

Pain Characteristics of Central Nervous System Tumor in Mohammad Hoesin General Hospital

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Abstract

Pain is one of the cardinal symptom in tumor patient, especially in Central Nervous System (CNS) tumor. It often impacts patient's quality of life. The incidence and characteristic of pain have rarely been reported in Palembang, Indonesia. This observational study was planned to investigate the clinical presentation and epidemiology of CNS tumor firstly diagnosed in ward throughout July to December 2018. 99 patients recently diagnosed with CNS tumor were enrolled. From 99 patients, we found 34 patients with tumor associated pain. We further evaluated the information of pain linked with brain tumors via questionnaire and medical record. Of all 34 subjects, the age ranged from 43 to 79 years old with female : male ratio 3:1. Pain was present 100% in spinal tumor and 54% in brain tumor. Clinical characteristics of pain found in brain tumor were typically in ipsilateral lesion (92%), pulsating (76%), moderate intensity (60%), recurrent (84%), not radiating (80%), with frequency of 3-4 times in a week (48%). On the other hand, pain in spinal tumor was generally felt on the site of the lesion (100%), radiating (77.8%), electrical type of pain (44.4%), high intensity (77.8), and constant (88.9%). From this study we conclude that tumor locations can show some different pain characteristics. Therefore careful pain assessment is compulsory to have better understanding and more appropriate management.

Key Word: Pain, Tumor Associated Pain, Central Nervous System Tumor, Brain Tumor, Spinal Tumor

1. Introduction

Pain is inevitably a part of benign and malignant tumor. This phenomenon has become a concern by the *World Health Organization*. It is known that 52 – 77% tumor patients has pain symptom and 1/3 of them suffered at least moderate pain.^{1,2} *International Association For Study of Pain* (IASP) states that every year, more than ten million persons in the world which has been diagnosed with malignant tumor experience pain as one of serious condition. This pain could be a result from complex mechanism which include an inflammatory process, ischemic, and compression of various structures.³ Pain prevalence has been increasing in

developing country caused by delayed diagnosing and limited access of opioid. Study from WHO shows that more than 80% of world population not acquire adequate pain treatment. Other study shows that inadequate pain management will significantly decrease patients quality of life.⁴ Therefore, pain needs multidimensional assessment and multidiscipline management.⁵ Study about CNS tumor associated pain has still rarely been reported. The data about pain profile such as location, characteristic, intensity, relieving, aggravating, and referred pain could be a helpful reference that leads to a better management.

2. Methods

This is a descriptive study which collects the data from medical record and through questionnaire from hospitalized patient with CNS tumor associated pain in Mohammad Hoesin General Hospital Palembang from July to December 2018 using total sampling technique. All patients with CNS tumor associated pain in hospital ward from July until December 2018 were included and then excluded the ones with unconsciousness, aphasia, and previously receiving chemotherapy, radiation, and/or operation. All the data

was recorded and processed with *SPSS 22 for Windows*.

3. Result

From July to December 2018 there were 99 subjects (Table 1). Of all 99 subjects, 90 patients have brain tumor and 9 patients have spinal tumor. From the brain tumor cases, 46 subjects were excluded due to aphasia and unconsciousness. In the end, we have 44 subjects with brain tumor, but only 25 suffered from pain, while on spinal tumor cases, all patients experienced the pain.

Table 1
Clinical distribution of patients with central nervous system tumor associated pain.

	Brain tumor		Spinal tumor	
	±SD	n%	±SD	n%
Pain	25	56.8	9	100
Without pain	19	43	0	0
Total	44	100	9	100

From our study we found the range age was 20-69 years with the percentage of woman and man were 76.5% and 23.5%. In brain and spinal tumor, the prevalence

in woman was higher than man (76% and 24%) and (77.8% and 22.2%). These results are listed in Table 2.

Table 2
Socio-demographic distribution of patients with central nervous system tumor associated pain.

	Central nervous system tumor		
	±SD	n%	
Age	<45 years	25	56.8
	45-64 years	19	55.8
	65-79 years	1	0.1
	≥80 years	0	0
Sex	Male	8	23.5
	Female	26	76.5
Education	Primary school	12	35.3
	>Middle school	22	64.7
Occupation	Working	8	33.5
	Not working	26	76.5

Based on table 3, subjects with CNS tumor were 73.5% brain tumor and 26.5% spinal tumor. We encountered 76% subjects with

primary brain tumor and 24% subjects were secondary tumor. While on spinal

tumor, there were 33.3% cases of primary were secondary tumor. From this study, location of tumor was known to be linked to pain location and only 2 subjects had different pain location from the tumor. Patients with brain tumor mostly had recurrent pain (84%), intermittent (48%),

tumor and the rest 66.7% moderate intensity (50%), and have equal percentage for relieving factor. While in spinal tumor mostly have a constant pain (88.9%), severe pain intensity (77.8%), doesn't have relieving pain (66.7%), and radiating pain (77.8%).

Table 3

Characteristic of pain associated to central nervous system tumor.

		Brain tumor		Spinal tumor	
		±SD	n%	±SD	n%
Tumor type					
	Primary	19	76	3	33.3
	Secondary	6	24	6	66.7
Location of pain					
	On site of the lesion	23	92	100	100
	Away from the lesion site	2	8	0	0
Pattern					
	Recurrent	21	84	1	11.1
	Intermittent	4	16	8	88.9
Frequency					
	Occasionally (1-2 days/week)	6	24	0	0
	Intermittent (3-4 days/week)	12	48	1	11.1
	Frequent (5 days/week)	1	4	0	0
	Constant (6-7 days/week)	6	24	8	88.9
Characteristic					
	Pulsating	19	76	0	0
	Stabbing	1	4	2	22.2
	Dull	2	8	1	11.1
	Burning	0	0	0	0
	Tightening	2	8	2	22.2
	Electrical	1	4	4	44.4
Intensity					
	Severe (7-10)	4	24	7	77.8
	Moderate (4-6)	15	60	2	22.2
	Mild (1-3)	6	24	0	0
Aggravating factor					
	Yes	11	44	6	66.7
	No	14	56	3	33.3
Relieving factor					
	Yes	14	56	3	33.3
	No	11	34	6	66.7
Radiating					
	Yes	5	20	7	77.8
	No	20	80	2	22.2

4. Discussion

Headache in patient with brain tumor is not always present. But, it has to be at least one or more neurological symptom to show a structural lesion on the brain. Purdy et al reported that approximately 75% patients have pain related to brain tumor and 25% patients with no pain.⁶ Benign tumor has a slow growth of tumor and mostly comes without pain.. From our study, we found that all of spinal tumor patients have pain related to tumor. Compression of spinal cord followed by destruction in periosteum are considered to be the main pathophysiology of pain on this case. Vischa et al and Lisa et al mentioned that pain is the most common symptom in spinal tumor with the prevalence almost 90%.⁷

CNS tumor incidence increases with age because of the cumulative effect from carcinogenic exposure. Suggested main mechanism of this is because systemic inflammation increases with age.^{8,9} This increased sensitivity can generate chronic inflammation that leads to sensitisation of central and peripheral nociceptor. Anatomical changes in elderly are responsible for somatic sensation, expression receptor disturbances, and neurotransmitter. Another variable that can increase pain sensation is gender aspect. Various psychosocial mechanisms also play an important role that set different pain threshold in woman and man. Man tends to use a distraction to manage the pain, while woman tends to use the emotional aspects. The estrogen related mechanism also influences the severity of pain.¹¹

The pathogenesis of pain related to brain tumor include the traction process in vascular, cranial, compression of cervical nerve, peripheral sensitisation process with neurogenic inflammation, and central sensitisation through trigeminovascular afferent in meninges and cranial blood vessel.¹⁴ The pain is mostly described with pulsating pain. The underlying mechanism

is the involvement of trigeminovascular system. This system consists of neuron that innervate the cerebral blood vessel. If there is any compression to the nerve, it will activate this system in meninges along with vasoactive neuropeptide release such as neurokinin A, substance P, and *Calcitonin Gene Related Peptide* by the afferent of trigeminal nerve. All this inflammation process in blood vessel then induces pulsating pain.⁶

Almost all of brain tumor give the same location with the pain. Traction of tumor that compresses the pain sensitive structures is the leading cause. Malignant tumor usually presents a nonspecific and unlocalized pain because of high intracranial pressure and edema.¹⁵ In this study, only 2 patients show different location between pain and the site of tumor. The first patient is the metastasis tumor and the other one has hydrocephalus. On the other hand, spinal tumor has a localized pain that radiates based on the segment of dermatome. It is known to be radicular pain.¹⁶ This pain is caused by irritation of sensory or dorsal root ganglion on spinal nerve so it can generate pain along the dermatome. This pain can radiate to the leg or develop a tightening pain. There are various mechanisms that can cause pain in spinal tumor, such as pressure to periosteum, expansion inside the vertebra body, fracture, and invasion to paravertebral structure which can compress spinal nerve roots. Pain on this tumor mostly gives a constant and severe pain. This mechanism also leads to an intermittent and constant pain to the patient.

5. Conclusion

There are two locations of CNS tumor. From this study, different tumor location shows different characteristic of pain. This finding might become a guidance for clinicians to understand the characteristic of pain related to tumor based on the

location so the management could be more adequate. However, larger sample and area are needed to provide more accurate and representative result.

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