis type and sex.

RESULTS

All paraffin blocs from 79 CNST cases from 2001 to 2003 were collected in this study. From all paraffin blocs collected, we made preparations with HE staining, and the reading of histopathological preparations was undertaken according to WHO Classification 1999. The result of histopathological reading in all cases (men and women) by the authors are as follows:

Table 1. Histopathological picture of all CNST cases

No	Histopathological Picture	Number of cases	
		Male	Female
1.	Astrocytic tumor		
	Fibrillary Astrocytoma	1	
	Pilocytic Astrocytoma	1	1
	Diffuse Astrocytoma	2	3
	Gemistocytic Astrocytoma	1	
	Anaplastic Astrocytoma	3	4
	Glioblastoma Multifome	2	
2.	Oligodendroglial Tumor		
	Oligoastrocytoma	1	3
3.	Ependymal tumor		
	Subependymoma	1	
	Anaplastic Ependymoma	1	
4.	Embryonal tumor		
	Medulloblastoma	1	4
5.	Central and Peripheral Nervous System Tumor		
	Schwannoma	9	4
6.	Meningeal tumor		
	Meningioma		
	1. Transitional Meningioma	2	12
	2. Meningothelial Meningioma	1	9
	3. Fibroblastic Meningioma	1	1
	4. Psammomatous Meningioma		2
	5. Microcystic Meningioma		2
	6. Angiomatous Meningioma		1
	7. Secretory Meningioma		1
7	Cystic tumor		
	Benign Mucinous Cyst	1	
8	Regio Sellar tumor		
	Craniopharyngioma		1
9	Metastatic Tumor	1	2

Based on the histopathological types, meningioma was found to be the most common diagnosis, and the most common type was the transitional meningioma, which was found in 14 cases. The second type was meningothelial meningioma, found in 10 cases. Astrocytic tumor was the second most common group, with the type of anaplastic astrocytoma in 7 cases and diffuse astrocytoma in 5 cases were the most frequent type. The third tumor group was schwannoma in 13 cases. With HE standard staining, histopathological diagnosis based on WHO classification 1999 was made almost to all cases. However, there was one case with a predilection of medulloblastoma, instead of astrocytoma. From the data, the three most common histopathological diagnosis groups, i.e., the astrocytic, meningioma, and schwannoma, were selected to be analyzed statistically for finding the correlation between sex and the diagnosis. The test was carried out with chi-square test and the result can be seen in Table 2. The result had 0.0001, indicating the difference in the frequency of occurrence of astrocytic tumor, meningioma, and schwannoma between men and women ($p < 0.05$).

Table 2. Cases of astrocytic, meningioma, and schwannoma tumor based on sex

Histopathological picture	Male	Female
Astrocytic tumor	10	8
Meningioma tumor	4	28
Schwannoma	9	4

DISCUSSION

CNST is a rare but highly varied tumor. The result of this study revealed that the total case of CNST between 2001 and 2003 was 79 from the existing 18,222 cases, or 0.43% of the whole cases at the Department of Anatomic Pathology, Airlangga University School of Medicine, Dr Soetomo Hospital. Based on the type of histopathological diagnosis, it was found that meningioma is the most predominant case, counting of 32 cases (40.5%), with transitional meningioma as the most common type, comprising 14 cases. The number was higher than the total incidence of meningioma found in various literatures, which comprised 15-26% (Louis 1999; Wahab 2003). This was because the result of these studies revealed all CNST cases subjected to operation and histopathological examination, not describing the whole incidence of CNST.

Based on sex grouping, we had undertaken statistical test showing the difference of frequency of Astrocytic tumor incidence in men and women. In this study, Astrocytic tumor more often occurred in men than in

women, with the ratio of 1.25 : 1. This was in line with several literatures, which mentioned that the incidence of astrocytic tumor in men was higher than that in women, with a ratio of 1.18 : 1 to 1.87 : 1. However, the correlation between the high incidence of astrocytic tumor and male group remains unclear (Bruce 2001; Kleihues 1999). Statistical test between sex group and meningioma also revealed the difference of meningioma frequency in men and women, with a ratio of 1 : 7. This also confirmed the findings in the literature that meningioma more often occurs in women than in men with a ratio of 1 : 2 to 1 : 3 (Louis 1999; Wahab 2003). The high incidence rate of meningioma in women is suspected to have correlations with hormonal factor. This is proved by the advance of meningioma growth during pregnancy and lutheal phase of menstrual cycle (Rosenblum 2004). Wahab and Al-Azzawi found that 81% to 91% of meningioma tumor cells expressed progesterone receptors, while the estrogen receptors were weak (Wahab 2003).

Statistical test in sex groups diagnosed with Schwannoma revealed that there was difference in the frequency of Schwannoma occurrence in men and women. In this study, the ratio in men and women was 2.25 : 1. Literatures showed that Schwannoma could occur either in men or women, and no predilection in certain sex, except that the intracranial one is more often in women than in men with men and women ratio of 1 : 2 (Woodruff 1999). This study did not differentiate intracranial and spinal one, since secondary data from histopathological examination archives were incomplete.

A study by Inoue proved that several types of CNST cells expressed progesterone A and B receptors that play role in regulating the tumor cell growth. Meningioma tumor cells showed an expression of progesterone A receptor of 41.6% and B 56.5%. Astrocytic tumor and schwannoma showed predominant expression only in progesterone B receptor. Statistical test undertaken in the study showd correlation between progesterone A with tumor cell proliferation (Inoue 2002). Several authors have attempted to find correlation between high progesterone receptor expression and histopathological degree in meningioma. Meningioma with low progesterone receptor expression had more aggressive behavior. It was believed that the high expression of progesterone receptor had a role in the regulation of cell cycle in a way in which progesterone induces D1 cyclin at the early phase of G1 (Wahab 2003).

In this study, by standard staining HE we found one case that was difficult to be differentiated between medulloblastoma and astrocytoma. To establish diagnosis for difficult case, we needed an additional examination, the immunohistochemistry. This case required the immunohistochemical examination of Synaptophysin and Glial Fibrillary Acidic Protein (GFAP). Immunoreaction in Synaptophysin provided a characteristic picture of medulloblastoma, while the GFAP was consistent with astrocytoma (Giangaspero 1999; Kleihues 1999).

CONCLUSIONS

CNST is a rare but highly varied tumor. CNST type most commonly operated and examined at the Department of Anatomic Pathology, Airlangga University School of Medicine, Dr Soetomo Hospital, is meningioma with the most common subtype is transitional meningioma. There is difference frequency in the occurrence of astrocytic tumor, meningioma and schwannoma in men and women. It is likely that progesterone has a role in the growth of astrocytic tumor, meningioma and schwannoma. In establishing histopathological diagnosis of CNST, standar staining with HE is sufficient, while in difficult cases, additional examination, such as histochemistry, is needed.

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