Diagnosis and Management of Brain Tumors in Children

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ABSTRACT Brain tumors are the second most common malignancy and the most common solid tumors found in childhood. During 11 months 19 patients with brain tumors were hospitalized at the Department of Child Health, Dr. Cipto Mangunkusumo Hospital, Jakarta, 10 of them were males. The youngest patient was 5 months old and the oldest was 13 years old. The important signs and symptoms in establishing diagnosis were the non-localizing signs and symptoms, i.e., nausea and vomiting. The most frequent localizing signs and symptoms were papilledema, cranial nerves palsy, ataxia and incoordination, hemiparesis, visual disturbances, and optic atrophy. Focal seizures were rare. Most of the tumors were in infratentorial region, and metastatic tumors were rare. The mortality of this series was high due to the severity of the disease. The most frequent of tumors are astrocytomas and medulloblastomas. **[Paediatr Indones 1995;35: 185-189]**

Introduction

Signs and symptoms of brain tumors vary depending on the location, the parts of nervous system with which the tumor interferes, and the age and development of the child. There are no pathognomonic features; signs and symptoms of a general nature without focal signature may reflect increased intracranial pressure. Increased intracranial pressure may result from a mass growing within a fixed volume or obstruction of spinal fluid pathways occurring within the limited volume or a relatively rigid cranial vault.[1,2] Symptoms attributed to slowly developing intracranial pressure include irritability, lethargy, vomiting, anorexia, headache, and changes in behavior. The complaint of diplopia, abducens paresis, focal headache, ataxia, and changes in behavior may all reflect a generalized

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intracranial process.

The finding of papilledema, and in small children enlargement of the head or separation of cranial sutures suggests a space-occupying lesion. Symptoms characteristic of brain tumor, but not specifically localizing, are vomiting, headache, and behavioral changes.[2,3] Vomiting is one of the most constant sign of increased intracranial pressure in children; it occurs in 84% of the patients,[4] and is often not projectile. Headache and vomiting are most prominent in the morning, and vomiting is unrelated to eating. Signs and symptoms of a localizing nature are focal seizures, visual complaint, gaze paralysis, hemiparesis, ataxia, nystagmus, incoordination, gait disturbances, and cranial nerve palsy.[2,5] Diagnosis of brain tumor is based on clinical signs and symptoms supported by electroencephalography (EEG), evoked potentials, computerized tomography (CT) scan, and magnetic resonance imaging (MRI). Sometimes arteriography is needed.[1-5] Management of brain tumors consists of surgery in combination with radiation and or chemotherapy.[3] The purpose of this study is to evaluate the diagnosis and management of brain tumor in children in our department.

Methods

This is a retrospective study about the most important clinical signs and symptoms of brain tumors, results of CT scan, MRI and arteriography, types of tumors, results of treatment, and mortality. Subjects are consecutive patients with the diagnosis of brain tumor treated at the Division of Neurology, Department of Child Health, Medical School, University of Indonesia - Cipto Mangunkusumo Hospital, Jakarta during the period from September 1993 to July 1994. History and physical examination as well as the results of investigations (CT scan, magnetic resonsnce imaging, histopathology, etc.) were collected from medical records.

Results

During the period from September 1993 until July 1994, 19 patients with brain tumors were hospitalized at the Department of Child Health, Dr. Cipto Mangunkusumo Hospital, Jakarta. Of the 19 patients, 10 were males, and 9 were females. The youngest patient was 5 months old, and the oldest was 13 years old.

Table 1 shows the non-localizing signs and symptoms of the 19 patient. Fourteen (73.6%) of the patients suffered from vomiting, and 13 (68.4%) experienced headache.

Table 1. The non-localizing signs and symptoms of 19 patients with brain tumor

Signs and symptoms	No. of cases	%
Vomiting	14	73.6
Headache	13	68.4

Table 2 shows the localizing signs and symptoms of the 19 patients. The most frequent was papilledema in (12 patients) and then cranial nerves palsy (9 patients).

Ataxia and incoordination were found in 7 patients, hemiparesis in 6 patients, visual disturbances in4 patients, optic atrophy in 4 patients, focal seizures in 2 patients (10.5%), and enlargement of head in 2 patients (10.5%).

Either by CT scan or MRI examinations we can detect the location of the tumors. Table 3 shows the location of the tumors. Of the 19 patients, 17 had the tumor located in the infratentorial region, and 2 (10.5%) in the supratentorial region.

Table 2. The localizing signs and symptoms of 19 patients with brain tumor

Signs and symptoms	No. of cases
Papilledema	12
Cranial nerves palsy	9
Ataxia and incoordination	7
Hemiparesis	6
Visual disturbance	4
Optic atrophy	4
Focal seizures	2
Enlargement of head	2

Table 3. Location of tumors in 19 patients

Location of tumor	No of cases
Infratentorial	17
Supratentorial	2
Total	19

From table 4 we can see the origin of the tumors. Seventeen of the 19 patients suffered from primary brain tumor, and only 2 patients suffered from metastatic tumors.

Table 4. Distribution of tumors according to their origin

Origin	No of cases	Percentage
Primary brain tumors	17	89.5
Metastatic tumors	2	10.5
Total	19	100.0

Table 5 shows the outcome of the 19 patients. Seven patients was discharged after craniotomy and tumors extirpation, 3 patients were discharged on family request following ventriculo-peritoneal (V-P) shunt, and 5 patients were discharged upon parental request before any surgical intervention was done. Five patients died following V-P shunt, and 3 patients died before any surgical intervention was performed.

In 9 of the 19 patients in ou series the types of tumors could be confirmed by histopathologic examination, but the remainder 10 patients the types of tumors were suspected indirectly, namely only by CT scan or MRI examination. Table 6 summarizes our findings on the type of the brain tumors in our series of 19 patients. It shows that astrocytoma was found in 8 patients, medulloblastoma in 4 patients, neuroblastoma in 2 patients, ependymoma in 2 patients, craniopharyngioma in 2 patients, and meningioma in one patient. There were two metastatic

tumors, namely astrocytoma originating from spinal cord tumor in one patient, and neuroblastoma in another patient.

Table 5. The outcome of the 19 patients with brain tumors

Outcome	No of patients	Percentage
Discharge after tumors extirpation	7	36.9
Discharged on request after V-P shunt	3	15.8
Discharge on request before surgery	5	26.3
Died following V-P shunt	1	5.2
Died before surgery	3	15.8
Total	19	100.0

Table 6. The types of tumors in 19 patients

Type of tumor	PA*	CT/MRI**	Total
	No of cases		
Astrocytoma	2	6	8
Medulloblastoma	3	1	4
Neuroblastoma	2	2	1
Ependymoma	11	2	1
Craniopharyngioma	2	2	1
Meningioma	1	1	5
Total*	9	10	19

PA=histopathologically confirmed; CT/MRI=diagnosed by CT scan or magnetic resonance imaging.

Discussion

Neuroectodermal (brain) tumors are the second most common malignancy and the most common solid tumor in childhood.[6] During 11 months 325 neurological patients were hospitalized, and 19 of them suffered from brain tumors. In establishing the diagnosis of brain tumor, EEG examination was not performed routinely, because EEG does not show any specific patterns of electrical abnormalities that allow differentiation of tumors from metabolic or vascular pathology.[2] Evoked potential examination was performed, and will be reported separately.

Vomiting and headache occurred in 73.6% and 68.4% of our cases (Table 1). These figures were lower compared with other studies,[2,4] which reported about 80-84%. This condition might be due to the age of our patients. Five of our patients were below 5 years of age with separated sutures, by which increased intracranial pressure could be compensated. Focal seizures are rare, and reported in less than 15%,[2] as was in our study, i.e., only 2 out of 19 cases (see Table 2).

Enlargement of head was found in 2 patients (Table 2); the age of these patients was 5 and 6 months old with opened fontanel and separated sutures. Increased intracranial pressure will be compensated by enlargement of head. From Table 3 we can see that most of the tumors 17/19 are in infratentorial region; this finding was not different with other study.[6]

The total mortality of in this study is 21%; one patient died post V-P shunt, and the cause of the death is septicemia,

while 3 patients died before any surgical intervention was done (Table 5). These patients were admitted to our hospital in bad condition with severe disease due to late treatment. Table 6 shows the tumor types; 8 patients had astrocytoma, 4 had medulloblastoma. This finding was not quite different with other studies. Farwell et al[7] reported astrocytoma in 42% , and medulloblastomas in 25% of their cases; Ertel[8] reported astrocytoma in 45.2% and medulloblastoma in 10.6% of their cases.

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